**Attachment 3D - Catchment Areas** 14



#### PRE DEVELOPMENT CATCHMENT AREAS

										PERVI	OUS INPUT PARAMTER	RS		
RECEIVING NODE	CATCHMENT ID	AREA (HA)	IMPERVIOUS AREA (HA)	%	PERVIOUS AREA	%	EMC CATEGORY	SOIL TYPE	SSC	FC	INF A	INF B	DDR (%)	DBR (%)
	JLAKE CS	0.2	0.00	0	0.20	100	Forest	SAND/SANDY CLAY	161.8	82	288	1.5	70	40
J-LAKE	JLAKE S/SC	0.27	0.09	33	0.18	67	Agricultural	SAND/SANDY CLAY	161.8	82	288	1.5	70	40
J-LAKE	JLAKE FOREST	3.66	0.00	0	3.66	100	Agricultural	CLAYEY SAND	107	75	250	1.3	60	45
	JLAKE CS/SC	5.38	0.32	6	5.06	94	Agricultural	CLAYEY SAND/SANDY CLAY	128	86.4	208	2.32	39	33
		9.5												
	MYALL FOREST	2.32	0.00	0	2.32	100	Forest	LOAMY SAND	139	69	360	0.5	100	50
	MYALL LS/S	7.47	0.00	0	7.47	100	Agricultural	LOAMY SAND/SAND	168	73	360	0.5	100	50
MYALL CREEK	MYALL LS	13.37	0.00	0	13.37	100	Agricultural	LOAMY SAND	139	69	360	0.5	100	50
	UPSLOPE MYALL	8.887	0.89	10	8.00	90	Forest	SANDY CLAY LOAM	108	73	250	1.3	60	45
	ADDITIONAL MYALL LS/S	7.47	0.00	0	7.47	100	Agricultural	LOAMY SAND/SAND	168	73	360	0.5	100	50
		39.5												
	WETLAND 1 FOREST LS/S	2.3	0.00	0	2.30	100	Forest	LOAMY SAND/SAND	168	73	360	0.5	100	50
	WETLAND 1 FOREST CS	1.04	0.00	0	1.04	100	Forest	CLAYEY SAND	107	75	250	1.3	60	45
	WETALND 1 CS	2.03	0.00	0	2.03	100	Agricultural	CLAYEY SAND	107	75	250	1.3	60	45
WETLAND 1	UPSLOPE WETLAND 1	4.8	0.48	10	4.32	90	Forest	SANDY CLAY LOAM	108	73	250	1.3	60	45
***************************************	WETLAND 1 BUFFER	0.4	0.00	0	0.40	100	Forest	CLAYEY SAND	107	75	250	1.3	60	45
	ADDITIONAL WETLAND 1 BUFFER	7.73	0.00	0	7.73	100	Forest	CLAYEY SAND	107	75	250	1.3	60	45
	ADDITIONAL WETLAND 1 LS/S	0.69	0.00	0	0.69	100	Agricultural	LOAMY SAND/SAND	168	73	360	0.5	100	50
	ADITIONAL WETLAND 1 CS	0.15	0.00	0	0.15	100	Agricultural	CLAYEY SAND	107	75	250	1.3	60	45
		19.1									•	•		
	UPSLOPE WETLAND 2 AGRICULTURALa	27.38	0.82	3	26.56	97	Agricultural	SANDY CLAY LOAM	108	73	250	1.3	60	45
	UPSLOPE WETLAND 2 FOREST	74.44	7.44	10	67.00	90	Forest	SANDY CLAY LOAM	108	73	250	1.3	60	45
	WETLAND 2 SC/C	6.22	0.00	0	6.22	100	Agricultural	SANDY CLAY/CLAY	107.7	75.8	148.5	3.7	14.5	14.5
	WETLAND 2 SC	27.03	0.00	0	27.03	100	Agricultural	SANDY CLAY	142	94	180	3	25	25
WETLAND 2	WETLAND 2 S/SC	1.02	0.00	0	1.02	100	Agricultural	SAND/SANDY CLAY	161.8	82	288	1.5	70	40
	WETLAND 2 CS/SC	11.58	0.00	0	11.58	100	Agricultural	CLAYEY SAND/SANDY CLAY	128	86.4	208	2.32	39	33
	WETLAND 2 CS	15.96	0.00	0	15.96	100	Agricultural	CLAYEY SAND	107	75	250	1.3	60	45
	WETLAND 2 LS	7.09	0.00	0	7.09	100	Agricultural	LOAMY SAND	139	69	360	0.5	100	50
	WETLAND 2 BUFFER	4.12	0.00	0	4.12	100	Forest	CLAYEY SAND	107	75	250	1.3	60	45
		174.8					1			1	1			
	WETLAND 3 FOREST 1	0.8	0.00	0	0.80	100	Forest	SANDY CLAY/CLAY	107.7	75.8	148.5	3.7	14.5	14.5
	WETLAND 3 FOREST 2	0.77	0.00	0	0.77	100	Forest	SANDY CLAY	142	94	180	3	25	25
	WETLAND 3 FOREST 3	0.96	0.00	0	0.96	100	Forest	SAND/SANDY CLAY	161.8	82	288	1.5	70	40
	WETLAND 3 SC/C	1.07	0.00	0	1.07	100	Agricultural	SANDY CLAY/CLAY	107.7	75.8	148.5	3.7	14.5	14.5
	WETLAND 3 SC	0.28	0.00	0	0.28	100	Agricultural	SANDY CLAY	142	94	180	3	25	25
WETLAND 3	WETLAND 3 S/SC	1.88	0.00	0	1.88	100	Agricultural	SAND/SANDY CLAY	161.8	82	288	1.5	70	40
	WETLAND 3 CS/SC	1.03	0.00	0	1.03	100	Agricultural	CLAYEY SAND/SANDY CLAY	128	86.4	208	2.32	39	33
	WETLAND 3 CS	15.15	0.00	0	15.15	100	Agricultural	CLAYEY SAND	107	75	250	1.3	60	45
	WETLAND 3 LS	1.65	0.00	0	1.65	100	Agricultural	LOAMY SAND	139	69	360	0.5	100	50
	WETLAND 3 BUFFER	10.01	0.00	0	10.01	100	Forest	CLAYEY SAND	107	75	250	1.3	60	45
	UPSLOPE WETLAND 3 FOREST	11.84	1.18	10	10.66	90	Forest	SANDY CLAY LOAM	108	73	250	1.3	60	45
	_	45.4												
	TOTAL CATCHMENT AREA	288.4	ha											

POST DEVELOPMENT CATCHMENT AREAS

NB ALL POST DEVELOPMENT CATCHMENTS ARE 100MM LOAMY SAND/400MM SAND SOIL TYPE ALL OTHER CATCHMENTS ARE BASED ON PRE DEVELOPMENT SOIL TYPES

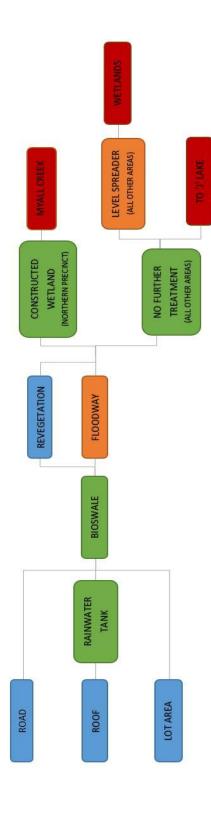
														PERVIOUS INPI	JT PARAM	TERS -ONLY				
CEIVING NODE	CATCHMENT	Total Area	Biofilter Area	1/2 DD Area.	Road Area	Driveway Area	Footpath Area	Lot Area	ROOF Area	Residential Node	% Impervious (Res)	%Pervious (Res)	NODE	SOIL TYPE	SSC	FC	INF A	INF B	DDR (%)	DBR (
	JLAKE FLOODWAY	1.833									0%	100%	URBAN	LOAMY SAND/SAND	168	73	360	0.5	100	50
JLAKE	10a	3.14	0.07	0.12	0.87	0.13	0.18	1.51	0.61	1.67	19%	81%		LOAMY SAND/SAND	168	73	360	0.5	100	50
JLAKE	10b	3.89	0.00	0.00	0.00	0.04	0.00	3.90	3.51	3.89	90%	10%		LOAMY SAND/SAND	168	73	360	0.5	100	50
		8.87																		
	5	2.78	0.07	0.12	0.45	0.15	0.09	1.73	0.69	1.64	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	50
	6	4.39	0.05	0.09	0.66	0.24	0.11	2.26	0.90	2.84	12%	88%		LOAMY SAND/SAND	168	73	360	0.5	100	50
	7	6.48	0.10	0.18	0.86	0.35	0.14	4.52	1.81	3.82	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	50
	9a	4.60	0.12	0.18	1.08	0.20	0.27	2.46	0.98	2.58	18%	82%		LOAMY SAND/SAND	168	73	360	0.5	100	5
Wetland 3	9b	2.30	0.00	0.00	0.00	0.01	0.00	2.24	2.02	2.30	90%	10%		LOAMY SAND/SAND	168	73	360	0.5	100	u)
wetianu 5	1	3.79									0%	100%	AGRICULTURE	CLAYEY SAND	107	75	250	1.3	60	4
	WETLAND 3 REVEGETATION	9.36									0%	100%	FOREST	CLAYEY SAND	107	75	250	1.3	60	4
	WETLAND 3 BUFFER	10.20									0%	100%	FOREST	CLAYEY SAND	107	75	250	1.3	60	45
	WETLAND 3 FLOODWAYS	6.70									4%	96%	URBAN							
	Total	50.60																		
	2	4.38	0.09	0.17	0.79	0.20	0.17	2.38	0.95	2.63	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	3	4.69	0.07	0.14	0.87	0.25	0.13	2.31	0.92	2.90	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	4	4.69	0.08	0.15	0.76	0.25	0.13	3.03	1.21	2.72	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	11	2.55												LOAMY SAND/SAND	168	73	360	0.5	100	5
	12	5.86	0.07	0.15	0.93	0.30	0.19	3.67	1.47	3.46	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	-
	13	5.88	0.13	0.24	1.11	0.24	0.28	2.83	1.13	3.64	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	į
	14	4.07	0.07	0.13	0.57	0.23	0.07	2.87	1.15	2.36	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	5
WETLAND 2	15	3.84	0.06	0.11	0.58	0.23	0.08	2.69	1.08	2.19	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	5
WEILAND 2	16	4.80	0.07	0.13	0.62	0.22	0.13	2.63	1.05	3.13	11%	89%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	17	3.64	0.07	0.13	0.52	0.17	0.12	2.49	1.00	2.13	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	UPSLOPE WEST	14.26									3%	97%	FOREST	SANDY CLAY LOAM	108	73	250	1.3	60	4
	UPSLOPE WETLAND 2 AG	15.57									6%	94%	AGRICULTURE	SANDY CLAY LOAM	108	73	250	1.3	60	4
	UPSLOPE WETLAND 2 FOREST	85.36									10%	90%	FOREST	SANDY CLAY LOAM	108	73	250	1.3	60	4
	WETLAND 2 REVEGETATION	9.18									0	100%	FOREST	LOAMY SAND/SAND	168	73	360	0.5	100	5
	WETLAND 2 BUFFER	4.12									0	100%	FOREST	CLAYEY SAND	107	75	250	1.3	60	4
	Total	172.9																		
	WETLAND 1 REVEGETATION	9.92									0	100%	FOREST	LOAMY SAND/SAND	168	73	360	0.5	100	50
WETLAND 1	ADDITIONAL WETLAND 1 BUFFER	6.52									0	100%	FOREST	CLAYEY SAND	107	75	250	1.3	60	4.
	Total	16.4							•		•									
	20	1.96	0.06	0.11	0.41	0.09	0.06	1.13	0.45	1.10	14%	86%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	21	2.00	0.08	0.13	0.42	0.09	0.06	1.11	0.45	1.13	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	
	22	4.11	0.05	0.10	0.48	0.24	0.07	3.08	1.23	2.39	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	23	1.88	0.05	0.09	0.31	0.10	0.05	1.21	0.48	1.08	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	5
	24	1.71	0.04	0.08	0.30	0.09	0.04	1.10	0.44	0.97	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	Ę
IYALL CREEK	25	2.21	0.07	0.12	0.46	0.10	0.06	1.28	0.51	1.24	13%	87%		LOAMY SAND/SAND	168	73	360	0.5	100	
	MYALL UPSLOPE	13.38									10%	90%	FOREST	SANDY CLAY LOAM	108	73	250	1.3	60	4
	PARKLAND RESERVE	8.34												LOAMY SAND/SAND	168	73	360	0.5	100	
	MYALL REVEGETATION	3.01		1							0%	100%	FOREST	LOAMY SAND/SAND	168	73	360	0.5	100	
	MYALL FLOODWAY	0.99		1							0%	100%	URBAN	LOAMY SAND/SAND	168	73	360	0.5	100	5
	Total	39.6				•						•				•				-
	Total Catchment Area	288.4 ha												•						

