

3 September, 2021

Charles David Pty Ltd
C/ - Morgan English Commercial Lawyers
Attn: Mr Daniel Morgan
By email

Dear Daniel,

RE: PROPOSED SUBDIVISION DEVELOPMENT AT 150 GUNDY ROAD SCONE – GROUNDWATER SALINITY ASSESSMENT: PRELIMINARY FIELDWORK FINDINGS

Martens and Associates have been engaged by Charles David Pty Ltd to undertake a groundwater salinity assessment for the above development. The work seeks to address the JRPP comments provided in determination of DA 163 / 2017 dated 30 September 2020.

This letter provides an overview of the scope of work undertaken to date and expected time frame for groundwater monitoring, modelling, and reporting to address the JRPP comments.

1. Field Investigations Completed

Groundwater well installation and associated field investigations were conducted between 19 - 29 July 2021 and included:

1. Drilling of ten boreholes to a maximum depth 19.4 m below ground level (**bgl**) using a truck-mounted drill rig.
2. Installation of ten groundwater monitoring wells to a maximum depth of 19.4 m bgl.
3. Development of monitoring wells and recovery tests on wells to assess sub-surface permeability.
4. Collection of groundwater samples for laboratory testing.
5. Installation of groundwater loggers in all wells to allow for long term, continuous groundwater level monitoring.

Borehole and groundwater monitoring well locations are shown in Attachment A.

2. Observed Subsurface Conditions

Observed site soils are characterised as generally consisting of clayey topsoils overlying high plasticity residual clays. Substratum layer depths vary across the site. No significant areas of fill were identified during the intrusive investigations. Weathered bedrock encountered was comprised of shale, sandstone and conglomerate. Further detail is provided on the borehole logs at Attachment B.

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3. Initial Groundwater Observations

During well installation, groundwater seepage only occurred in MW06. One week following drilling and well installation, groundwater was observed in seven of the ten monitoring wells. Monitoring well construction details are provided in Attachment B with summary data for the week following installation provided in Table 1.

Table 1: Groundwater level summary.

Groundwater Monitoring Well	Date	Well Installation Depth (m bgl)	Surface Level (m AHD)	Approx. Groundwater Levels	
				Depth (m bgl)	Depth (m AHD)
MW01A	28.07.2021	11.80	208.53	2.30	206.23
MW01B	28.07.2021	4.10	208.59	2.50	206.09
MW02	28.07.2021	19.40	218.49	18.50	199.99
MW03	28.07.2021	11.80	213.84	4.55	209.29
MW04A	28.07.2021	17.80	230.36	Dry	-
MW04B	28.07.2021	1.00	230.35	Dry	-
MW05	28.07.2021	12.00	218.94	9.03	209.91
MW06	28.07.2021	13.30	219.11	7.71	211.40
MW07	28.07.2021	12.00	224.39	11.16	213.23
MW08	28.07.2021	14.45	240.19	Dry	-

Installed groundwater level data loggers have been set to record at 15 minute intervals over a of three months. These data will inform calibration of the groundwater model and shall be presented in the final report once completed.

4. Groundwater Laboratory Testing Results

Laboratory testing was carried out on collected groundwater samples. The samples were tested for pH, electrical conductivity and ionic balance. Laboratory analytical certificates are provided in Attachment C. The pH and electrical conductivity test results are summarised in Table 2, indicating that groundwater is generally brackish to slightly saline.

Table 2: Summary of pH and electrical conductivity laboratory test results.

Sample ID ¹	EC _w (μS/m) ²	pH
8371/MW01a	3,500	7.2
8371/MW01b	4,900	7.9
8371/MW02	2,900	7.5
8371/MW03	4,500	7.2
8371/MW05	11,000	7.1
8371/MW06	1,500	7.5
8371/MW07	2,700	7.4

Notes:

1. Borehole#.
2. EC is direct electrical conductivity measurement of water in micro Siemens per metre.

5. Anticipated Timing of Future Modelling Works

We anticipate that the groundwater monitoring phase should be completed by around the end of October 2021, this being subject to sufficient rain occurring during the monitoring period within the site and catchment to trigger and monitor a groundwater recharge response to rainfall. Following this we will be able to construct and calibrate a groundwater model for existing conditions. If insufficient rainfall occurs during the monitoring period, then we would need to extend the initial phase of monitoring until such time as appropriate data are collected.