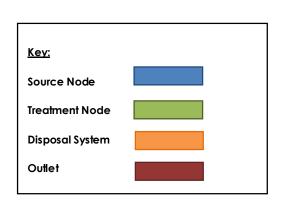


15 Attachment 3E - Conceptual Layout: Proposed Water

Quality Treatment Train



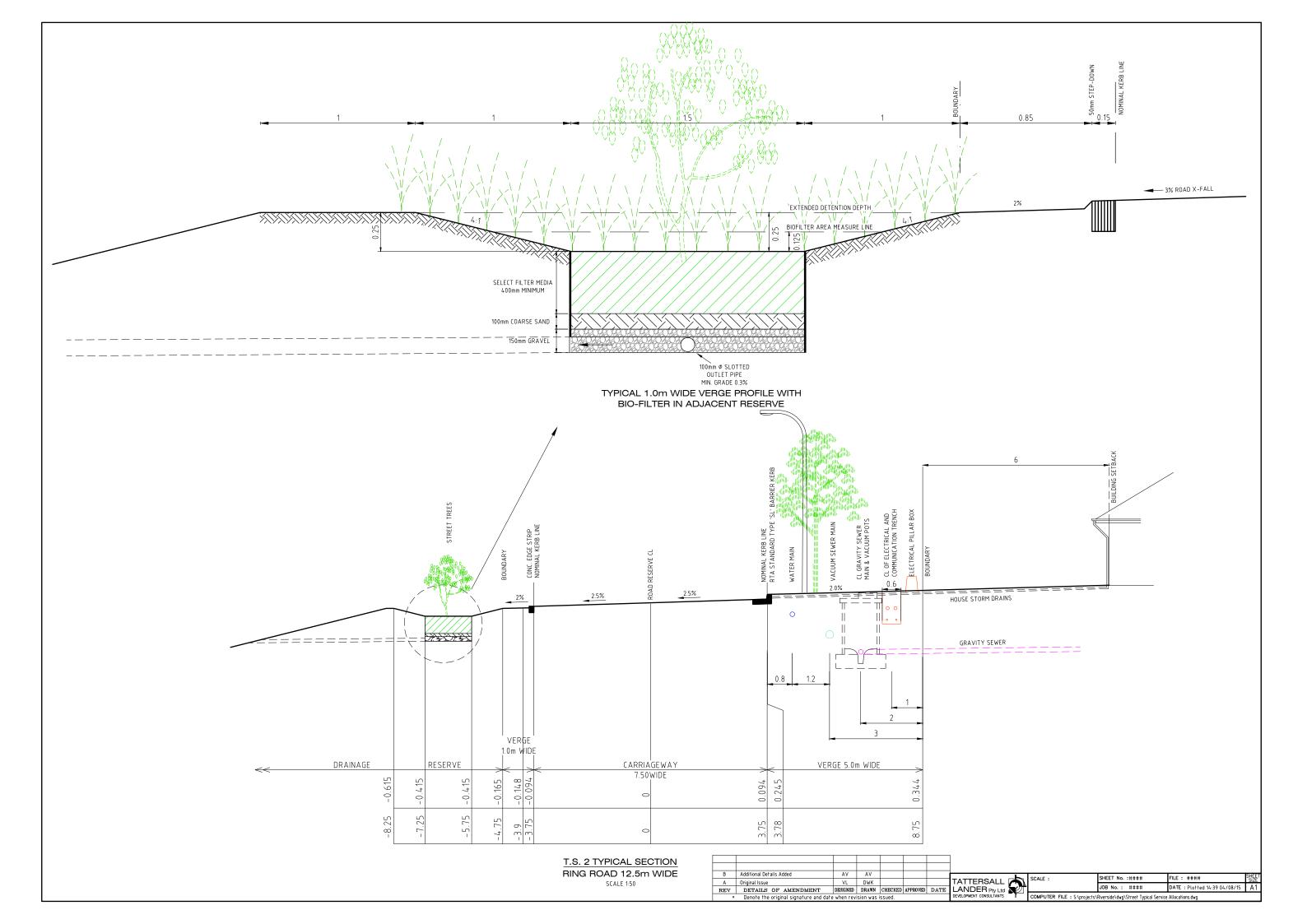


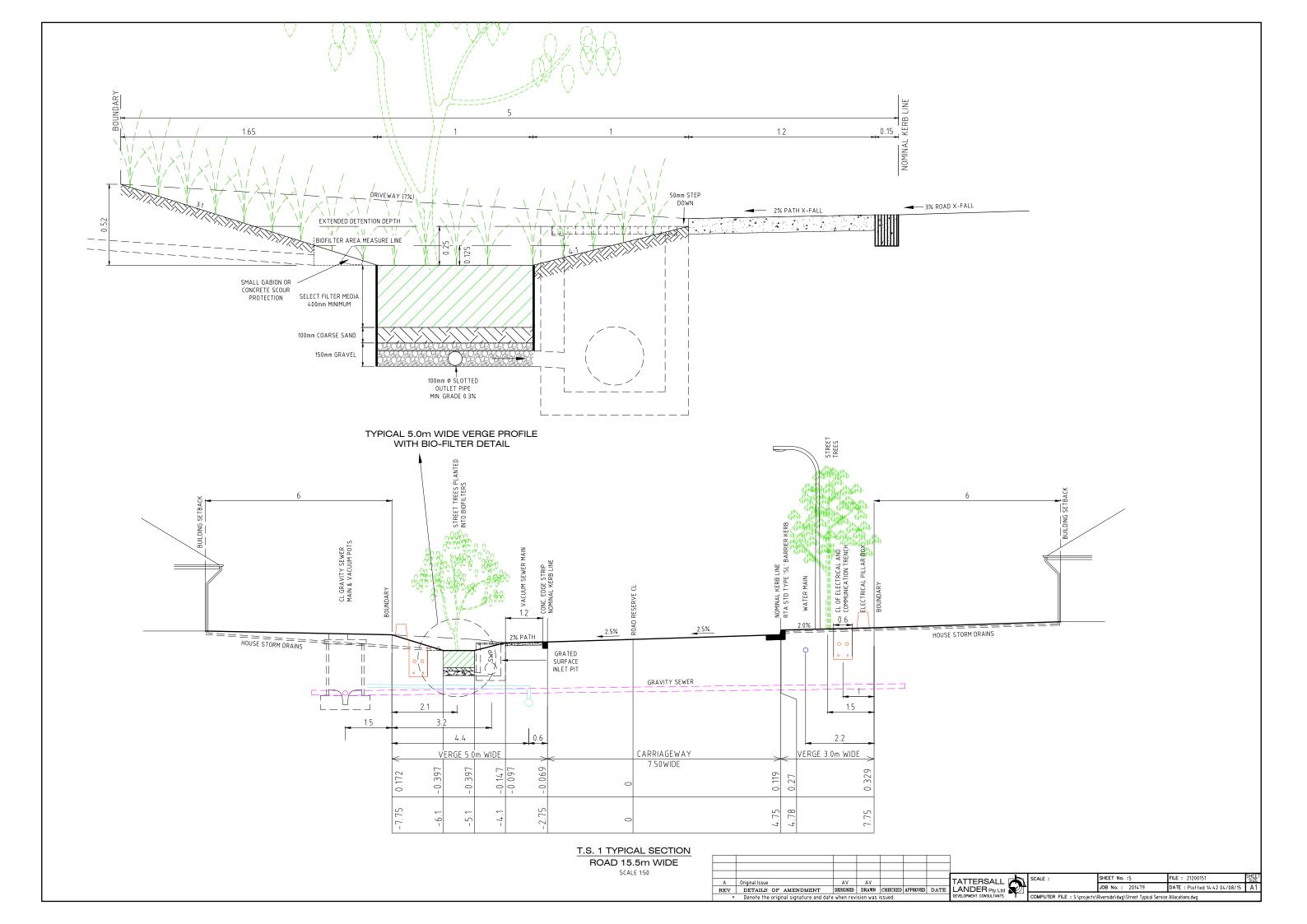


Martens & Associates Pty	<b>Ltd</b> ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   C	Civil   Management
Drawn:	DG		
Approved:	DM	Conceptual Model – Proposed Treatment Train	Attachment E
Date:	09/09/2015		
Scale:	NA		Job No: P1504136

**Attachment 3F - Proposed Bioswale Design** 16







17 Attachment 3G – Pre and Post Development Recharge Rates; MUSIC Modelling



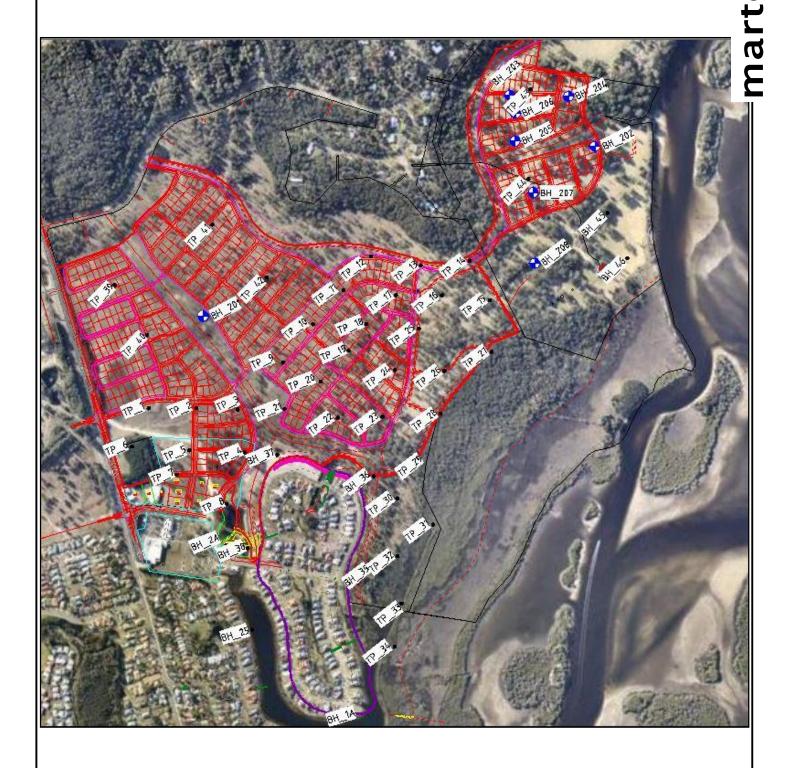
#### INFILTRATION RATES EXISTING - WATER BALANCE BY CATCHMENT AREA

					ML/yr		
RECEIVING NODE	CATCHMENT ID	TOTAL AREA (HA)	RAINFALL	ET	GW INFILTRATION	RUNOFF/FLOW OUT	RECHARGE RATE (mm/y
	JLAKE FOREST	0.20	2.70	1.70	0.90	0.10	450.00
J-LAKE	JLAKE S/SC	6.97	95.80	57.60	30.90	7.30	443.33
J-LAKE	JLAKE CS	3.66	50.30	32.60	11.00	6.70	300.55
	JLAKE CS/SC	0.27	3.70	1.80	0.50	1.40	185.19
	MYALL FOREST	2.32	31.90	19.40	11.70	0.80	504.31
	MYALL LS/S	3.83	52.60	31.50	20.70	0.40	540.47
MYALL CREEK	MYALL LS	9.73	133.70	81.20	49.10	3.40	504.62
	UPSLOPE MYALL	9.14	121.90	71.70	25.60	24.60	280.09
	ADDITIONAL MYALL LS/S	7.47	102.60	61.30	40.40	0.80	540.83
			21.52	10.00			
	WETLAND 1 FOREST LS/S	2.30	31.60	18.90	12.40	0.30	539.13
	WETLAND 1 FOREST CS	1.04	14.30	9.30	3.10	1.90	298.08
	WETLAND 1 LS/S	7.28	100.00	59.80	39.40	0.80	541.21
	WETLAND 1 CS	2.03	27.90	18.10	6.10	3.70	300.49
WETLAND 1	UPSLOPE WETLAND 1	4.80	66.00	38.80	13.80	13.30	287.50
	WETLAND 1 BUFFER	0.40	5.50	3.60	1.20	0.70	300.00
	ADDITIONAL WETLAND 1 BUFFER	7.73	106.20	68.90	23.20	14.10	300.13
	ADDITIONAL WETLAND 1 LS/S	0.69	9.50	5.70	3.70	0.10	536.23
	ADDITIONAL WETLAND 1 CS	0.15	27.90	18.10	6.10	3.70	4066.67
	UPSLOPE WETLAND 2 AGRICULTURAL	27.38	213.90	130.70	46.80	36.40	170.93
	UPSLOPE WETLAND 2 FOREST	86.28	1185.50	697.40	248.50	239.60	288.02
	WETLAND 2 SC/C	6.22	85.50	55.70	3.50	23.60	56.27
	WETLAND 2 SC	27.03	371.40	250.80	55.00	65.50	203.48
WETLAND 2	WETLAND 2 S/SC	1.02	14.00	8.90	4.80	0.30	470.59
	WETLAND 2 CS/SC	11.58	159.10	105.80	35.20	18.10	303.97
	WETLAND 2 CS	15.96	219.30	142.30	47.90	29.10	300.13
	WETLAND 2 LS	7.09	97.40	59.10	35.80	2.50	504.94
	WETLAND 2 BUFFER	4.12	56.60	36.70	12.40	7.50	300.97
	WISTIAND 3 SOREST 4	2.22	44.00	7.20	0.50	2.40	62.50
	WETLAND 3 FOREST 1	0.80	11.00	7.20	0.50	3.40	62.50
	WETLAND 3 FOREST 2	0.77	10.60	7.10	1.60	34.00	207.79
	WETLAND 3 FOREST 3	0.96	13.20	8.40	4.50	0.30	468.75
	WETLAND 3 SC/C	1.07	14.70	9.60	0.60	5.10	56.07
WETLAND 3	WETLAND 3 SC	0.28	3.80	2.60	0.60	0.70	214.29
	WETLAND 3 S/SC	1.88	25.80	16.40	8.90	0.60	473.40
	WETLAND 3 CS/SC	1.03	14.20	9.40	3.10	1.60	300.97
	WETLAND 3 CS	15.15	208.20	135.10	45.40	27.70	299.67
	WETLAND 3 LS	1.65	22.70	13.80	8.30	0.60	503.03
	WETLAND 3 BUFFER	10.01	137.50	89.20	30.00	18.30	299.70

Infiltration = 180 mm/hr for sandy loams and sands
INFILTRATION RATES PROPOSED - WATER BALANCE BY CATCHMENT AREA