Following calibration of the existing conditions groundwater model, we will be able to proceed to undertake an assessment of the development proposal and make recommendations, if any are required, in respect of modifications to the stormwater management regime to mitigate against any possible impacts on the groundwater regime which may impact soil and groundwater salinity conditions (for both on and off site). Where required, we shall include mitigation measures for construction and / or long term in a plan of management.

We expect that the groundwater model calibration, assessment of the proposal, documentation of findings and preparation of plan of management will take in the order of 6 – 8 weeks after monitoring is completed. An interim report can be prepared at the completion of monitoring to advise the JRPP (if required) of an updated timeframe for the development of the model and final report.

Please call our offices if you have any further queries regarding this matter.

For and on behalf of

MARTENS & ASSOCIATES PTY LTD



JEFF FULTON

BSc, MEngSc

Project Manager / Senior Engineer



DR DANIEL MARTENS

LLB(Hons1), BSc(Hons1), MEngSc, PhD, FIEAust, CPEng, NER, RPEQ, APEC Eng, IntPE(Aus)

Managing Director / Principal Engineer

Attachments

Attachment A – Site Plan

Attachment B – Borehole and Monitoring Well Logs

Attachment C – Laboratory Analytical Certificates

ATTACHMENT A – SITE PLAN

Legend

- Site Boundary
- Monitoring Well Locations
- Contour Interval (10m)
- Contour Interval (2m)



0 40 80 120 160 200 m

1:4000 @ A3

Aerial Photo Source: Nearmaps (<https://www.nearmap.com/au/en>); Aerial Photo Date: 12 April 2021.

Map Title / Figure:

Site Testing Plan

Map 07	Map
Gundy Road, Scone, NSW.	Site
Groundwater and Salinity Investigations - Gundy Rd Scone Subdivision	Project
Site & Constraints Mapping	Sub-Project
Charles David Pty Ltd	Client
03/09/2021	Date

ATTACHMENT B – BOREHOLE AND MONITORING WELL LOGS

CLIENT	Charles David Pty Ltd	COMMENCED	22/07/2021	COMPLETED	22/07/2021	REF BH101a/MW01a	
PROJECT	Groundwater & Salinity Assessment	LOGGED	AG	CHECKED	SVK/JF	Sheet 1 OF 1	
SITE	150 Gundy Road, Scone, NSW	GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass & shrubs	PROJECT NO. P2108371	
EQUIPMENT	4WD truck-mounted hydraulic drill rig	LONGITUDE	150.8774	RL SURFACE	208.53 m	DATUM	AHD
EXCAVATION DIMENSIONS	Ø100 mm x 11.80 m depth	LATITUDE	-32.0603	ASPECT	South	SLOPE	<5%

Drilling			Sampling		Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION
					SOIL/ROCK MATERIAL DESCRIPTION		MOISTURE CONDITION	
							CONSISTENCY DENSITY	
							ID	
							Static Water Level	
							MW101a	
AD/T	L			0.30	0.2-0.3/S/1 D 0.20 m			
	L-M			208.23	0.5-0.6/S/1 D 0.50 m			
				0.80				
				207.73	1.0-1.1/S/1 D 1.00 m			
					1.1-1.2/S/1 D 1.20 m			
					1.5-1.6/S/1 D 1.50 m			
			2		2.0-2.1/S/1 D 2.00 m			
					2.5-2.6/S/1 D 2.50 m			
					3.0-3.1/S/1 D 3.00 m			
					3.5-3.6/S/1 D 3.50 m			
			4		4.0-4.1/S/1 D 4.00 m			
				4.20				
				204.33	4.5-4.6/R/1 D 4.50 m			
					5.0-5.1/R/1 D 5.00 m			
				5.60				
				202.93	5.5-5.6/R/1 D 5.50 m			
			6		6.0-6.1/R/1 D 6.00 m			
					6.5-6.6/R/1 D 6.50 m			
					7.0-7.1/R/1 D 7.00 m			
					7.5-7.6/R/1 D 7.50 m			
			8		8.0-8.1/R/1 D 8.00 m			
					8.5-8.6/R/1 D 8.50 m			
					9.0-9.1/R/1 D 9.00 m			
					9.5-9.6/R/1 D 9.50 m			
			10		10.0-10.1/R/1 D 10.00 m			
					11.0-11.1/R/1 D 11.00 m			
				11.80	11.5-11.6/R/1 D 11.50 m			
			12		Hole Terminated at 11.80 m (Target depth reached)			
			14					
			16					
			18					

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS



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**Engineering Log -
TEST**

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P210837\BH101A-BH104B\01.MW101A-MW104B.GPJ <-DrawingFile>> 26/08/2021 12:27 10:02:00.04 Diggit Lab and In Situ Tool - DGGI [Lib: Martens 2.00 2016-11-13 Proj: Martens 2.00 2016-11-13]

CLIENT	Charles David Pty Ltd			COMMENCED	22/07/2021	COMPLETED	22/07/2021	REF BH101b					
PROJECT	Groundwater & Salinity Assessment			LOGGED	AG	CHECKED	SVK/JF	Sheet 1 OF 1					
SITE	150 Gundy Road, Scone, NSW			GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass & shrubs	PROJECT NO. P2108371					
EQUIPMENT		4WD truck-mounted hydraulic drill rig			LONGITUDE	150.87741	RL SURFACE	208.59 m	DATUM AHD				
EXCAVATION DIMENSIONS		ø100 mm x 4.10 m depth			LATITUDE	-32.0603	ASPECT	South	SLOPE <5%				
Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L			208.59				ML	TOPSOIL: Clayey SILT; medium to high plasticity; dark brown; trace rootlets; trace gravel; trace sand.		S		TOPSOIL
				0.30									
	L-M			208.29	0.5/S/1 D 0.50 m			CL-CI	Silty CLAY; low to medium plasticity; dark brown, dark grey; trace sand; trace gravel.		St		ALLUVIUM
				0.90									
			1	207.69	1.0/S/1 D 1.00 m			CL	Sandy Silty CLAY; low plasticity; dark brown, dark grey.				RESIDUAL SOIL
					1.5/S/1 D 1.50 m					M (<PL)			
			2		2.0/S/1 D 2.00 m						St-Vst		
					2.5/S/1 D 2.50 m								
				2.80									
			205.79	3.0/S/1 D 3.00 m					SHALE; pale brown, pale olive; highly weathered; inferred very low strength.			WEATHERED ROCK	
					3.5/S/1 D 3.50 m								
			4	4.10	4.0/S/1 D 4.00 m								
									Hole Terminated at 4.10 m (Target depth reached)				
			5										
			6										
			7										
			8										
			9										
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CLIENT	Charles David Pty Ltd			COMMENCED	22/07/2021	COMPLETED	22/07/2021	REF BH102					
PROJECT	Groundwater & Salinity Assessment			LOGGED	AG	CHECKED	SVK/JF	Sheet 1 OF 1					
SITE	150 Gundy Road, Scone, NSW			GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass & shrubs	PROJECT NO. P2108371					
EQUIPMENT	4WD truck-mounted hydraulic drill rig			LONGITUDE	150.8776	RL SURFACE	218.49 m	DATUM	AHD				
EXCAVATION DIMENSIONS	ø100 mm x 19.40 m depth			LATITUDE	-32.0641	ASPECT	North	SLOPE	5-10%				
Drilling		Sampling		Field Material Description									
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L			0.30	0.2/S/1 D 0.20 m			CI-ML	TOPSOIL: Clayey SILT; medium plasticity; dark grey, blue; trace gravel.	M	F - St		TOPSOIL
	L-M			0.60	0.5/S/1 D 0.50 m			CI-ML	Silty CLAY; medium to high plasticity; dark brown; trace gravel.	<PL	St - VSt		RESIDUAL SOIL
	H			217.89	0.7/R/1 D 0.70 m			CI-CH	CONGLOMERATE; inferred green, blue, olive; highly weathered; very low strength (rock containing quartzite, sandstone, siltstone).				WEATHERED ROCK
					1.0/R/1 D 1.00 m								
					1.5-1.6/R/1 D 1.50 m								
					2.0-2.1/R/1 D 2.00 m								
					2.5-2.6/R/1 D 2.50 m								
					3.0-3.1/R/1 D 3.00 m								
					3.5-3.6/R/1 D 3.50 m								
					4.0-4.1/R/1 D 4.00 m								
					4.5-4.6/R/1 D 4.50 m								
					5.0-5.1/R/1 D 5.00 m								
					5.5-5.6/R/1 D 5.50 m								
					6.0-6.1/R/1 D 6.00 m								