				ML/yr			
RECEIVING NODE	CATCHMENT ID	RAINFALL/INFLOW	ET	GW INFILTRATION	RUNOFF/FLOW OUT	AREA (HA)	RECHARGE RATE (mm,
	JLAKE FLOODWAY	25.19	15.05	9.92	0.22	1.83	541.19
	10 Residential	22.92	11.45	7.31	4.16		
JLAKE	10 Bioswale	72.94	0.87	17.62	54.45		
	10 commercial	53.50	7.06	2.11	44.33		
	10				0.00	7.03	384.64
	5 Residential	22.55	11.73	7.55	3.27		
	5 Bioswale	23.39	0.83	2.97	19.59	2.70	270.42
	5	20.05	20.00	42.50	4.50	2.78	378.42
	6 Residential	38.95	20.86	13.50	4.59		
	6 Bioswale	34.90	0.59	6.67	27.64	4.20	450.45
	7 residential	F2 4F	27.02	17.06	6.67	4.39	459.45
	7 residential	52.45	27.82 1.20	17.96 9.53	43.42		
Wetland 3	7 Bioswale	54.15	1.20	9.53	43.42	6.49	424.22
wettand 5	9 residential	35.49	17.91	11.46	6.12	6.48	424.23
	9 commercial	31.55	4.16	1.24	26.15		
	9 Bioswale	68.49	1.45	11.39	55.65		
	a Bioswale	08.43	1.43	11.33	33.03	6.95	346.62
	1	52.12	31.15	20.52	0.45	3.79	541.42
	WETLAND 3 REVEGETATION	128.62	83.46	28.07	17.09	9.36	299.89
	WETLAND 3 REVEGETATION WETLAND 3 BUFFER	140.08	90.90	30.58	18.60	10.20	299.80
		92.04	55.02	36.24	0.78	6.70	540.90
	WETLAND 3 FLOODWAYS					0.70	540.90
	2 Residential	36.18	18.07	11.54 4.99	6.57		
	2 Bioswale	37.67	0.13	4.99	32.55	4.38	377.40
	3 Residential	39.83	21.13	13.64	5.06	4.38	3//.40
	3 Bioswale	38.64	0.36	8.64	29.64	4.69	475.05
	4 Posidontial	27.25	10.62	12.64	F 00	4.69	4/5.05
	4 Residential	37.35	19.62	12.64	5.09		
	4 Bioswale	39.67	0.40	9.03	30.24	4.60	462.05
	4	47.00	25.00	16.12	6.40	4.69	462.05
	12 Residential	47.60	25.00	16.12	6.48		
	12 Bioswale	49.29	0.36	12.21	36.72	F. 0.C	402.45
	12	40.00	26.00	46.72	7.26	5.86	483.45
	13 Residential	49.99	26.00	16.73	7.26		
	13 Bioswale	49.29	0.65	10.05	38.59	5.00	455.44
	13	22.44	47.00	44.24	2.02	5.88	455.44
WETLAND 2	14 Residential	32.44	17.38	11.24	3.82		
	14 Bioswale	33.97	0.36	7.34	26.27		
	14	20.40	45.04	10.10	4.40	4.07	456.51
	15 Residential	30.10	15.81	10.19	4.10		
	15 Bioswale	32.43	0.29	0.26	31.88	204	272.44
	15	42.05	22.20	45.00	4.60	3.84	272.14
	16 Residential	43.05	23.28 0.36	15.08 7.66	4.69 30.17		
	16 Bioswale 16	38.19	0.36	7.66	30.17	4.00	472.75
		20.21	15.40	10.01	2.74	4.80	473.75
	17 Residential	29.21	15.49	10.01	3.71		
	17 Bioswale	30.92	0.36	6.45	24.11		
	17	405.02	422.02	44.27	20.72	3.64	452.20
	UPSLOPE WEST	195.92	122.92	44.27	28.73	14.26	310.45
	UPSLOPE WETLAND 2 AG	213.90	130.70	46.80	36.40	15.57	300.58
	UPSLOPE WETLAND 2 FOREST	1172.00	723.00	259.00	190.00	85.36	303.42
	WETLAND 2 REVEGETATION	126.00	75.41	49.67	0.92	9.18	541.07
	WETLAND 2 BUFFER	56.57	36.71	12.35	7.51	4.12	299.76
WETLAND 1	WETLAND 1 REVEGETATION	136.33	81.49	53.67	1.17	9.92	541.03
	ADDITIONAL WETLAND 1 BUFFER	89.63	58.16	19.56	11.91	6.52	300.00
	20 Residential	15.05	7.90	5.09	2.06		
	20 Bioswale	16.20	0.75	1.77	13.68		
	20			<b>_</b>		1.96	350.00
	21 Residential	15.58	8.26	5.34	1.98		
			0.94	1.35	14.09		
	21 Bioswale	16.38	0.5 .				224 EO
	21 Bioswale 21					2.00	334.50
	21 Bioswale 21 22 Residential	32.89	17.45	11.27	4.17	2.00	334.30
	21 Bioswale 21 22 Residential 22 Bioswale			11.27 6.28	4.17 25.43		
	21 Bioswale 21 22 Residential 22 Bioswale 22	32.89 32.38	17.45 0.67	6.28	25.43	4.11	427.01
	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential	32.89 32.38 14.89	17.45 0.67 7.90	6.28 5.10	25.43 1.89		
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale	32.89 32.38	17.45 0.67	6.28	25.43	4.11	427.01
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 32 Residential 23 Bioswale 23 Bioswale	32.89 32.38 14.89 15.04	17.45 0.67 7.90 0.61	5.10 1.78	25.43 1.89 12.65		
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential	32.89 32.38 14.89 15.04	17.45 0.67 7.90 0.61	5.10 1.78 4.56	25.43 1.89 12.65 1.69	4.11	427.01
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 44 Residential 24 Bioswale	32.89 32.38 14.89 15.04	17.45 0.67 7.90 0.61	5.10 1.78	25.43 1.89 12.65	4.11	427.01 365.96
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential 24 Bioswale 24 Bioswale	32.89 32.38 14.89 15.04 13.31 13.87	7.90 0.61 7.06 0.54	5.10 1.78 4.56	25.43 1.89 12.65 1.69 11.61	4.11	427.01
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 44 Residential 24 Bioswale	32.89 32.38 14.89 15.04 13.31 13.87	7.90 0.61 7.06 0.54	5.10 1.78 4.56 1.72 5.81	25.43 1.89 12.65 1.69 11.61 2.16	4.11	427.01 365.96
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential 24 Bioswale 24 Bioswale	32.89 32.38 14.89 15.04 13.31 13.87	7.90 0.61 7.06 0.54	5.10 1.78 4.56 1.72	25.43 1.89 12.65 1.69 11.61	4.11	427.01 365.96
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential 24 Bioswale 24 25 Residential	32.89 32.38 14.89 15.04 13.31 13.87	7.90 0.61 7.06 0.54	5.10 1.78 4.56 1.72 5.81	25.43 1.89 12.65 1.69 11.61 2.16	4.11	427.01 365.96
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential 24 Bioswale 24 25 Residential 25 Bioswale	32.89 32.38 14.89 15.04 13.31 13.87	7.90 0.61 7.06 0.54	5.10 1.78 4.56 1.72 5.81	25.43 1.89 12.65 1.69 11.61 2.16	1.88	427.01 365.96 367.25
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential 24 Bioswale 24 25 Residential 25 Bioswale 25	32.89 32.38 14.89 15.04 13.31 13.87 16.97 18.29	7.90 0.61 7.06 0.54 9.00 0.87	5.10 1.78 4.56 1.72 5.81	25.43  1.89 12.65  1.69 11.61  2.16 15.95	1.88 1.71	427.01 365.96 367.25
MYALL CREEK	21 Bioswale 21 22 Residential 22 Bioswale 22 23 Residential 23 Bioswale 23 24 Residential 24 Bioswale 24 25 Residential 25 Bioswale 25 MYALL UPSLOPE	32.89 32.38 14.89 15.04 13.31 13.87 16.97 18.29	7.90 0.61 7.90 0.61 7.06 0.54 9.00 0.87	5.10 1.78 4.56 1.72 5.81 1.47	25.43  1.89 12.65  1.69 11.61  2.16 15.95	4.11 1.88 1.71 2.21 13.38	365.96 367.25 329.41 313.75

## 18 Attachment 3H – Site Testing Plan



Martens & Associates Pty	<b>Ltd</b> ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management							
Drawn:	DG								
Approved:	GT	Site Testing Plan	Attachment H						
Date:	21.09.2015								
Scale:	NA		Job No: P1404136						

## 19 Attachment 3I – Borelogs



### Excavation No.

**TP 1** 

Sheet

GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

Date completed:

4.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW Mi

Test pit location:

REFER TO FIGURE 1

Checked by:

ou by.		
R.L.	. Surface:	2.586

equipment type an	d model:	4WD B	ackho	е		Pit Orientation:	Easting:	m			R.L	. Surface:	2.586	
excavation dimens	ions:	1.5m lo	ng (	).4m wi	de		Northing:	m			dati	ım:	AHD	
excavation infe	ormation			mate	erial s	ıbstance								
method  To penetration Support water	notes samples, tests, etc	RL m	depth.	graphic log	classification symbol	material soil type: plasticity or partic colour, secondary and mit	or components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 ponetro- 400 meter	addit	structure and ional observations	
BH		2.5	0.5		CI	TOPSOIL: SAND, fine to medius brown with approximately 30% is 300mm of rootlets.  Sandy CLAY: medium plasticity sand fine to medium grained.	ow plasticity fines,		М			TOPSOIL	· 	
	D	2.0	1 1 1	<i>((((</i> )	SP	SAND: fine to medium grained,	pale grey-white.			VD				
	D	_1.5	1. <u>0</u> - -			Becoming pale grey-brown.			w					
		_1.0	1. <u>5</u>											
	D													
04-04-07 8:54am		_0.5	2.0			Test pit TP 1 terminated at 1,9m								

ı										
ſ	method		support	notes,	samples, tests	class	ification symbols and	Г	consistency	density Index
I	N	natural exposure	S shoring N nil	$U_{50}$	undisturbed sample 50mm diameter	soil	description	L	VS	very soft
ı	X	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	d on unified classification		S	soft
١ŀ	8H	backhoe bucket	penetration	D	disturbed sample	syste	m		F	firm
	В	bulldozer blade	1234	٧	vane shear (kPa)			1	St	stiff
5	R	ripper	no resistance ranging to	Bs	bulk sample	mois	ture		VSt	very stiff
3	E	excavator	refusal	Ε	environmental sample	D	dry	ı	н	hard
2			water	R	refusal	M	moist		Fb	friable
Ņ			water level			W	wet		VL	very loose
5			on date shown			Wp	plastic limit	1	L	loose
ų						W <sub>L</sub>	liquid limit	j.	MD	medium dense
≟ا			water inflow						D	dense
ē			— water outflow					ŀ	VD	very dense

Excavation No.

TP 2

Sheet

1 of 1 GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

Date completed:

4.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CN

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment	type	and	model: 4	4WD I	Backho	e		Pit Orientation: Ea	sting: n	n		R.L	. Surface;	2.433	
excavation				1.5m l	lona (	3.4m w	ide		rthing: n	n		dati		AHD	
excavat								ıbstance						=	
method 1 5 penetration 2	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle charac	onents.	moisture	consistency/ density index	100 pocket 200 pocket 300 penetro- 400 meter	addit	structure and ional observations	
ВН	N			_2.0			CI	TOPSOIL: Silty Clayey SAND, fine to me grained, dark brown with approximately 3 plasticity fines, with approximately 300mi	0% of low 1 of rootlets.	M M/W	St		TOPSOIL		-
			D		0. <u>5</u>		GI .	Sandy CLAY: medium plasticity, dark browith some sand lenses.	wn-orange,	IVI/VV	Sī	X			
		E		_1.5	1.0							×			_
		04-04-07 9:13am	D		  - 										-
		<b>►</b>		_1.0	1. <u>5</u>		SP	SAND: fine to medium grained, brown-da	rk grey.	w		The state of the s			
			D		-								Rapid inflo	w of groundwater an below 1.7m depth.	nd pit
88 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				_0.5	2. <u>0</u>			Test pit TP 2 terminated at 1.9m							
			:	_0.0	2.5										

	method		support	notes,	samples, tests	clas	sification symbols and			density index
	N	natural exposure	Sishoring Ninil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	S	very soft
	X	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S		soft
ζ.	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F		firm
Rev	В	buildozer blade	1234	V	vane shear (kPa)			St	t	stiff
3.	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VS	St	very stiff
함	E	excavator	ranging to	Ε	environmental sample	D	dry	Н		hard
<u>ss</u>			water	R	refusal	М	moist	Ft	0	friable
5.2			w water level			W	wet	VI	L	very loose
			on date shown	1		Wp	plastic limit	L		loose
99				1		W <sub>L</sub>	liquid limit	M	D	medium dense
Ĕ			water inflow	ŀ			•	D		dense
둳			→ water outflow					VI	D	very dense

Excavation No.

1 of 1

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Sheet

4.4.2007 4.4.2007

TP 3

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

Date completed:

equipment type	and model;	4WD Backho	е	Pit Orientation:	Easting:	m			R.L	. Surface:	2.571	
excavation dim	ensions:	1.5m long	0.4m wide		Northing:	m			dati	um:	AHĐ	
excavation	nformation		material s	ubstance								
method  Denetration Support	notes samples, tests, etc	depth RL metres	graphic log classification symbol	.1	or components.		moisture condition	consistency/ density index	100 pocket 200 ponetro- 300 mmeter 400 meter	additio	tructure and onal observations	<b>;</b>
BH Z		_2.5		TOPSOIL: Silty Clayey SAND, fin grained, pale brown-brown, low p some rootlets to 300mm.	lasticity fines with	1	M			TOPSOIL		
	D	2.0	sc	Clayey SAND: fine to medium grange-brown / pale brown, low p	ained, lasticity fines.			ΔD				-
	D	1. <u>0</u>	SP	SAND: fine to coarse grained to f grained, pale grey-white. Becoming pale brown-white.	ne to medium		M/W					
	D D	1. <u>5</u>		Becoming white.							of groundwater a elow 1.7m depth.	nd pit
	04-04-0	_0.5		Test pit TP 3 terminated at 1.8m								
Sketch		2.5										

1	method		support	notes, s	amples, tests	class	sification symbols and	consisten	cy/density index
1	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	vs	very soft
1	X	existing excavation	ļ '	U <sub>63</sub>	undisturbed sample 63mm diameter	base	d on unified classification	s	soft
?	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
إفِ	В	bulldozer blade	1234	V	vane shear (kPa)			St	stiff
5	R	ripper	no resistance ranging to	Bs	bulk sample	mois	ture	VSt	very stiff
9	Ε	excavator	refusal	Ε	environmental sample	D	dry	H	hard
ŝ			water	R	refusal	М	moist	Fb	friable
ĭ			water level	•		W	wet	VL	very loose
šl			on date shown	1		Wp	plastic limit	L	loose
ij			1	1		W <sub>L</sub>	liquid limit	MD	medium dense
Ξĺ			water inflow	l			•	D	dense
5	l		water outflow	l				VD	von donne

Excavation No.

TP 4

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

5.4.2007

Principal:

Date completed:

5.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

CW MAK

Test pit location:

REFER TO FIGURE 1

Checked by:

rest pit location. NET EN 10													>11ECKE				
equipment type and model: 4WD Backhoe							e		Pit Orientation:	Easting:	m			R.L	Surface:	2.260	
excavation dimensions: 1.5m long 0						long (							datum: AHD				
ex		ion	info	rmation			mat	erial s	ubstance								
notes samples, tests, etc depth RL metres by 123			classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.			moisture condition consistency/ density index		100 x pocket 200 x penetro- 300 w meter								
BH		N			_2.0	]			TOPSOIL: Silty CLAY, mediu grey-black, small percentage rootlets.	of sand <10% with s		М		×	TOPSOIL		
200000000000000000000000000000000000000				D		0. <u>5</u>		CH	CLAY: medium to high plastic	oity, dark grey.		M>Wp	St	×			
					_1.5	-								A CONTRACTOR OF THE CONTRACTOR			
				D		1. <u>0</u>											
					_1.0	-											
			17 12:12pm		0.5	1. <u>5</u>								××			
			05-04-07		_0.5	2. <u>0</u>			<b></b>					XXXXX	Rapid inflo	w of groundwater at า.	
				D				SP	SAND: fine to coarse grained	., .,		W					
					_0.0	_			Test pit TP 4 terminated at 2.	1m							

Sketch

method N X	natural exposure existing excavation	support S shoring N nil	U <sub>so</sub> undisturbed sample 50mm diameter	classification symbols and soil description based on unified classification	consisten VS S	cy/density index very soft soft
BH	backhoe bucket	penetration 1 2 3 4		system	F	firm
B R	buildozer blade ripper	no resistance	V vane shear (kPa)  Bs bulk sample	moisture	St VSt	Stiff
È	excavator	ranging to	E environmental sample	D dry	H H	very stiff hard
		water	R refusal	M moist	Fb	friable
3		water level		W wet	VL	very loose
3		on date shown		Wp plastic limit	L	loose
<u> </u>		water inflow		W <sub>L</sub> liquid limit	MD D	medium dense dense
5		→ water outflow			VD	very dense

Excavation No.

TP 5

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

Date completed:

4.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

M	
. *	

equipment type and	model: 4\	WD Backho	oe .		Pit Orientation:	Easting: m				R.L	Surface: 2.765	
excavation dimensio	ns: 1.	.5m long	0.4m wide Northing: m			m			datum: AHD			
excavation infor	mation		mate	rial st	ıbstance							
notes samples, tests, etc depth			graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mino	or components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 pocket 400 meter	structure and additional observations	
BH	D D	2.5   0.5   1.0   1.5   1.5   1.0   2.0		CI SP	TOPSOIL: SAND, fine to medium brown, with low plasticity fines, apfines with some rootlets to approx  Sandy CLAY: medium plasticity, of sand fine to medium grained.  SAND: fine to medium grained, page of the pa	grained, dark proximately 30% imately 150mm. orange-brown,		W	VSt	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Rapid groundwater inflow below 1.7m depth.	
		0.5 - 2.5										

Sketch

method	i
N	natural exposure
Х	existing excavation
BH	backhoe bucket
В	buildozer blade
R	ripper
Ε	excavator

	port			
Ss	horing	N	nil	
		esistan ging to sal	ice	
wat	er			
<u>¥</u> .	water leve on date s			
<b>—</b>	water inflo	w		

water outflow

notes, samples, tests											
$U_{so}$	undisturbed sample 50mm diameter										
U <sub>50</sub>	undisturbed sample 63mm diameter										
D	disturbed sample										
٧	vane shear (kPa)										
Bs	bulk sample										
E	environmental sample										
R	refusal										
D V Bs	disturbed sample vane shear (kPa) bulk sample environmental sample										

	classification symbols and									
	description									
bas	ed on unified classification									
syst	em									
	sture									
*****										
Ð	dry									
M	moist									

plastic limit liquid limit

 $\begin{array}{c} W\rho \\ W_L \end{array}$ 

consister	cy/density index
VS	very soft
s	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense

dense

very dense

REFER TO FIGURE 1

Excavation No.