					6.5-6.6/R/1 D 6.50 m								
					7.0-7.1/R/1 D 7.00 m								
					7.5-7.6/R/1 D 7.50 m								
					8.0-8.1/R/1 D 8.00 m								
					8.5-8.6/R/1 D 8.50 m								
					9.0-9.1/R/1 D 9.00 m								
					9.5-9.6/R/1 D 9.50 m								
					10.0-10.1/R/1 D 10.00 m								
					11.0-11.1/R/1 D 11.00 m								
					11.5-11.6/R/1 D 11.50 m								
					12.0-12.1/R/1 D 12.00 m								
					12.5-12.6/R/1 D 12.50 m				Trace clay from 12.2 to 13.0m present.				
					13.0-13.1/R/1 D 13.00 m								
					13.5-13.6/R/1 D 13.50 m								
					14.0-14.1/R/1 D 14.00 m								
					14.5-14.6/R/1 D 14.50 m								
					15.0-15.1/R/1 D 15.00 m								
					15.5-15.6/R/1 D 15.50 m				Trace clay from 15.5 to 16.5m.				
					16.0-16.1/R/1 D 16.00 m								
					16.5-16.6/R/1 D 16.50 m								
					17.0-17.1/R/1 D 17.00 m								
					17.5-17.6/R/1 D 17.50 m				Trace clay at 17.5m onwards.				
					18.0-18.1/R/1 D 18.00 m								
					18.5-18.6/R/1 D 18.50 m								
					19.0-19.1/R/1 D 19.00 m								
									Hole Terminated at 19.40 m (Target depth reached)				
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CLIENT	Charles David Pty Ltd			COMMENCED	22/07/2021	COMPLETED	22/07/2021	REF BH103							
PROJECT	Groundwater & Salinity Assessment			LOGGED	AG	CHECKED	SVK/JF	Sheet 1 OF 1							
SITE	150 Gundy Road, Scone, NSW			GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass & shrubs	PROJECT NO. P2108371							
EQUIPMENT	4WD truck-mounted hydraulic drill rig			LONGITUDE	150.88097	RL SURFACE	213.84 m	DATUM	AHD						
EXCAVATION DIMENSIONS	Ø100 mm x 11.80 m depth			LATITUDE	-32.06117	ASPECT	South	SLOPE	<5%						
Drilling		Sampling		Field Material Description											
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS		
AD/T	L	M	213.24	0.30	0.2/S/1 D 0.20 m			CH	TOPSOIL: CLAY; high plasticity; dark grey, dark brown; with silt; trace rottlets.	M	F - St	TOPSOIL			
	M			0.60	0.5/S/1 D 0.50 m				CLAY; low to medium plasticity; dark brown, dark grey; trace sand; trace gravel.					<PL	Vst
RAB	H	Not Encountered during drilling		1.0/R/1 D 1.00 m	1.5-1.6/R/1 D 1.50 m				SANDSTONE; fine to medium grained; dark brown; inferred highly weathered; very low strength.				WEATHERED ROCK		
				2.0-2.1/R/1 D 2.00 m											
				2.5-2.6/R/1 D 2.50 m											
				3.0-3.1/R/1 D 3.00 m											
				3.5-3.6/R/1 D 3.50 m											
				4.0-4.1/R/1 D 4.00 m											
				4.5-4.6/R/1 D 4.50 m											
				5.0-5.1/R/1 D 5.00 m											
				5.50											
				208.34	5.5-5.6/R/1 D 5.50 m				SANDSTONE; fine to medium grained; grey, bluish grey; highly weathered to medium weathered; inferred; very low to low strength.					D	
6.30	6.0-6.1/R/1 D 6.00 m	SANDSTONE; fine to medium grained; dark brown; inferred highly weathered; very low strength.													
207.54	6.5-6.6/R/1 D 6.50 m														
7.0-7.1/R/1 D 7.00 m															
7.5-7.6/R/1 D 7.50 m															
8.0-8.1/R/1 D 8.00 m															
8.5-8.6/R/1 D 8.50 m															
9.0-9.1/R/1 D 9.00 m															
9.5-9.6/R/1 D 9.50 m															
RAB	L-M	Not Encountered during drilling		10.0-10.1/R/1 D 10.00 m	110.-11.0-11.1/R/1 D 11.00 m										
				11.80											
				12										Hole Terminated at 11.80 m (Target depth reached)	
				14											
				16											
				18											

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS



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Engineering Log -
BOREHOLE

CLIENT	Charles David Pty Ltd	COMMENCED	22/07/2021	COMPLETED	22/07/2021	REF BH103/MW03	
PROJECT	Groundwater & Salinity Assessment	LOGGED	AG	CHECKED	SVK/JF	Sheet 1 OF 1	
SITE	150 Gundy Road, Scone, NSW	GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass & shrubs	PROJECT NO. P2108371	
EQUIPMENT	4WD truck-mounted hydraulic drill rig	LONGITUDE	150.88097	RL SURFACE	213.84 m	DATUM	AHD
EXCAVATION DIMENSIONS	ø100 mm x 11.80 m depth	LATITUDE	-32.06117	ASPECT	South	SLOPE	<5%

Drilling				Sampling		Field Material Description												
METHOD	PENETRATION RESISTANCE		WATER	DEPTH (metres)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	PIEZOMETER DETAILS					
AD/T	L	M		DEPTH RL									ID	Static Water Level				
RAB	H	Not Encountered during drilling		0.30	0.2/S/1 D 0.20 m		CH	TOPSOIL: CLAY; high plasticity; dark grey, dark brown; with silt; trace rottlets.	M	F	S	V	MW103					
			0.60	0.5/S/1 D 0.50 m	CL			CLAY; low to medium plasticity; dark brown, dark grey; trace sand; trace gravel.										
			213.24	0.7/R/1 D 0.70 m	CL			SANDSTONE; fine to medium grained; dark brown; inferred highly weathered; very low strength.										
				1.0/R/1 D 1.00 m														
				1.5-1.6/R/1 D 1.50 m														
				2.0-2.1/R/1 D 2.00 m														
				2.5-2.6/R/1 D 2.50 m														
				3.0-3.1/R/1 D 3.00 m														
				3.5-3.6/R/1 D 3.50 m														
				4.0-4.1/R/1 D 4.00 m														
	4.5-4.6/R/1 D 4.50 m																	
	5.0-5.1/R/1 D 5.00 m																	
	5.50	5.5-5.6/R/1 D 5.50 m						SANDSTONE; fine to medium grained; grey, bluish grey; highly weathered to medium weathered; inferred; very low to low strength.										
	208.34	6.0-6.1/R/1 D 6.00 m																
	6.30	6.5-6.6/R/1 D 6.50 m						SANDSTONE; fine to medium grained; dark brown; inferred highly weathered; very low strength.										
	207.54	7.0-7.1/R/1 D 7.00 m																
		7.5-7.6/R/1 D 7.50 m																
		8.0-8.1/R/1 D 8.00 m																
		8.5-8.6/R/1 D 8.50 m																
		9.0-9.1/R/1 D 9.00 m																
		9.5-9.6/R/1 D 9.50 m																
		10.0-10.1/R/1 D 10.00 m																
		11.0-11.1/R/1 D 11.00 m																
		11.80																

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS



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**Engineering Log -
TEST**

[illegible]

CLIENT	Charles David Pty Ltd	COMMENCED	22/07/2021	COMPLETED	22/07/2021	REF BH104b Sheet 1 OF 1 PROJECT NO. P2108371	
PROJECT	Groundwater & Salinity Assessment	LOGGED	AG	CHECKED	SVK/JF		
SITE	150 Gundy Road, Scone, NSW	GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass & shrubs		
EQUIPMENT	4WD truck-mounted hydraulic drill rig	LONGITUDE	150.8818	RL SURFACE	230.35 m	DATUM	AHD
EXCAVATION DIMENSIONS	ø100 mm x 1.00 m depth	LATITUDE	-32.064	ASPECT	North East	SLOPE	5-10%

Drilling			Sampling			Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	Not Encountered during drilling		230.35	0.2S/1 D 0.20 m			ML	TOPSOIL: SILT; medium plasticity; dark brown; trace gravel; with clay.		S - F		TOPSOIL
	L-M		0.30 230.05				ML	Clayey SILT; medium plasticity; dark brown, dark red; trace gravel.	M (<PL)	St	RESIDUAL SOIL		
			0.5	0.60 229.75					CONGLOMERATE; brown, pale red, grey; inferred highly weathered; very low strength.	D		WEATHERED ROCK	
	H			0.8/R/1 D 0.80 m									
			1.0	1.00					Hole Terminated at 1.00 m				1.00: TC bit refusal
			1.5										
			2.0										
			2.5										
			3.0										
			3.5										
			4.0										
			4.5										