TP 6

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

5.4.2007

Principal:

\_\_\_\_\_\_

5.4.2007

Project:

Test pit location:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

CW

Checked by:

Date completed:

one and by													
equipment typ	equipment type and model: 4WD Backhoe Pit Orientation: Easting: m R.L. Surface: 2.846												
excavation din	_		1.5m J	ong (	).4m w			m			dat	lum:	AHD
excavation	info	rmation			mat	erial s	ubstance						
method  support  water  water  water  water  water  water  water  RL metres  graphic log  classification  symbol					graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.		moisture condition consistency/		100 pocket 200 penetro- 300 m meter		
BH			_2.5	0. <u>5</u>			TOPSOIL: Silty SAND, fine to medium grained, dark grey mottled white, with some rootlets and roots to 150mm.		Ď			TOPSOIL	-
		D D	2.0	1. <u>0</u>		SM	Sifty SAND: fine to medium grianed, brown / red cemented sand nodules.		М	VD		INDURAT	ED SAND?
	12:33pm		1.5	1, <u>5</u>		SP	SAND: fine to medium grained, pale brown-white with some cemented sand nodules.				ARAN MANA AN MANALA AL		-
	V 05-04-07 12		_1.0	2. <u>0</u>			Becoming pale grey-white.  Lenses of cemented sand nodules dark brown-red present.		w			Water visi groundwa	ble. Pit collapsing due to er. –
			_0.5	2.5			Test pit TP 6 terminated at 2.1m						

Sketch

- 1										
	method	nod support		notes, s	amples, tests	class	sification symbols and	consistency/density Index		
	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft	
	Х	existing excavation		. Ues	undisturbed sample 63mm diameter	base	d on unified classification	s	soft	
١!	8H	backhoe bucket	penetration	D	disturbed sample	syste	am .	F	firm	
Ď	8	bulldozer blade	1 2 3 4	٧	vane shear (kPa)			St	stiff	
2	R	ripper	ranging to	Bs	bulk sample	mois	ture	VSt	very stiff	
9	ε	excavator	refusal	E	environmental sample	D	dry	н	hard	
20			water	R	refusal	M	moist	Fb	friable	
3			waterievel			W	wet	VL	very loose	
اد		J	on date shown			Wρ	plastic limit	L	loose	
5	}					WL	liquid limit	MD	medium dense	
٤			water inflow					D	dense	
Ō		i	water outflow	I				VD.	very dense	

### Excavation No.

TP 7

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

13.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

13.4.2007 JJT

Test pit location:

REFER TO FIGURE 1

Checked by:

Date completed:

/II/\_\_\_

equipment	type	and	model:					Pit Orientation: Easting:	m			R.L	. Surface: 2.388
excavation	dim	ensic	ons: r	m long	g m v	vide		Northing:	m			datı	um; AHD
excavati	ion	info	rmation			mat	erial s	ubstance					
method 1 5 penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.		moisture condition	consistency/ density index	100 × pocket 200 × penetro- 300 w meter	structure and additional observations
НА	N		D	_2.0	0. <u>5</u>		СН	Sandy CLAY: high plasticity, dark brown, sand fir to medium grained.	ne	M			-
		▼	D	_1.5	1.0		sc	Clayey SAND: fine to medium grained, grey.		W	VD		-
				_1.0	1. <u>5</u>			Hole terminated at 1.0m, hole collapsing because groundwater. Test pit TP 7 terminated at 1m	e of				- - - -
				_0.5	2. <u>0</u>								- -
				_0.0	- 2.5								-

Sketch

Form GEO 5.2 Issue 3 Rev.2

TESTPIT 20248AA LOGS.GPJ COFFEY.GDT 23.10.07

m	ethod	support	notes,	samples, tests	clas	sification symbols and	consister	cy/density index
N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
X	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
y B⊦	H backhoe bucket	penetration	D	disturbed sample	syste	e <b>m</b>	F	firm
įВ	bulldozer blade	1234	٧	vane shear (kPa)	<b></b>		St	stiff
R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
E	excavator	refusal	E	environmental sample	Ð	dry	н	hard
ő		water	R	refusal	M	moist	Fb	friable
Ž,		water level			W	wet	VL	very loose
5		on date shown			Wp	plastic limit	L	loose
u 5			I		W <sub>L</sub>	liquid limit	MD	medium dense
έl		water inflow	l		I -		D	dense
5		→ water outflow	1		l		VO	yeni dense

Excavation No.

TP 8

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

13.4.2007

Principal:

Date completed:

13.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

JJT

Test pit location:

REFER TO FIGURE 1

Checked by:

A	
200	
MI RA	
#150	
TIME.	
F 17 11'	

equipment type and	l model:			Pit Orientation:	Easting:	m			R.L	Surface:	3.184
excavation dimensi	ons: m	long mw	ide		Northing:	m			datu	ım:	AHD
excavation info	rmation		material	substance							
method  penetration support water	notes samples, tests, etc	depth RL metres	p 25		cle characteristics, nor components.		moisture condition	consistency/ density index	100 x packet 200 x penetro- 300 w meter		structure and tional observations
HA Z Z Not Measured	: D	3.0	SP	Clayey SAND: fine to medium	grained, black.		М	Ď			
		2.5 1.0 2.0 1.5 1.5 2.0 1.0		Hole terminated at 0.6m, sand Test pit TP 8 terminated at 0.6r	too dry to retrieve.						

Sketch

method		support	notes,	samples, tests	clas	sification symbols and	consister	cy/density index
N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
×	existing excavation	<b>†</b>	U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	s	soft
8H	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
8	bulldozer blade	1234	٧	vane shear (kPa)			St	stiff
R	ripper	no resistance ranging to	Bs	bulk sample	moi	sture	VSt	very stiff
Ε	excavator	ranging to	Ε	environmental sample	D	dry	н	hard
		water	ĸ	refusai	М	moist	Fb	friable
1		water level	ŀ		W	wet	VL	very loose
1		on date shown			Wp	plastic limit	L	loose
ŀ		1.	ŀ		W <sub>L</sub>	liquid limit	MD	medium dense
1		water inflow	1			•	D	dense
1		water outflow					VO	very dense

Sheet

Excavation No.

TP 9

1 of 1

Project No:

GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS.ogged by:

CW

4.4.2007

Test pit location:

REFER TO FIGURE 1

Checked by:

M

equipr	nent t	type	and	model: 4	WD 8	3ackho	е		Pit Orientation: Easting:	m			R,L	. Surface; 2.735
excav	ation (	dim	ensic	ons: 1	1.5m l	ong (	0.4m w	ide	Northing:	m			dati	um: AHD
exca	vatio	on i	nfo	rmation			mat	erial s	ubstance					
Ψ.	ດ penetration ເ	support	water	notes samples, tests, étc	RL 1	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 popenetro- 400 meter	structure and additional observations
BH		Z		D	_2.5	0.5	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		TOPSOIL: Silty Clayey SAND, fine to medium grained, dark grey, low plasticity fines, with some rootlets and thick roots to 100mm.		М			TOPSOIL
				D	_2.0	1. <u>0</u>		SC	Clayey SAND: fine to medium grained, dark brown-black, low plasticity fines with some black cemented sand nodules up to approximately 0.13rdiameter.	m		DND		
			04-04-07 10:41am	U	_1.5	- - - 1. <u>5</u>		SP	SAND: medium to coarse grained, pale grey-white	<u>.</u> —				-
			▲ 04-0		_1.0	-			Becoming pale grey-brown.		w			Groundwater inflow below 1.8m depth.
		-		D		2.0			Test pit TP 9 terminated at 2m					
					_0.5	- - -			rest pit 17 - 9 teminiateu at 2ai					- - -
1						2.5							200	-

Sketch

method	
V	natural exposure
X	existing excavation
ВH	backhoe bucket
3	buildozer blade
₹	ripper
Ξ	excavator

	port shoring	N	nil	
	netration 2 3 4 no res rangin	g to	ice	
wa	ter			
<u>\</u>	water level on date sho	wn		

notes,	samples, tests
$U_{50}$	undisturbed sample 50mm diamete
U <sub>63</sub>	undisturbed sample 63mm diamete
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
Ε	environmental sample
R	refusal

soil	offication symbols and description description description denunified classification on the control of the cont	
mois	ture	
D	dry	
M	moist	
W	wet	
Mo	alastia limit	

liquid limit

consister	cy/density index	
vs	very soft	
S	soft	
F	firm	
St	stiff	
VSt	very stiff	
Н	hard	
Fb	friable	
VL	very loose	
L	loose	

medium dense dense very dense

MD

**REFER TO FIGURE 1** 

Excavation No.

**TP10** 

Sheet

1 of 1

GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

Date completed: 4.4.2007

Project:

Test pit location:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Checked by:

equipment typ	e and			Backho			Pit Orientation:	Easting:	m		JIICON		Surface:	2.585	
excavation dir			1.5m l	long (	).4m w	ide		Northing:	m			datı		AHD	
excavation							ubstance					duit	*****	7,110	
method  7 penetration	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mind	r components.		moisture condition	consistency/ density index	100 x pocket 200 x penetro- 300 m meter 400 meter	addit	structure and ional observations	
BH			2.5	, , , , , , , , , , , , , , , , , , ,	**************************************		TOPSOIL: Clayey SAND, fine to i brown, low plasticity fines, with so roots (10-30mm thick) to approxir	me rootiets and nately 450mm.		М			TOPSOIL		
	- P.	D	_2.0	0. <u>5</u>		\$C	Clayey SAND: fine to medium gra with some cemented sand nodule fines.	nined, pale browres, low plasticity	n,		MD				
Water Company of Company of Company	None Observed		1.5	1. <u>0</u>	<u>/</u>	SP	SAND: fine to medium grained, po	ale grey-white.			D				-
van de la constant de		D		-			:				VD				
			_1.0	1. <u>5</u>											-
		D					One big, 0.7mm dia., cemented s	and nodule.		w			No obvious inflow but p	s groundwater level o it collapsing.	r
			_0.5	2. <u>0</u>			Test pit TP10 terminated at 1.9m								-
				25											

Sketch

method support notes, samples, tests classification symbols and consistency/density index natural exposure S shoring undisturbed sample 50mm diameter soil description very soft X BH B R existing excavation U<sub>63</sub> D undisturbed sample 63mm diameter based on unified classification S soft backhoe bucket disturbed sample penetration system firm bulldozer blade vane shear (kPa) St no resistance Bs E ripper bulk sample moisture VSt very stiff excavator environmental sample dry hard refusal moist Fb friable VL very loose water level on date shown L MD plastic limit loose fiquid limit medium dense water inflow dense water outflow very dense

Excavation No.

**TP11** 

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

4.4.2007 CW

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment	t type	and	model:	4WD	Backho	е		Pit Orientation:	Easting:	m			R.L	Surface:	2.732	
excavation	ı dim	ensic	ons:	1,5m l	long (	).4m w	ide		Northing:	m			dat	um:	AHD	
excavat	ion	info	rmation			mat	erial s	ubstance								
method 1 2 penetration		water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mino	r components.		moisture condition	consistency/ density index	100 x pocket 200 x penetro- 300 w meter		structure and tional observations	
BH	Z		D	_2.5	0.5		SC	TOPSOIL: Silty SAND, fine to med grey-brown, low plasticity fines? w Clayey SAND: fine to medium gragrey-brown, low plasticity fines.  Clayey SAND: fine to medium graorange-brown, dark brown-black, with cemented sand nodules up to 0.13mm dia.	rith some rootlets  lined, pale  lined, low plasticity fine		M	VD		TOPSOIL		-
			D	_1.5	1. <u>0</u>		SP	SAND: fine to coarse grained, pake	e grey-brown.		W				·	-
Sketch		04-04-07 11:15am	D	_0.5	2.0			Test pit TP11 terminated at 1.9m							Alexander of the second of the	

Sketch

Г	method		support	notes, s	amples, tests	clas	sification symbols and	consistenc	y/density index
П	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	lios	description	VS	very soft
П	X	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	s	soft
1	BH	backhoe bucket	penetration	D	disturbed sample	syste	e <b>m</b>	F	firm
9	В	buildozer biade	1 2 3 4	V	vane shear (kPa)			St	stiff
5	R	ripper	ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
3	E	excavator	refusal	E	environmental sample	D	dry	н	hard
ğ			water	R	refusal	M	moist	Fb	friable
4			water level			W	wet	VL	very loose
á			on date shown			Wp	plastic limit	L	loose
31						W <sub>L</sub>	liquid limit	MD	medium dense
ŧI.			water inflow					D	dense
Ž.			—		İ			VD	very dense

Excavation No.

TP12

Sheet

1 of 1 GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

4.4.2007 CW

Test pit location:

REFER TO FIGURE 1

Checked by:

R Surface: 3.126

equ	iipment	type	and	model:	4WD	Backho	е		Pit Orientation:	Easting:	m			R.L	Surface:	3.126	
exc	avation	dim	ensid	ons:	1.5m l	long	0.4m v	ide		Northing:	m			dat	tum:	AHD	
ex	cavati	on	info	rmation			mat	erial s	ubstance								
method	ר ס penetration	support	water	notes samples, tests, etc	RL	depth metres		classification symbol	materi soil type: plasticity or par colour, secondary and r	ticle characteristics, minor components.		moisture condition	consistency/ density index	200 pocket 200 penetro- 300 meter		structure and tional observation	S
Н		Z	n	D D	2.5	1.0		SC CL SP	TOPSOIL: Silty Clayey SAND grained, dark grey, low plastic rootlets to approximately 350r  Clayey SAND / Sandy CLAY: grained, dark grey-brown, me  Sandy CLAY: low to medium orange-brown, sand fine to m  SAND: fine to coarse grained.  Becoming pale grey-brown.	ity fines, with some mm.  fine to medium dium plasticity fines.  plasticity, edium grained.		M	St VD	X	TOPSOIL	<b>-</b>	
			04-04-07 11:30am		_1.0	2.5			rest pit ir 12 teinimateu at 21	"							- - -

					<del></del>				
	method		support	notes, s	samples, tests	clas	sification symbols and	consisten	cy/density index
	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
	X	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
7.	BH	backhoe bucket	репetration	D	disturbed sample	syste	em	F	firm
é	В	bulldozer blade	1 2 3 4	٧	vane shear (kPa)			St	stiff
6	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
읦	E	excavator	ranging to	E	environmental sample	D	dry	н	hard
33			water	Ŕ	refusal	М	moist	Fb	friable
5.2			water level			W	wet	VL	very loose
			on date shown			Wρ	plastic limit	L	loose
GEO						Wر	liquid limit	MD	medium dense
E			water inflow					D	dense
ñ			→ water outflow					VD	very dense

#### Excavation No.

1 of 1

Sheet Project No:

GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

4.4.2007 4.4.2007

Principal:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

CW

**TP13** 

Project:
Test pit location:

REFER TO FIGURE 1

Checked by:

<u>////\_\_\_\_\_</u>

equipment t	type	and	model: 4	WD E	Backho	е		Pit Orientation: Easting:	m			R.L	. Surface: 2.825
excavation (	dim	ensic	ons:	1.5m l	ong (	).4m w	ide	Northing:	m			dati	um: AHD
excavation	on	info	rmation			mat	erial s	ıbstance					
method  1  No penetration	support	water	notes samples, tests, etc	ŘL :	depth metres.	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 popenetro- 400 meter	structure and additional observations
ВН	N			_2.5	0. <u>5</u>	**************************************	SM	TOPSOIL: Silty SAND, fine to medium grained, digrey-black with some rootlets and roots (10-30mr thick).  Silty SAND: dark brown-dark red, fine to medium	n	D/M	VD		TOPSOIL
		-	D	_2.0	1.0		Sivi	grained, with cemented sand nodules to 0.16mm	dia.	JVI	, VD		Bucket scraping on hard layer.
		04-04-07 11:51am	D	_1.5	1. <u>5</u>			Becoming brown-pale brown cemented nodules of sand still present.	of				
		Ò	D	_1.0	2.0			Becoming dark brown-brown weakly cemented nodules present. Test pit TP13 terminated at 2m		W			-
				_0.5	2.5								

Sketch

GEO 5.2 Issue 3 Rev.2

method		support	notes, s	samples, tests	clas	sification symbols and	consistenc	y/density index
N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
Х	existing excavation	j	U <sub>63</sub>	undisturbed sample 63mm diameter	bas	ed on unified classification	S	soft
BH	backhoe bucket	penetration	D	disturbed sample	syst	em	F	fim
В	bulldozer blade	1234	V	vane shear (kPa)			St	stiff
R	ripper	no resistance ranging to	Bs	bulk sample	moi	sture	VSt	very stiff
8 €	excavator	ranging to	E	environmental sample	D	dry	H	hard
		water	R	refusal	М	moist	Fb	friable
!		w water level			W	wet	VL	very loose
		on date shown			Wp	plastic limit	L	loose
<b>! [</b>					W,	liquid limit	MD	medium dense
1		water inflow					D	dense
i <b>i</b>		→ water outflow					VD	very dense

Excavation No.

**TP14**1 of 1

Sheet

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

Date completed:

4.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

161	,
M	

equipment type and model: 4WD Backho	e Pit Orientation: Easting: m	R.L. Surface: 2.760
excavation dimensions: 1.5m long	0.4m wide Northing: m	datum: AHD
excavation information	material substance	
notes samples, tests, etc depth RL metres	ති වී කි colour, secondary and minor components.	moisture condition consistency/ density index do a pocket
D _2.0 1.0	TOPSOIL: Silty CLAY, medium plasticity fines, brown with some rootlets approximately 400mm.  CH CLAY: high plasticity, brown-dark brown.  Becoming dark grey-black with some mottled orange.	VSt X X X
_0.5	Test pit TP14 terminated at 1.8m	

- 1									
1	method		support	notes, s	samples, tests	clas:	sification symbols and	consisten	cy/density index
	N	natural exposure	S shoring N nil	U <sub>so</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
1	Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	d on unified classification	S	soft
7	BH	backhoe bucket	penetration	D	disturbed sample	syste	ım	F	firm
Ó	В	bulldozer blade	1234	٧	vane shear (kPa)			St	stiff
9	R	ripper	no resistance ranging to	8s	bulk sample	mois	ture	VSt	very stiff
2	E	excavator	ranging to refusal	Ε	environmental sample	0	dry	н	hard
2	İ		water	R	refusal	M	moist	Fb	friable
7.4			water level			W	wet	VL	very loose
Ś	•		n date shown			Wp	plastic limit	L	loose
5			_			W <sub>L</sub>	liquid limit	MD	medium dense
=	l		water inflow					D	dense
5	l		─ water outflow					VO	very dense

Excavation No.

TP15

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

4.4.2007

equipment type and	d model: 4W	VD Backho	е	Pit Orientation:	Easting:	m		R.L	. Surface; 2.355
excavation dimensi	ons: 1.5	õm long (	0.4m wide		Northing:	m		dat	um: AHD
excavation info	rmation		material	substance					
method  t penetration support	notes samples, tests, etc	depth RL metres	graphic log classification symbol	<u></u>	components.	moisture condition	consistency/ density index	100 pocket 200 U penetro- 300 u meter	structure and additional observations
BH		2.0	SP	TOPSOIL: Silty (Clayey) SAND, fin grained, dark grey-black, with some rootlets to approximately 400mm.  SAND: fine to coarse grained, pale small percent of fines <20%.  Becoming pale grey mottled black	e roots 10mm and	d M	D/VD		Pit collapsing no groundwater observed.
	_0	2.0		Pit collapsing. Test pit TP15 terminated at 1.7m					   
	0	2.5							_

Sketch

method		support	notes,	samples, tests	clas	sification symbols and	consister	ncy/density index
N	natural exposure	Sishoring Ninil	U <sub>so</sub>	undisturbed sample 50mm diameter		description	VS .	very soft
X	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter		ed on unified classification	S	soft
вн	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
В	bulldozer blade	1 2 3 4 no resistance	٧	vane shear (kPa)	-		<b>–</b> St	stiff
R	ripper		Bs	bulk sample	moi:	sture	VSt	very stiff
E	excavator	ranging to refusal	E	environmental sample	D	dry	Н	hard
		water	R	refusal	M	moist	Fb	friable
		water level	1		W	wet	VL	very loose
l		on date shown	ł		Wp	plastic limit	L	loose
		1_	1		Wر	liquid limit	MD	medium dense
Í		water inflow	1				D	dense
		water outflow	1		İ		VD	very dense

Excavation No. TP16

Sheet

1 of 1

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

4.4.2007 4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDEN & ogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

R.L. Surface: 2.683

equipment ty	уре а	and	model: 4	IWD E	Backho	е		Pit Orientation:	Easting:	m			R.L.	Surface:	2.683	
excavation of	dime	nsio	ns: 1	.5m lo	ong (	0.4m w	ride		Northing:	m			dati	um:	AHD	
excavatio	on ir	ıfor	mation			mat	erial și	ubstance								
120	support	water	notes samples, tests, etc	RL r	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mino	r components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 popenetro- 400 meter	addit	structure and ional observation	s
BH		04-04-1/ 12:54pm	D O	_2.5	0.5 1.0 1.5		SP	TOPSOIL: Silty SAND, fine to med grey-black mottled white, with som	ne rootlets.	rrk	M/w	VD		TOPSOIL		
	*		D				SP	SAND: fine to medium grained, da cemented sand nodules, coffee ro	ark grey-black,		W			INDURATE	ED SAND	
				_0.5	2.0			Pit collapsing. Test pit TP16 terminated at 1.8m	in the second							

	method	support	notes, samples, tests	classification symbols and	consistency/density index
	N natural exposure	S shoring N mil	U <sub>so</sub> undisturbed sample 50mm diameter	soil description	VS very soft
	X existing excavation		U <sub>63</sub> undisturbed sample 63mm diameter	based on unified classification	S soft
١į	8H backhoe bucket	penetration	D disturbed sample	system	j F firm
į	8 bulldozer blade	1234	V vane shear (kPa)		St stiff
5	R ripper	no resistance ranging to	Bs bulk sample	moisture	VSt very stiff
5	E excavator	refusal	E environmental sample	D dry	H hard
2		water	R refusal	M moist	Fb friable
7		water level		W wet	VL very loose
آد	Į.	on date shown		Wp plastic limit	L loose
5		1.		W <sub>L</sub> liquid limit	MD medium dense
Ė	ł	water inflow		I -	D dense
5	!	water outflow			VD very dense

Excavation No. TP17

Sheet

1 of 1

Project No:

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

4.4.2007 4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS\_ogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment type and m	odel: 4WD B	ackhoe		Pit Orientation:	Easting:	m			R.L	Surface: 2,635
excavation dimensions	s: 1.5m lo	ing 0.4	4m wide		Northing:	m			dat	um: AHD
excavation inform	nation		material sı	naterial substance						
	notes samples, ests, etc RL m	depth netres	graphic log classification symbol	material soil type: plasticity or partic colour, secondary and mi	cle characteristics, nor components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 pocket 400 meter	
BH	D _2.0  D _1.5  D _0.5	0. <u>5</u>	SP	TOPSOIL: Silty Clayey SAND, if grained, dark grey-black mottle fines, with some rootlets.  Silty Clayey SAND: fine to medium plast cemented nodules of SAND. Clayey SAND: fine to medium glast cemented nodules of sand.  SAND: fine to coarse grained, particles of sand.  SAND: fine to coarse grained, particles of sand.  Becoming grey-brown.	d white, low plastici lium grained, dark sticity fines, with grained, brown-pale weakly cemented	Đ	M W	VD		Rapid inflow of groundwater below 1.7m depth.

me	thod	support	notes,	samples, tests	clas	sification symbols and	consister	cy/density index
N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
y BH	l backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
В	bulldozer blade	1234	V	vane shear (kPa)			St	stiff
R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
ÿ E	excavator	refusal	E	environmental sample	D	dry	н	hard
2		water	R	refusal	М	moist	Fb	friable
ž		water level			w	wet	VL	very loose
5		on date shown	l		Wp	plastic limit	L	loose
네.		1.	1		W <sub>L</sub>	liquid limit	MD	medium dense
≟I		water inflow	1		_		D	dense
5		water outflow	į.				VD	very dense

Excavation No.

**TP18** 

Sheet

1 of 1 GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

5.4.2007

Principal:

Date completed:

5.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment type and model:	4WD Backhoe	Pit Orientation: Easting: m	R.L. Surface: 2.302
excavation dimensions:	1.5m long 0.4m wid	wide Northing: m	datum: AHD
excavation information	mate	terial substance	
notes sample: tests, et		material  logical soil type: plasticity or particle characteristics, colour, secondary and minor components.	Condition Condition Consistency/ density index density index density index approximate and additional observations approximate and additional observations
BH		TOPSOIL: Sandy CLAY, low to medium plasticity, dark brown-black, sand fine to medium grained, with some rootlets to 100mm.  CI CLAY: medium plasticity, dark grey mottled orange, with minor sand component approximately 10%.  SC Clayey SAND: fine to medium grained, grey, low plasticity fines.  SP SAND: fine to coarse grained, pale grey-white.  Becoming grey / brown.  Sand becoming indurated and dark brown / red.	VSt VSt VD
	_0.0	Pit collapsing due to inflow of groundwater, collapsing from sides. Test pit TP18 terminated at 1.9m	

Sketch

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TESTPIT 20248AA LOGS.GPJ COFFEY.GDT 23.10.07

method	
N	natural exposure
X	existing excavation
BH	backhoe bucket
В	bulldozer blade
R	ripper
E	excavator

	роп			
Ss	horing	Ν	nil	
	etration			
1 2				
ж,	no resi		ice	
800	ranging	; to		
-				
wat	er			
•	water level			
<u>.                                    </u>	on date short	۸n		

water inflow

water outflow

notes, sa	mples, tests
U <sub>50</sub>	undisturbed sample 50mm diamete
U <sub>63</sub>	undisturbed sample 63mm diamete
Ð	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
Ε	environmental sample
R	refusal

symbols and
п
ed classification

plastic římít

liquid limit

consisten	cy/density ind
VS	very soft
s	soft
F	firm
St	stiff
VSt	very stiff
Н	hard
Fb	friable

L MD

friable very loose

loose

dense

very dense

medium dense

Excavation No.

**TP19** 

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

TATTERSALE SURVETURS FIT LIL

Date completed:

4.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

///

equipment t	type	and	model:	4WD E	3ackho	е		Pit Orientation:	Easting:	m			R.L	Surface:	2.261	
excavation	dime	ensid	ns:	1.5m k	ong (	0.4m w	ide		Northing:	m			dat	tum:	AHD	
excavati	on i	nfo	rmation			mat	erial s	ubstance								
method L N penetration	support	water	notes samples, tests, etc	RL I	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mino	r components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 pochetro- 400 meter		structure and tional observations	
ВН	N			_2.0	0. <u>5</u>		СН	TOPSOIL: Clayey SAND, fine to n dark brown-black, tow plasticity fin rootlets.  Sandy CLAY: medium to high plast brown-black, sand fine to coarse g	es with some		Ď		MANAGEMENT OF A STATE	TOPSOIL		- - - -
		-	D	_1.5	- - 1. <u>0</u>											 
THE PERSON NAMED IN PROPERTY OF THE PERSON NAMED IN PROPERTY O		04-04-07 2:31pm	D	_1.0	1.5		SP	Becoming dark grey-grey. SAND: fine to coarse grained, pale	grey-white.		W	VD				-
	Þ	•	Q	_0.5	_			Becoming pale brown / grey.								-
					2. <u>0</u> -			Pit collapsing due to groundwater. Test pit TP19 terminated at 1.8m								
				_0,0	2.5											-

	method		support	notes,	samples, tests	clas	sification symbols and	consister	cy/density index
	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	l vs	very soft
	Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
7.	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
é	В	buildozer blade	1234	ν	vane shear (kPa)			St	stiff
3	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
9	E	excavator	refusal	Ε	environmental sample	D	dry	н	hard
8			water	R	refusal	M	moist	Fb	friable
5.2			w water level			W	wet	VL	very loose
			→ on date shown			Wp	plastic limit	L.	loose
GEO						W <sub>L</sub>	liquid limit	MD	medium dense
ε			water inflow	I				D	dense
ğ			─ water outflow	I	i			VD	very dense

Excavation No.

TP20

Sheet

1 of 1 GEOTSGTE20248AA

Cliont

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal:

4.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

Date completed:

M	
intaca.	2 255

equi	pment	type	and	model:	4WD	Backho	е		Pit Orientation:	Easting:	m			R.L	. Surface:	2.255	
exca	avation	dim	ensio	ns:	1.5m	long (	3,4m w	ide .		Northing:	m			dati	ım:	AHD	
ex	cavati	on	info	rmation			mat	erial s	ubstance								
method	v penetratio⊓	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mine	or components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 ponetro- 400 meter		structure and tional observatio	ns
ВН		Z			_2.0	0.5		CL	TOPSOIL: Silty Clayey SAND, fin grained, dark grey-black mottled rootlets.  Sandy CLAY: low plasticity, dark fine to medium grained, trace of cemented sand nodules.  Sandy CLAY: low to medium plar grey-pale brown mottled orange, grained.	white, with some brown-red, sand rootlets and sticity, pale	/	М			TOPSOIL		- 
				D	_1.5	1. <u>0</u>						M/W					- - -
	The control of the factor of t		7 2:15pm	D	_1.0	-   -   -											- - -
			04-04-07	D		1. <u>5</u>			Becoming pale brown / grey.								
					_0.5	2.0			Pit collapsing due to groundwater Test pit TP20 terminated at 1.7m	;							- - - -
					_0.0	2.5			,					W AND ADDRESS OF THE STATE OF T			

Sketch

- 1						
	method	support	notes, samples, tests	classification symbols and	consistency/o	density index
	N natural exposu	ıre Sshoring Ninil	U <sub>so</sub> undisturbed sample 50mm diameter	soil description	vs	very soft
	X existing excav	ation	U <sub>63</sub> undisturbed sample 63mm diameter	based on unified classification	S	soft
į	BH backhoe buck	et penetration	D disturbed sample	system	F	firm
٤	B bulldozer blad	e 1234	V vane shear (kPa)		<b>—</b> St	stiff
5	R ripper	no resistance ranging to	Bs bulk sample	moisture	VSt	very stiff
3	E excavator	refusal	E environmental sample	D dry	Н	hard
2		water	R refusal	M moist	Fb	friable
ı		water level		W wet	VL VL	very loose
śl		on date shown		Wp plastic limit	l L	loose
4		1.		W <sub>L</sub> liquid limit	MD	medium dense
Ě		water inflow			D	dense
5	l	water outflow			VD	very dense

Excavation No.