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS



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**Engineering Log -
BOREHOLE**

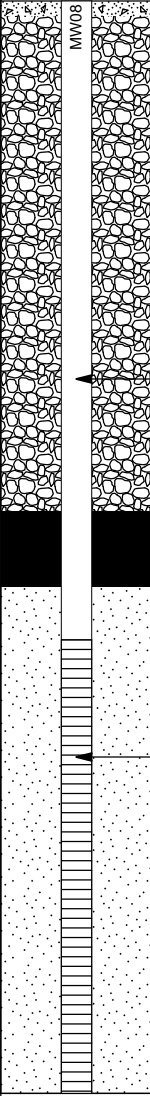
[illegible]

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P210837/BH101A-BH104B/GPJ <-DrawingFile>> 26/08/2021 12:28 10.02.00.04 DigLab and In Situ Tool - D/GC | Lib: Martens 2.00 2016-11-13 Proj: Martens 2.00 2016-11-13

CLIENT	Charles David Pty Ltd				COMMENCED	21/07/2021	COMPLETED	21/07/2021	REF BH107			
PROJECT	Groundwater & Salinity Assessment				LOGGED	SVK	CHECKED	SVK/JF	Sheet 1 OF 1			
SITE	150 Gundy Road, Scone, NSW				GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass	PROJECT NO. P2108371			
EQUIPMENT		4WD ute-mounted hydraulic drill rig			LONGITUDE	150.8857	RL SURFACE	224.39 m	DATUM	AHD		
EXCAVATION DIMENSIONS		ø100 mm x 12.00 m depth			LATITUDE	-32.0602	ASPECT	Southwest	SLOPE	5%		
Drilling		Sampling			Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L			224.29	0.4-0.5/S/1 D 0.40 m			CI CH	TOPSOIL: CLAY; medium plasticity; dark olive to grey; trace gravel and sand.	M (<PL)	F St	TOPSOIL
	M				1.0-1.1/S/1 D 1.00 m				CLAY; high plasticity; brown to grey; with silt; trace sand.		VSt	RESIDUAL SOIL
				2								

CLIENT	Charles David Pty Ltd		COMMENCED	21/07/2021	COMPLETED	21/07/2021	REF BH108					
PROJECT	Groundwater & Salinity Assessment		LOGGED	SVK	CHECKED	SVK/JF	Sheet 1 OF 1					
SITE	150 Gundy Road, Scone, NSW		GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass	PROJECT NO. P2108371					
EQUIPMENT	4WD truck-mounted hydraulic drill rig		LONGITUDE	150.8856	RL SURFACE	240.19 m	DATUM	AHD				
EXCAVATION DIMENSIONS	Ø100 mm x 14.45 m depth		LATITUDE	-32.065	ASPECT	Northwest	SLOPE	5%				
Drilling		Sampling		Field Material Description								
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L			240.19	0.1-0.2/S/1 D 0.10 m			CH	TOPSOIL: Silty CLAY; high plasticity; dark grey to dark olive; trace gravel and sand.	M		TOPSOIL
	M			0.60 239.59	0.5-0.6/S/1 D 0.50 m							
	H				1.0-1.1/S/1 D 1.00 m			CI	Silty CLAY; medium plasticity; dark brown; with sand; trace gravel.	M	VSt	RESIDUAL SOIL
				1.40 238.79	1.5-1.6/R/1 D 1.50 m				SANDSTONE; fine to medium grained; dark brown; inferred high strength.			WEATHERED ROCK
	M				2.0-2.1/R/1 D 2.00 m							
				2.71 237.48	2.5-2.6/R/1 D 2.50 m				SHALE; dark red; very low strength; highly weathered.			
					3.5-3.6/R/1 D 3.50 m							
				3.71 236.48	4.0-4.1/R/1 D 4.00 m				SANDSTONE; fine to medium grained; dark brown and dark grey; inferred high strength.			
					4.5-4.6/R/1 D 4.50 m							
					5.0-5.1/R/1 D 5.00 m							
					5.5-5.6/R/1 D 5.50 m							
					6.0-6.1/R/1 D 6.00 m							
					6.5-6.6/R/1 D 6.50 m							
					7.0-7.1/R/1 D 7.00 m							
					7.5-7.6/R/1 D 7.50 m							
					8.0-8.1/R/1 D 8.00 m							
					8.5-8.6/R/1 D 8.50 m							
					9.0-9.1/R/1 D 9.00 m							
					9.5-9.6/R/1 D 9.50 m							
					10.0-10.1/R/1 D 10.00 m							
					11.0-11.0-11.1/R/1 D 11.00 m							
					11.5-11.6/R/1 D 11.50 m							
					12.0-12.1/R/1 D 12.00 m							
					12.5-12.6/R/1 D 12.50 m							
					13.0-13.1/R/1 D 13.00 m							
					13.5-13.6/R/1 D 13.50 m							
					14.0-14.1/R/1 D 14.00 m							
				14.42								
									SHALE; dark red. Hole Terminated at 14.45 m (Target depth reached)			

CLIENT	Charles David Pty Ltd	COMMENCED	21/07/2021	COMPLETED	21/07/2021	REF BH108/MW08 Sheet 1 OF 1 PROJECT NO. P2108371	
PROJECT	Groundwater & Salinity Assessment	LOGGED	SVK	CHECKED	SVK/JF		
SITE	150 Gundy Road, Scone, NSW	GEOLOGY	Jerrys Plains Subgroup	VEGETATION	Grass		
EQUIPMENT	4WD truck-mounted hydraulic drill rig	LONGITUDE	150.8856	RL SURFACE	240.19 m	DATUM	AHD
EXCAVATION DIMENSIONS	Ø100 mm x 14.45 m depth	LATITUDE	-32.065	ASPECT	Northwest	SLOPE	5%

Drilling					Sampling		Field Material Description									
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	PIEZOMETER DETAILS			
AD/T	M	H		240.19	0.1-0.2/S/1 D 0.10 m			CH	TOPSOIL: Silty CLAY; high plasticity; dark grey to dark olive; trace gravel and sand.	M	<PL	VSt	MW08		Concrete	
				0.60	0.5-0.6/S/1 D 0.50 m			CI		Silty CLAY; medium plasticity; dark brown; with sand; trace gravel.	M					<<PL
RAB	M		Not Encountered during drilling	239.59	1.0-1.1/S/1 D 1.00 m				SANDSTONE; fine to medium grained; dark brown; inferred high strength.				MW08		Cuttings	
				1.40	1.5-1.6/R/1 D 1.50 m											
				238.79	2.0-2.1/R/1 D 2.00 m											
				2.71	2.5-2.6/R/1 D 2.50 m											
				237.48	3.5-3.6/R/1 D 3.50 m											
				3.71	4.0-4.1/R/1 D 4.00 m											
				236.48	4.5-4.6/R/1 D 4.50 m											
					5.0-5.1/R/1 D 5.00 m											
					5.5-5.6/R/1 D 5.50 m											
					6.0-6.1/R/1 D 6.00 m											
					6.5-6.6/R/1 D 6.50 m											
					7.0-7.1/R/1 D 7.00 m											
					7.5-7.6/R/1 D 7.50 m											
					8.0-8.1/R/1 D 8.00 m											
	8.5-8.6/R/1 D 8.50 m															
	9.0-9.1/R/1 D 9.00 m															
	9.5-9.6/R/1 D 9.50 m															
					10.0-10.1/R/1 D 10.00 m											
					11.0-11.0-11.1/R/1 D 11.00 m											
					11.5-11.6/R/1 D 11.50 m											
					12.0-12.1/R/1 D 12.00 m											
					12.5-12.6/R/1 D 12.50 m											
					13.0-13.1/R/1 D 13.00 m											
					13.5-13.6/R/1 D 13.50 m											
					14.0-14.1/R/1 D 14.00 m											
				14.42												
									SHALE; dark red.							
									Hole Terminated at 14.45 m (Target depth reached)							
	</															

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

ATTACHMENT C – LABORATORY ANALYTICAL CERTIFICATES

CERTIFICATE OF ANALYSIS 274962

Client Details

Client	Martens & Associates Pty Ltd
Attention	Jeff Fulton, Yiwen Li
Address	Suite 201, 20 George St, Hornsby, NSW, 2077