TP21

1 of 1

Sheet

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007 4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

Date completed:

quipment	type	and	model:	WD E	3ackho	е		Pit Orientation:	Easting:	m				R.L	Surface:	2,675
cavation				1.5m k	ong (	0.4m w	ide		Northing:	m				dat	um:	AHD
excavati	on	nfo	rmation			mat	erial s	ubstance								
12 penetration	support	water	notes samples, tests, etc	RL i	depth metres	graphic log	classification symbol	material soil type: plasticity or partic colour, secondary and mir	or components.		moisture condition	consistency/ density index	100 200 A pocket		addit	structure and ional observations
	Z		D	_2.5	0. <u>5</u>		SP	TOPSOIL: Silty Clayey SAND, figrained, dark grey, low plasticity rootlets and some thick roots to Clayey SAND: fine to medium g brown, low plasticity fines with so sand nodules.  SAND: fine to medium grained,	fines with some 300mm. rained, orange-pal ome cemented rec	e i	M	VD			TOPSOIL	
		04-04-07		1.0	1. <u>5</u>			Becoming pale brown-pale grey		-	w				Rapid grou 1.7m depth	indwater inflow below 1.
			D				•	Test pit TP21 terminated at 2m					$\top$	П		
MARA PARAMANANANANANANANANANANANANANANANANANAN				_0.5	-											
					2.5											

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TESTPIT 20248AA LOGS.GPJ COFFEY.GDT 23.10.07

method	
N	natural exposure
Х	existing excavation
BH	backhoe bucket
В	buildozer blade
R	ripper
E	excavator

SU	pport				
S	shoring	N		nil	
	netration				
1	234		_		
		o resista Inging to		CE	
	ooo ne	fusal	•		
w	ater				
	water le	vel			
¥.	on date	shown	ı		

water inflow

water outflow

пotes, sa	mples, tests
$U_{50}$	undisturbed sample 50mm diamete
Ues	undisturbed sample 63mm diamete
D	disturbed sample
٧	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

soil	sification symbols and description ed on unified classification em
mois	sture
D	dry
M	moist

plastic limit

liquid limit

Wp

ına	l
ation	

consistency/density ind						
VS	very soft					
S	soft					
F	firm					
St	stiff					
VSt	very stiff					
н	hard					
Fb	friable					
VL	very loos					
1	lanca					

medium dense

very dense

dense

MĐ

Excavation No.

TP22

# **Engineering Log - Excavation**

Sheet

1 of 1 GEOTSGTE20248AA

Cliant

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

4.4.2007

Test pit location:

REFER TO FIGURE 1

Checked by:

Date completed:

CW

equipment type an	d model: 4	WD Backho	e	Pit Orientation: Easting: m			R.L	. Surface: 2.332
excavation dimens	ions: 1	.5m long	0.4m wide	Northing: m			datu	ım: AHD
excavation inf	ormation		material s	ubstance				
method  Denetration Support water	notes samples, tests, etc	depth RL metres	graphic log classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	100 x pocket 200 x penetro- 300 w meter	structure and additional observations
BH		_2.0 -		TOPSOIL: Sandy CLAY, low to medium plasticity, dark brown-black, sand fine to medium grained, with some rootlets.	D			TOPSOIL -
Andrews of Property of the State of the Stat	D	_	CI	CLAY: medium plasticity, dark brown-black, with some sand component approximately 30%.	М			
		_1.5	SM	Silty SAND: fine to medium grained, brown-pale brown, with some cemented sand nodules.		D VD		_
	D	_1.0	SP	SAND: fine to medium grained, pale grey-white.	M/W	VU		-
		1. <u>5</u>		Becoming pale grey / brown.				-  -
<b>_</b> wc	D	_0.5 -						-
04-04-07 2:50pm		2. <u>0</u> -		Pit collapsing due to groundwtaer inflow. Test pit TP22 terminated at 1.9m				-
04-6		_0.0 -		,				<u>-</u>

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method		support	notes, samples, tests			sification symbols and	consistency/density index		
N	natural exposure	Sishoring Ninil	Usa	undisturbed sample 50mm diameter	soil	description	VS	very soft	
х	existing excavation	I.	$U_{63}$	undisturbed sample 63mm diameter	base	ed on unified classification	s	soft	
BH	backhoe bucket	penetration	D	disturbed sample	syst	em	F	firm	
В	bulldozer blade	1234	V	vane shear (kPa)			St	stiff	
R	пррег	no resistance ranging to	Bs	bulk sample	moi	sture	VSt	very stiff	
E	excavator	ranging to refusal	Ε	environmental sample	D	dry	н	hard	
		water	R	refusal	М	moist	Fb	friable	
		water level			w	wet	VL	very loose	
		on date shown			Wp	plastic limit	L	loose	
		1			W.	liquid limit	MD	medium dense	
ı		water inflow			1	·	D	dense	
ı		→ water outflow	1		1		VD	very dense	

Excavation No.

TP23

Sheet 1 of 1

GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

5.4.2007

5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment t	type	and	model: 4	WD E	Backho	е		Pit Orientation: Easting:	m			R.L	. Surface: 2.090		
excavation	dim	ensic	ns: 1	.5m k	ong (	).4m w	de	Northing:	m			datı	um: AHD		
excavati	on i	nfo	rmation			mate	material substance								
method 1 0 penetration	support	notes samples, tests, etc depth RL metres 55				graphic log	classification symbol	material soil type: plasticity or particle characteristic colour, secondary and minor components	ticle characteristics.			100 pocket 200 pocket 300 popenetro- 400 meter			
	Z	None Observed	D	_1.5	0.5		SC CL SC SP	TOPSOIL: Silty Clayey SAND, fine to medium grained, dark grey-black, low plasticity fines, wit some rootiets to 300mm.  Clayey SAND: fine to medium grained, dark grey-black, low to medium plasticity fines.  Sandy CLAY: low to medium plasticity, pale broorange, sand fine to medium grained.  Clayey SAND: fine to medium grained, pale grey-pale brown, low plasticity fines.  SAND: fine to coarse grained, pale grey-white.	wn /	M	VD		No visible water, but pit collapsing below 1.7m depth.		
8883			<u>.</u>	_0.0	2.0			Test pit TP23 terminated at 2m							
					2.5										

Sketch

classification symbols and consistency/density index method support notes, samples, tests natural exposure undisturbed sample 50mm diameter soil description X BH B R U<sub>ss</sub> existing excavation undisturbed sample 63mm diameter based on unified classification S soft disturbed sample firm backhoe bucket system bulldozer blade vane shear (kPa) St stiff Bs bulk sample moisture VSt very stiff ripper dry moist excavator environmental sample hard М Fb friable refusal ٧L very loose water level on date shown plastic limit MD liquid limit medium dense dense water outflow very dense

Excavation No.

TP24

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

5.4.2007 CW

Test pit location:

REFER TO FIGURE 1

Checked by:

R.L. Surface: 2.177

equipment type and model: 4WD Backho							е		Pit Orientation:	Easting:	m			R.L	. Surface:	2.177	
ехс	cavation	ı dim	ensid	ons:	1.5m l	ong (	0.4m w	ride		Northing:	m			dati	um:	AHD	
excavation information								material substance									
method	t penetration	support	water	поtes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or partic colour, secondary and mi	nor components.		moisture condition	consistency/ density index	100 pocket 200 pocket 300 popenetro- 400 meter	addit	structure and ional observations	
HB		Z	05-04-07 11:44am	D	_1.5	1. <u>0</u>		CL.	TOPSOIL: Sandy CLAY, low to sand fine to medium grained, wi 100mm.  Sandy CLAY: low to medium plifine to coarse grained.  SAND: fine to medium grained, mottled orange.  Lenses of colour change to pale some clay lenses.  Pit collapsing from groundwater Test pit TP24 terminated at 2m	e grey / brown, with	ind	W	VD	XX	TOPSOIL		
L						2.5			0.1.00								_

- 1										
ſ	method	***	support	notes, samples, tests			sification symbols and	consistency/density index		
-	N	natural exposure	S shoring N nit	U <sub>so</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft	
- 1	Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	d on unified classification	S	soft	
N	8H	backhoe bucket	penetration	D	disturbed sample	syste	em .	F	firm	
<b>⊚</b>	В	bulldozer blade	1234	V	vane shear (kPa)			St	stiff	
51	R	ripper	no resistance ranging to	Bs	bulk sample	mois	iture	VSt	very stiff	
91	E	excavator	refusal	E	environmental sample	ס	dry	н	hard	
8			water	R	refusal	M	moist	Fb	friable	
2			water level			W	wet	VL	very loose	
ål.			on date shown			Wp	plastic limit	L	loose	
ΞĮ						W,	liquid limit	MD	medium dense	
ĔΙ			water inflow	Ì		_		D	dense	
틹			→ water outflow	I				VD	very dense	

Excavation No.

**TP25** 

Sheet

1 of 1 GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS.ogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

Date completed:

5.4.2007

equipment type and model: 4WD Backho							е		Pit Orientation:	Easting:	m			R.	L. Surface:	2.611	
excavation dimensions: 1.5m long							).4m w	ide		Northing:	m			da	itum:	AHD	
excavation information							mat	erial s	ıbstance								
method	c penetration	support	water	notes samples, tests, etc	RL t	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and mino	r components.		moisture condition	consistency/ density index	100 y pocket 200 y penetro- 300 w meter		structure and litional observations	
ВН		Z			_2.5	0. <u>5</u>			TOPSOIL: Silty SAND, fine to med grey mottled white with some rootl (10mm) to 150mm.	ets and roots		D	D		TOPSOIL	FED SAND	- - -
				D D	2.0	1. <u>0</u>			cemented nodules of SAND.	u, oark grey-bia	ick,	IVI	VD		INDOKA	ED SAND	
			05-04-07 11:08am	<u> </u>	_1.5	- - 1. <u>5</u>			100mm band of pale grey-pale brobecoming grey-brown weakly cem nodules.			W					- - - -
	The state of the s		05-04-0	D	-	2.0			Becoming dark brown / red weakly	/ sand nodules.					Rapid infl	ow of groundwater be tth.	 wol:
					_0.5	- - - 2.5			Test pit TP25 terminated at 2m								- - -

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TESTPIT 20248AA LOGS.GPJ COFFEY.GDT 23.10.07

natural exposure
existing excavation
backhoe bucket
bulldozer blade
ripper
excavator

sup	port			
SS	horing	N	ni!	
	etration			
1 2	<u>34</u>			
15		sistar	ice	
	rangi			
	reius	al		
wat	ter			
_	water level	ı		
<u>.</u>	on date sh	own.		

water outflow

notes, samples, tests									
U <sub>50</sub>	undisturbed sample 50mm diamete								
$U_{63}$	undisturbed sample 63mm diamete								
D	disturbed sample								
V	vane shear (kPa)								
Bs	bulk sample								
E	environmental sample								
R	refusal								

soil	sification symbols and description d on unified classification em	_
moi	sture	
Ð	dry	
M	moist	

plastic limit

liquid limit

Wp

	consiste	ency/density index
	vs	very soft
	S	soft
	F	firm
_	St	stiff
	VSt	very stiff
	н	hard
	Fb	friable
- 1	VL	very loose

~	10.,00
	soft
	firm
ŧ	stiff
St	very stiff
	hard
b	friable
L	very loose
	loose
ID.	medium c

dense

very dense

Sheet

TP26

1 of 1

Project No:

GEOTSGTE20248AA

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TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

Excavation No.

4.4.2007 4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

4WD Backhoe 1.709 equipment type and model: Pit Orientation: Easting: R.L. Surface: m Northing: datum: AHD excavation dimensions: 1.5m long 0.4m wide excavation information material substance pocket penetro-meter classification symbol consistency/ density index notes material graphic log structure and samples. method support additional observations tests, etc kPa soil type: plasticity or particle characteristics, depth RL metres 200 pg 4 colour, secondary and minor components. 123 TOPSOIL: Silty Sandy CLAY, medium plasticity, dark grey-black, sand fine to medium grained, with some rootlets to 100mm. \_1.5 SAND: fine to coarse grained, pale grey-white. D 0.5 D \_1.0 1.0 D Becoming pale brown / grey. 0.5 Pit collapsing due to groundwater. Test pit TP26 terminated at 1.5m D 0.0 2.0 -0.5

Sketch

GEO 5.2 Issue 3 Rev.2

L.											
ſ	method		support	notes, s	amples, tests	clas	sification symbols and	consisten	cy/density index		
	N	natural exposure	S shoring N nil	U₅o	undisturbed sample 50mm diameter	soil	description	VS	very soft		
	X	existing excavation		U <sub>83</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft		
Ņ	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm		
é.	В	bulldozer blade	1234	V	vane shear (kPa)			St	stiff		
9	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff		
Sue	E	excavator	refusal	E	environmental sample	D	dry	Н	hard		
SS			water	R	refusal	M	moist	Fb	friable		
5.2			water level			W	wet	٧L	very loose		
$\circ$			on date shown			Wp	plastic límit	L	loose		
Ü						WL	fiquid limit	MD	medium dense		
			water inflow	l				D	dense		
E o			water outflow	l				VD	very dense		

<u>.</u>.

TP27

Sheet Project No:

Excavation No.

1 of 1 GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

4.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

Purface: 1.536

4.4.2007

equipment type and model: 4WD Backho							e Pit Orientation: Easting: m R.L., Surface: 1.				. Surface: 1.536		
excavation dimensions: 1.5m long							ide	Northin	g: r	m		date	um: AHD
excavati	on	info	rmation			mat	naterial substance						
method 1 2 penetration	support	water	notes samples, tests, etc	RL I	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteris colour, secondary and minor componer	ıts.	moisture	consistency/ density index	100 pocket 200 d penetro- 300 m meter	structure and additional observations
BH	N			_1.0	0. <u>5</u>			TOPSOIL: Silty (Clayey) SAND, fine to mediu grained, dark grey-black, with some rootlets to 200mm.	์ ก	D			TOPSOIL
			D	_0.5	- - 1. <u>0</u>		SM	Silty SAND: fine to medium grained, dark browith some cemented sand nodules.  SAND: fine to coarse grained, brown / grey, was small percent of fines approximately 20-30% clay lenses or nodules.	vith — —	M	VD		-
		V 04-04-07 3:46pm	D	_0.0	1. <u>5</u>			Becoming pale grey-white.  Becoming pale grey / brown.		M/W			
			D	0.5	2. <u>0</u> - - - 2.5	`		Pit collapsing due to groundwater inflow. Test pit TP27 terminated at 1.8m					

ı	method		support	notes, samples, tests	classification symbols and	consistency/density index
1	N	natural exposure	S shoring N nil	U <sub>so</sub> undisturbed sample 50mm diameter	soil description	VS very soft
١	Х	existing excavation	ŀ	U <sub>63</sub> undisturbed sample 63mm diameter	based on unified classification	S soft
۱	вн	backhoe bucket	penetration	D disturbed sample	system	F firm
	В	bulldozer blade	1 2 3 4	V vane shear (kPa)		St stiff
	R	ripper	no resistance ranging to	Bs bulk sample	moisture	VSt very stiff
ì	Ε	excavator	ranging to refusal	E environmental sample	D dry	H hard
			water	R refusal	M moist	Fb friable
į			water level		W wet	VL very loose
1			on date shown	[	Wp plastic limit	L loose
ĺ				· .	W, liquid limit	MD medium dense
1			water inflow	1		D dense
: 1				1		VD year donce

Excavation No.