Sample Details

Your Reference	<u>Gundy Rd Scone</u>
Number of Samples	7 Water
Date samples received	30/07/2021
Date completed instructions received	30/07/2021

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	06/08/2021
Date of Issue	05/08/2021
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Team Leader, Inorganics
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Client Reference: Gundy Rd Scone

Miscellaneous Inorganics						
Our Reference		274962-1	274962-2	274962-3	274962-4	274962-5
Your Reference	UNITS	8371/MW01a	8371/MW01b	8371/MW02	8371/MW03	8371/MW05
Date Sampled		29/07/2021	29/07/2021	29/07/2021	29/07/2021	29/07/2021
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	30/07/2021	30/07/2021	30/07/2021	30/07/2021	30/07/2021
Date analysed	-	30/07/2021	30/07/2021	30/07/2021	30/07/2021	30/07/2021
pH	pH Units	7.2	7.9	7.5	7.2	7.1
Electrical Conductivity	µS/cm	3,500	4,900	2,900	4,500	11,000

Miscellaneous Inorganics			
Our Reference		274962-6	274962-7
Your Reference	UNITS	8371/MW06	8371/MW07
Date Sampled		29/07/2021	29/07/2021
Type of sample		Water	Water
Date prepared	-	30/07/2021	30/07/2021
Date analysed	-	30/07/2021	30/07/2021
pH	pH Units	7.5	7.4
Electrical Conductivity	µS/cm	1,500	2,700

Client Reference: Gundy Rd Scone

Ion Balance						
Our Reference		274962-1	274962-2	274962-3	274962-4	274962-5
Your Reference	UNITS	8371/MW01a	8371/MW01b	8371/MW02	8371/MW03	8371/MW05
Date Sampled		29/07/2021	29/07/2021	29/07/2021	29/07/2021	29/07/2021
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	30/07/2021	30/07/2021	30/07/2021	30/07/2021	30/07/2021
Date analysed	-	30/07/2021	30/07/2021	30/07/2021	30/07/2021	30/07/2021
Calcium - Dissolved	mg/L	73	180	73	180	320
Potassium - Dissolved	mg/L	0.5	3	2	0.6	5
Sodium - Dissolved	mg/L	590	900	430	610	1,300
Magnesium - Dissolved	mg/L	78	65	71	130	290
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	520	160	340	450	380
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	520	160	340	450	380
Sulphate, SO ₄	mg/L	70	370	29	110	170
Chloride, Cl	mg/L	700	1,200	630	1,000	2,800
Ionic Balance	%	6.0	10	6.0	7.0	5.0

Ion Balance			
Our Reference		274962-6	274962-7
Your Reference	UNITS	8371/MW06	8371/MW07
Date Sampled		29/07/2021	29/07/2021
Type of sample		Water	Water
Date prepared	-	30/07/2021	30/07/2021
Date analysed	-	30/07/2021	30/07/2021
Calcium - Dissolved	mg/L	32	84
Potassium - Dissolved	mg/L	0.8	1
Sodium - Dissolved	mg/L	270	410
Magnesium - Dissolved	mg/L	24	46
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	550	200
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5
Total Alkalinity as CaCO ₃	mg/L	550	200
Sulphate, SO ₄	mg/L	35	120
Chloride, Cl	mg/L	140	550
Ionic Balance	%	-2.0	8.0

Client Reference: Gundy Rd Scone

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.

Client Reference: Gundy Rd Scone

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			30/07/2021	1	30/07/2021	30/07/2021		30/07/2021	[NT]
Date analysed	-			30/07/2021	1	30/07/2021	30/07/2021		30/07/2021	[NT]
pH	pH Units		Inorg-001	[NT]	1	7.2	7.3	1	100	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	3500	3400	3	104	[NT]

Client Reference: Gundy Rd Scone

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			30/07/2021	1	30/07/2021	30/07/2021		30/07/2021	[NT]
Date analysed	-			30/07/2021	1	30/07/2021	30/07/2021		30/07/2021	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	73	73	0	93	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	0.5	0.5	0	95	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	590	590	0	91	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	78	78	0	95	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	520	510	2	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	520	510	2	109	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	1	70	70	0	98	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	700	700	0	89	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	6.0	6.0	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.