TP28

Sheet

1 of 1 GEOTSGTE20248AA

Client.

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

4.4.2007

Principal:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

4.4.2007 CW

Project:
Test pit location:

REFER TO FIGURE 1

Checked by:

equipment	type	and	model: 4	4WD	Backho	е		Pit Orientation: Easting: m			R.L	. Surface: 2.012
excavation	dim	ensic	ons:	1.5m l	long (	0.4m w	/ide	Northing: m			dati	um: AHD
excavat	ion	info	rmation			mat	erial s	ubstance		,		
method 1 5 penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	100 pocket 200 pocket 300 ponetro- 400 meter	structure and additional observations
HB	N		D	_1.5	0.5		SM	TOPSOIL: Silty SAND, fine to medium grained, dark grey-black, with some rootlets.  Silty SAND: fine to medium grained, dark brown-black / red, cemented sand nodules.	M	D		
		▼ 04-04-07 3:31pm	D	0.5	1.0		SP	SAND: fine to coarse grained, pale brown / grey.  Becoming brown / grey mottled orange.	W			-
				0.0	2.0			Test pit TP28 terminated at 1.8m				-

					· *				
	method		support	notes,	samples, tests	clas	sification symbols and	consister	cy/density index
	N	natural exposure	S shoring N nil	$U_{so}$	undisturbed sample 50mm diameter	soil	description	VS	very soft
	Х	existing excavation	I -	U <sub>63</sub>	undisturbed sample 63mm diameter	base	d on unified classification	S	soft
6	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
Rev	В	bulldozer blade	1 2 3 4	V	vane shear (kPa)			St	stiff
ص ص	R	проег	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
ā	E	excavator	ranging to	Ε	environmental sample	D	dry	Н	hard
SSI	i -		water	R	refusal	М	moist	Fb	friable
2			w water level	1		w	wet	VL	very loose
5			on date shown	l		Wp	plastic limit	L	loose
GEO.			1	<b>†</b>		W.	fiquid limit	MD	medium dense
. 0			water inflow					D	dense
L C			water outflow					VD	very dense
1L				<u> </u>				-	

\_. .

TP29

Sheet Project No:

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

Excavation No.

5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

5.4.2007 CW

Test pit location:

REFER TO FIGURE 1

Checked by:

: **/**///

equi	pment	ment type and model: 4WD Backh							Pit Orientation:	Easting:	m				R.L	. Surface:	2.170	
excavation dimensions: 1.5m long							0.4m w	ide		Northing:	m				datı	um:	AHD	
exc	cavati	on	info	rmation			mat	erial s	ubstance									
method	benetration	support	water	notes samples, tests, etc	RL .	depth metres	graphic log	classification symbol	material soil type: plasticity or particl colour, secondary and min	or components.		moisture condition	consistency/ density index	100 × pocket 200 × pocket	а	addit	structure an ional observ	
H8		N		D	1.5	0. <u>5</u>		SC	TOPSOIL: Silty SAND, fine to me brown-black, with some rootlets.  Silty SAND: fine to medium griat brown.  Clayey SAND: fine to medium griat low plasticity fines.	ned, pale grey / p		M	D			TOPSOIL		
				D	_0.5	-					_							
			05-04-07 3:12pm		_0.0	2.0			Pit collapsing. Test pit TP29 terminated at 1.7n	1					1991 - 19		;	

1					
method		support	пotes, samples, tests	classification symbols and	consistency/density Index
N	natural exposure	S shoring N nil	U <sub>so</sub> undisturbed sample 50mm diameter	soil description	VS very soft
x	existing excavation		U <sub>63</sub> undisturbed sample 63mm diameter	based on unified classification	S soft
8H	backhoe bucket	penetration	D disturbed sample	system	F firm
В	bulldozer blade	1 2 3 4	V vane shear (kPa)		Şt stiff
R	ripper	no resistance ranging to	Bs bulk sample	moisture	VSt very stiff
E	excavator	refusal •	E environmental sample	D dry	H hard
		water	R refusal	M moist	Fb friable
		water level		W wet	VL very loose
l		on date shown		Wp plastic limit	L loose
1				W <sub>t</sub> liquid limit	MD medium dense
		water inflow			D dense
l		— water outflow	1		VD very dense

#### Excavation No.

TP30

1 of 1

Sheet

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

5.4.2007

Test pit location:

REFER TO FIGURE 1

Checked by:

4WD Backhoe equipment type and model; Pit Orientation: Easting: m R.L. Surface: 1.159 1.5m long Northing: datum: AHD excavation information material substance pocket penetro-meter penetration classification symbol consistency/ density index notes material moisture condition structure and samples. support graphic additional observations tests, etc kPa depth RL metres soil type: plasticity or particle characteristics, colour, secondary and minor components. 5888 123 TOPSOIL: Silty Clayey SAND, fine to medium grained, dark grey-black mottled white, low plasticity fines, some rootlets 300mm and roots to 300mm. \_1.0 SAND: fine to coarse grained, pale grey-white. W MD 05-04-07 Some inflow of groundwater to pit at 0.3m, 8:05am, pit slowly collapsing from sides, organic odour. 0.<u>5</u> ñ \_0.5 D Becoming pale brown-grey. D \_0.0 1.<u>5</u> Becoming dark brown-red, with some cemented sand D -0.5 Pit collapsing. Test pit TP30 terminated at 1.7m 2.0 \_-1.0

Sketch

Form GEO 5.2 Issue 3 Rev.2

L									
ſ	method		support	notes, s	amples, tests	clas	sification symbols and	consisten	cy/density index
ı	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
-	Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
N	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
١٤	. В	bulldozer blade	1 2 3 4	V	vane shear (kPa)			St	stiff
5	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
91	Ε	excavator	refusal	Е	environmental sample	D	dry	Н	hard
33			water	R	refusal	M	moist	Fb	friable
Ŋ			water level			W	wet	VL	very loose
ő			on date shown	İ		Wp	plastic limit	L	loose
Ξl						W <sub>i</sub>	liquid limit	MD	medium dense
٤١			water inflow	l		_	*	D	dense
5			— water outflow	1				VD	very dense

Sheet

TP31

Project No:

Excavation No.

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

5.4.2007 5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment type and model: 4WD B	ackhoe	Pit Orientation: Easting: m R.L. Surface:	0.732
excavation dimensions: 1.5m lo	ng 0.4m wide	Northing: m datum:	AHD
excavation information	material s	substance	
੬ 123 ਕੋ ਡੋ RL m	I		tructure and onal observations
五	0.5 SC	TOPSOIL: Sity Clayey SAND, fine to medium grained, dark grey-black mottled white, low to medium plasticity fines, with layer of mulch and rootlets to 100mm.  Clayey SAND: fine to medium grained, pale grey / pale brown, low plasticity fines.	wampy area) organic
D0.0	1.0	Becoming grey / brown. W Very slow in	flow of groundwater.
05-04-07 8:29am	1.5 SP	SAND: fine to medium grained, dark brown-red, indurated cemented sand nodules.	of groundwater
1.0	2.0	Silty Gravelly SAND: fine to coarse grained, dark grey-black, gravel fine to medium grained, \(\)rounded-subrounded.  Pit collapsing due to inflow of groundwater.  Test pit TP31 terminated at 1.8m	- - - -
The same of the sa	2.5		

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator  R ripper E excavator  Water  Water  Water  Water level On date shown  Water sufficion  Water on date shown  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  Water outflow  D outflow sample 50mm diameter based on unified classification symbols and soit description  VS very soft  S soft  System  St stiff  VSt very stiff  F firm  St stiff  VSt very stiff  Po dry  Water outflow  Water	•									
X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator  water	1	method		support	notes, s	amples, tests	clas	sification symbols and	consisten	cy/density index
BH backhoe bucket B bulldozer blade R ripper E excavator  Water Water level On disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample D disturbed sample V vane shear (kPa) Bs bulk sample D dry H hard M moist Fb friable V very stiff E environmental sample W wet V very loose W plastic limit W liquid limit MD medium dense	- 1	N	natural exposure	S shoring N nii	U <sub>so</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
B buildozer blade R ripper E excavator  Water level on date shown  Well Wilding to the control of the control o		Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	s	soft
R ripper E excavator  E excavator  Water   VSt very stiff  E environmental sample  D dry  H hard  H hard  Water   VSt very stiff  E environmental sample  W water   VSt very stiff  H hard  W wet  W wet  W wet  W plastic limit  U loose  W liquid limit  MD medium dense	٩	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
R ripper E excavator  E excavator  Water   VSt very stiff  E environmental sample  D dry  H hard  H hard  Water   VSt very stiff  E environmental sample  W water   VSt very stiff  H hard  W wet  W wet  W wet  W plastic limit  U loose  W liquid limit  MD medium dense	é	В	bulldozer blade		V	vane shear (kPa)			St	stiff
E excavator  water R refusal E environmental sample D dry H hard  water R refusal M moist Fb friable  W water level on date shown  on date shown  W iquid limit MD medium dense			ripper		Bs	bulk sample	mois	sture	VSt	very stiff
Water level	읔	E	excavator	refusal	Ε	environmental sample	D	dry	н	hard
O some shown by plastic limit L loose Will liquid limit MD medium dense				water	R	refusal	M	moist	Fb	friable
O some shown by plastic limit L loose Will liquid limit MD medium dense	2			water level	l		W	wet	VL	very loose
	õ			on date shown	1		Wρ	plastic limit	L	loose
	빙			1	l		W <sub>L</sub>	liquid limit	MD	medium dense
water outflow VD very dense				- water inflow	i				D	dense
	ō			water outflow	1				VD	very dense

Sheet

TP32

1 of 1

Project No:

Excavation No.

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started: Date completed: 5.4.2007 5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS\_ogged by:

CW

equ	ipment	equipment type and model: 4WD Backhoe Pit Orientation: Easting: m R.L. Surface: 0,994												ed by: R.L		
excavation dimensions: 1.5m long								ide		Northing:	m			dati	um:	AHD
еx	cavati	on	info	rmation			mat	erial s	ubstance							
method	v penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle ch colour, secondary and minor o	omponents.		moisture condition	consistency/ density index	100 x pocket 200 x pocket 300 v penetro- 400 meter		structure and tional observations
ВН		N				-			TOPSOIL: Silty Clayey SAND, fine to grained, dark grey-black mottled whi fines, with some rootlets and roots (	te, low plastici	ty	D			TOPSOIL	(swampy area)
					_0.5	0. <u>5</u>		SC	Clayey SAND: fine to coarse grainer brown, low plasticity fines maybe low fines approximately 30-40%.	l, pale grey-pa percentage o	ile if	М	D		Some inflo	w of water.
			05-04-07 8:47am	D D	_0.0	1. <u>0</u>			Becoming grey-brown, some present sand nodules.	ce of cemente	ed	W			Moderate i 8:47am.	inflow of groundwater
			05-04-(	D	0.5	1, <u>5</u>			Becoming grey mottled brown / oran	ge and presen	ice					
					1.0	2. <u>0</u>			of subrounded to rounded gravel (fin (grained) less than 10mm size. Pit continually collapsed due to wate Test pit TP32 terminated at 1.7m					The first of the control of the cont		
					-1.5	2.5										

Sketch

ı		
ı	method	
ı	N	natural exposure
ı	Х	existing excavation
ı	8H	backhoe bucket
	8	bulldozer blade
	Ŕ	ripper
۱	E	excavator
1		
ı		
ı		
	8 R	bulldozer blade ripper

sup	port			
S	shoring	N	nil	
	etration			
<u>. 1 ∠</u>		resistar		
8000		ging to	Ge	
	refi			
••••	-,	1501		
wat	ter			
_	water lev	o!		
v				
_	on date s	nown		
_	water in E			

otes, samples, tests									
$J_{50}$	undisturbed sample 50mm diameter								
J <sub>63</sub>	undisturbed sample 63mm diameter								
)	disturbed sample								
/	vane shear (kPa)								
3s	bulk sample								
Ξ	environmental sample								
₹	refusal								

soil	sification symbols and description ed on unified classification em	
moi	sture	
D	dry	

liquid limit

W wet Wp

ification symbols and	C
lescription	_ v
on unified classification	s
m	l F
	-ls
ture	V
dry	Н
moist	۶
wet	l v
plastic limit	İι

consistency/density Index										
VS	very soft									
S	soft									
F	firm									
St	stiff									
VSt	very stiff									
Н	hard									
Fb	friable									
VL	very loose									
L	loose									
MD	medium dense									

dense very dense

Sheet

TP33

Project No:

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

Excavation No.

5.4.2007

5.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

by: ////

		rmation	1.5m l	ong (	0.4m w mat		Northing: m			datu	ım: AHD		
			ļ		mat	erial s	material substance						
support	_	notes					***************************************						
	water	samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	100 × pocket 200 × penetro- 300 w meter	structure and additional observations		
N				_	**************************************		TOPSOIL: Silty Clayey SAND, fine to medium grained, dark grey-black mottled white, low plasticity fines, with some rootlets to 250mm.	D/M		ALTERNATION OF TAXABLE	TOPSOIL (swampy area)		
			_0.5	0. <u>5</u>		SC	Clayey SAND: fine to coarse grained, pale grey-pale brown.	M	D				
		D	]										
	I-07 8:56am		_0.0	1. <u>0</u>			Becoming grey / brown.	W			Very slow inflow of groundwater _ 8:56am, organic odour 		
	05-04	D	0.5	1.5							- -		
		D	1.0	2.0		SP	SAND: fine to medium grained, dark brown-black, some cemented nodules of sand.				_		
			1.5				Pit collapsing due to water table. Test pit TP33 terminated at 2m				- - -		
		05-04-07 8:56am	05-04-07 8;56am	D 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	D 0.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	D 0.5 1.0 1.0 1.5 D -1.0 2.0	D	D  -0.5  -0.	fines, with some rootlets to 250mm.    Clayer SAND: fine to coarse grained, pale grey-pale brown.   M	D  Output  D  Output	D  D  SC Clayey SAND: fine to coarse grained, pale grey-pale brown.  Becoming grey / brown.  W  Becoming grey / brown.  Becoming grey / brown.  Becoming grey / brown.  D  1.5  SAND: fine to medium grained, dark brown-black, some cemented nodules of sand.  Pit collapsing due to water table. Test pit TP33 terminated at 2m		

metho	d	support	notes, s	samples, tests	clas	sification symbols and	consisten	cy/density index
N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
В	bulidozer blade	1234	V	vane shear (kPa)			St	stiff
R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
E	excavator	refusal	Ε	environmental sample	D	dry	Н	hard
		water	R	refusal	М	moist	Fb	friable
1		w water level	1		W	wet	VL	very loose
		on date shown			Wp	plastic limit	L	loose
1			1		W,	liquid limit	MD	medium dense
		water inflow	1				D	dense
<b>:</b>		→ water outflow	1		l		VD	very dense



Excavation No. TP34

Sheet

1 of 1 GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD Project No:

Date started:

Principal:

Date completed:

5.4.20075.4.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

CW

Test pit location:

REFER TO FIGURE 1

Checked by:

_	quipment type and model: 4WD Backhoe Pit Orientation: Easting: m R.L. Surface: 0.893															
equ	equipment type and model: 4WD Backhoe Pit Orientation: Easting: m R.L. Surface: 0.893  excavation dimensions: 1.5m long 0.4m wide Northing: m datum: AHD  excavation information material substance															
					1.5m l	ong (				Northing:	m			da	tum:	AHD
ex		on i	nfo	rmation			mat	erial s	ıbstance						<del>.,</del>	
method	ν penetration ω	support	water	notes samples, tests, etc	RL i	depth metres		classification symbol	material soil type: plasticity or particle ch	components.		moisture condition	consistency/ density index	100 pocket 200 penetro- 300 m meter		structure and ditional observations
HB		N	05-04-07 9:13am	D	0.5	1. <u>5</u>		SC SP SC	TOPSOIL: Silty Clayey SAND, fine to grained, dark grey-black mottled whi plasticity fines.  Clayey SAND: fine to coarse grained grey-white, low plasticity fines.  Becoming pale grey-pale brown.  SAND: with some clayey lenses, fine grained, low plasticity fines.  Clayey SAND: fine to coarse grained low to medium plasticity fines.  Pit slowly collapsing due to water taken some clayey fines.  Silty SAND: fine to medium grained red.  Pit collapsing due to groundwater. Test pit TP34 terminated at 2m	d, pale to medium d, grey / brown		M/W	D MD		TOPSÖÜ	w inflow of water, 9:13am.

Issue 3 Rev.2	method N X BH B R	natural exposure existing excavation backhoe bucket bulldozer blade ripper excavator	support S shoring N nil  penetration 1 2 3 4 no resistance ranging to water	notes, U <sub>50</sub> U <sub>63</sub> D V Bs E R	samples, tests undisturbed sample 50mm diameter undisturbed sample 63mm diameter disturbed sample vane shear (kPa) bulk sample environmental sample refusal	soil base syste mois D M	sture dry moist	VS S F St VSt H Fb	cy/density index very soft soft firm stiff very stiff hard friable
GEO 5.2			water level on date shown			W Wp	wet plastic limit	L L	very loose loose
Form GE			water inflow water outflow			WL	liquid limit	MD D VD	medium dense dense very dense



Borehole No.

BH35

Sheet

1 of 1 **GEOTSGTE20248AA** 

Client

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

11.4.2007

11.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

JJT

Borehole Location: REFER TO FIGURE 1 Checked  drill model and mounting: MD20 Easting: slope: -90°  note diameter: 100 mm Northing bearing:  drilling information material substance													L Surface: 1.005		
					<del>-</del>					,					L. Surface: 1.006 stum: AHD
				mai		100 111	,,,	mate	erial si	ubstance	·9.			ua	Rdill. And
method	benetration	3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characte colour, secondary and minor compon	ristics, nents.	moisture condition	consistency/ density index	100 x pocket 200 x penetro- 300 m meter	
生		ľ		J			_		SP	SAND: fine to medium grained, grey.	· · · · · ·	M	MD		
			-	<u>*</u>	SPT 2,2,3 N*=5	_0	1 -					W			
				-	SPT 2,3,11 N*=14	1	2						D		,
					SPT	2	3								
					6,4,12 N*=16	-3	4								
meth	nod					4	5 5 7 7			Borehole BH35 terminated at 4m	ctassifi	cation sy	mbols an	d	consistency/density index
method  AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool HA hand auger DT dlatube B blank bit V V bit T T CC bit *bit shown by suffix e.g. ADT  support M mud N n C casing penetration 1 2 3 4 penetration 1 3 4 penetration 1 4 5 5 5 5 penetration 1 5 5 5 5 penetration 1 5 5 5 5 penetration 1 5 5					M C per 1 Wa	mud casing netration 2 3 4 from ter 10/1/98 on date	n resistar anging to efusal 3 water i e shown	nce evel	Uso undisturbed sample 50mm diameter undisturbed sample 63mm diameter disturbed sample 63mm diameter disturbed sample standard penetration test (SPT)  N' SPT - sample recovered  NC SPT with solid cone  V vane shear (kPa)  P pressuremeter  Bs bulk sample  E environmental sample  R refusal	soll des based o system moistur D d M m W w	cription on unified	classifica		VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	



Sheet

BH36 1 of 1

Project No:

Borehole No.

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

11.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

11.4.2007 JJT

				n: REF	ER MD20		IGUI	KE 7	Easting:	slope: -90°		Checke	ed by		urface:	2.361
ole dia				_	100 m				Northing	bearing:				datum		AHD
Irillir			rma				mate	erial si	ubstance				_	aucuiii		1 19,00
!	s penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle colour, secondary and minor	characteristics, r components.	moisture condition	consistency/ density index	100 pocket	а		ructure and nal observations
		С				_	: //	SC	Clayey SAND: fine to medium grail low plasticity.	ined, black, clay	M			Ш		
			<u>¥</u>	SPT 4,4,5 N*=9	_2			SP	SAND: fine grained, white.  SAND: fine to medium grained, bla	ack (coffee rock).	w	D				
				SpT Tq2	1	2		SP	SAND: fine grained, white.							
					_0	3			Becoming grey.							
					1			:				VD				
-2 SAND: fine to medium					SAND: fine to medium grained, bla  Becoming softer.	ack (coffee rock).										
				SPT 6,9,23 N*=32	3	<u>5</u>										
				SPT 8,16,14	4	6 1 1 1										÷
				N*=30	5	7			Borehole BH36 terminated at 7m							
						8										
method  AS auger screwing* AD auger drilling* RR roller/tricone W washbore CT cable tool HA hand auger DT diatube B blank bit V V bit T TC bit *bit shown by suffix e.g. ADT  support M mud N nil C casing penetration 1 2 3 4 no resistance ranging to ranging to ranging to attemption 1 2 10/1/98 water level on date shown  water  water  10/1/98 water level water inflow water outflow				n resistar anging to efusal 3 water l e shown	ice	notes, samples, tests U <sub>50</sub> undisturbed sample 50mm of U <sub>60</sub> undisturbed sample 63mm of disturbed sample 63mm of disturbed sample 8 standard penetration test (S N' SPT - sample recovered Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental sample R refusal	diameter diameter soil des based o system PT) moistur D di M m W W p pi	cation syn cription in unified cor- re re re re re re re re re re re re re				consistency VS S F St VSt H Fb VL L MD D VD	very soft soft firm stiff very stiff hard friable very loose loose medium dense dense very dense			



Borehole No.

BH37

Sheet

1 of 1 GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

11.4.2007

11.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

JJT

AH

Boreh	ole	Loc	atic	n: <i>REF</i>	ER	TO F	IGUF	RE 1				(	Checke	d by:				
drill mo	del a	and	mou	Ŭ	MD20				Easting:	slope:	-90°			F	R.L. Su	ırface:	Not Measured	
hole di					100 m	m			Northing	bearing:					iatum:		AHD	
drilli	<u> </u>	nto	rma	tion	_		mate		ıbstance					Ţ	_			
<u>u</u>	က penetration အ	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	soil type: plasticity o colour, secondary a	and minor componer	nts.	moisture condition	consistency/ density index	100 pocket 200 y penetro-	١		structure and onal observation	s
-   1	23		▼	SPT 4,6,10 N*=16 SPT 1,7,8 N*=15	N.C.	1 2 3 4 4		SC SP	Clayey SAND: fine to me low plasticity. SAND: fine to medium gra Becoming dark brown, wi	dium grained, black, ained, white.	clay	W	VD	200		DURATÉ	D SAND	
				SPT 5,7,R N*=R SPT 6,7,R N*=R		5 - 6 - 7			Becoming brown.									•
method AS AD RR W CT HA DT B V T *bit sho		au roi wa ca ha dia bla Vi	ger d ler/tria shbo ble to nd au atube ank bi bit bit	re ool uger	M C pe	ter 10/1/9	n no resista anging to efusal 3 water I e shown	evel		ole 50mm diameter ole 63mm diameter tion test (SPT) overed	soil desibased or system  moisture D dr M m W we Wp pl	n unified o	classificat			consister VS S F St VSt H Fb VL L MD D VD	very soft soft firm stiff very stiff hard friable very loose loose medium dense dense very dense	



Borehole No.

BH38

Sheet Project No: 1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

11.4.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

11.4.2007 JJT

Bore	ect: ehole	Lo	catio	on: REF					PROJECT APPLICATION, TE	A GANDE		.ogged Checke		III	•
rill m	nodel	and	moul	nting: i	MD20				Easting: slope	-90°			R	L. Surface:	2.303
ole (	diame	ter:			100 m	m			Northing bearing	ıg:			da	atum:	AHD
dril	ling	nfo	rma	tion			mate	eriai s	bstance						
method	v penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characte colour, secondary and minor compo		moisture condition	consistency/ density index	200 3 pocket 300 3 penetro-	3	structure and ditional observations
L S		C						CL.	TOPSOIL: Clayey SAND, fine grained, dar clay low plasticity.		M >Wp			TOPSOI	
			•	SPT 2,2,3 N*=5	_2	_ 			Sandy CLAY: medium to high plasticity, gr fine grained.	ey, sand	- vvp				
				IN =5	_1	<u>1</u> 		CL	Sandy CLAY: low to medium plasticity, dar sand fine grained.	k brown,					
			<u> </u>	SPT		2 2					w				
				4,5,5 N*=10	_0	-		sw	SAND: fine to medium grained, grey.		-	D			
					1	<u>3</u> -									
				SPT 12,18,23 N*=41		- 4			Becoming black.						
					2	- -									
				SPT 4,8,11 N*=19	3	<u>5</u> -									
					4	<u>6</u>						MD			
				SPT 4,8,8 N*=16		- 7			Borehole BH38 terminated at 7m						
					5	-   -			23. Short by test terminated at fill						
method  AS auger screwing* M mud  AD auger drilling* C casing  RR roller/tricone penetrati  W washbore 1 2 3 4  CT cable tool  HA hand auger  DT diatube water  B blank bit V V bit  T TC bit  Support  M mud  C casing  penetrati  1 2 3 4  1 2 3 4  1 2 3 4  1 2 3 4  1 2 3 4  1 2 3 4  1 2 3 4  1 7 3 3 4  1 0/17		mud casing netratio 2 3 4  tter 10/1/9 on dat water	n no resista ranging to refusal 8 water l e shown	level	notes, samples, tests  U <sub>50</sub> undisturbed sample 50mm diameter U <sub>63</sub> undisturbed sample 63mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered NC SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental sample R refusal		iption unified o			consis VS S F St VSt H Fb VL L MD D VD	very soft soft firm stiff very stiff hard friable very loose loose medium dense dense very dense				

Excavation No.

Date completed:

TP39

Sheet

1 of 1 GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

1.6.2007 1.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

RJP

Test pit location:

REFER TO FIGURE 1

Checked by:

equipi	ment t	ype	and	model: 4	4WD E	Backho	е		Pit Orientation:	Easting:	m				R.L	. Surface: 2,77
excav	ation o	dime	ensic	ons: 2	2m lor	ng 0.4	45m wi	de		Northing:	m				datı	um: AHD
exca	avatio	on i	nfo	rmation			mat	eria! s	ubstance							
	notes samples, tests, etc depleted and the samples and the sam							classification symbol	material soil type: plasticity or partic colour, secondary and mi	cle characteristics, nor components.		moisture condition	consistency/ density index	100 pocket	a a	structure and additional observations
₩ ₩	<b>₩</b>	N				_	{  {		TOPSOIL: Sandy Silty CLAY, n dark grey, sand fine to medium	nedium plasticity, grained.		М				TOPSOIL Root affected.
					_2.5	0.5		СН	CLAY: high plasticity, grey-brow mottled, some sand.			>Wp	St	X		-
			[	D												
					2.0			011								_
				D		1. <u>0</u>		СН	CLAY: high plasticity, grey-grey orange mottled with a trace of s grained.	-prown, some and fine to mediun	n			×		<u>.</u> 
			•	U	_1.5	-										-
		1	-	D		1. <u>5</u>		SP	SAND: fine to medium grained, grey-brown.	white / light		W				Pit collapsing below 1.4m, organic odour.
					_1.0	_			Moderate groundwater inflow b Test pit TP39 terminated at 1.7	elow 1.4m. m						-
						2. <u>0</u>										_
					0.5	-										
						2.5										

Sketch

	method	
	N	natural exposure
	Х	existing excavation
١	BH	backhoe bucket
é	В	bulldozer blade
5	R	ripper
3	E	excavator
2		
7-00 0.2 Issue o 1767.2		
á		
1		

support			
S shoring	Ν	nil	
penetration			
1234			
no res rangin		ice	
refusa			
water			
water level			
on date sho	wn		

water inflow

water outflow

notes,	samples, tests
Uso	undisturbed sample 50mm diameter
U <sub>63</sub>	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and										
soil description										
based on unified classification										
syste	:m	- 1 -								
mois	ture	_ I								
D	dry									
M	moist	- 1 -								
W	wet	_ I _ '								
Mo	plactic limit	- 1								

liquid limit

consister	ncy/density index
VS	very soft
s	soft
F	firm
St	stiff
∨St	very stiff
Н	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VO	very dense

2.0

0.5

**TP40** 

Sheet

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Excavation No.

1.6.2007

Principal:

1.6.2007 Date completed:

1 of 1

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS.ogged by:

RJP

REFER TO FIGURE 1 Test pit location: Checked by: 4WD Backhoe equipment type and model: Pit Orientation: Easting: R.L. Surface: 2.59 2m long Northing: datum: AHD material substance excavation information classification symbol consistency/ density index pocket penetro meter penetratio material notes graphic log moisture condition structure and samples, additional observations tests, etc kPa depth metres soil type: plasticity or particle characteristics, colour, secondary and minor components. 8888 123 TOPSOIL: Silty Sandy CLAY, medium plasticity, TOPSOIL Root affected. dark grey, sand fine to medium grained. Sandy CLAY: medium plasticity, grey-brown and orange mottled, sand fine to medium grained. St 0.5 D \_2.0 Becoming grey-brown and sand content increasing to Sandy CLAY / Clayey SAND. D SAND: fine to medium grained, grey-brown with W some clay. Rapid groundwater inflow below 1.4m. Organic odour. SAND: fine to medium grained, light grey-brown. 1.5 D \_1.0 Pit collapsing below 1.1m. Test pit TP40 terminated at 1.7m

Sketch

TESTPIT 20248AA LOGS.GPJ COFFEY.GDT 23.10.07

Form GEO 5,2 Issue 3 Rev.2

ı									
ſ	method		support	notes, s	amples, tests	class	sification symbols and	consisten	cy/density index
١	N	natural exposure	S shoring N nil	U <sub>50</sub>	undisturbed sample 50mm diameter	soil	description	VS	very soft
ı	X	existing excavation		$U_{63}$	undisturbed sample 63mm diameter	base	d on unified classification	S	soft
N	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
é	В	bulldozer blade	1234	٧	vane shear (kPa)			St	stiff
5	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
9	E	excavator	refusal	E	environmental sample	D	dry	Н	hard
S			water	R	refusal	М	moist	Fb	friable
$\sim$			w water level			W	wet	VL	very loose
31			on date shown			Wp	plastic limit	L	loose
Ų,				l		W.	liquid limit	MD	medium dense
۽Ι			water inflow	l		-	•	D	dense
ē			→ water outflow	l				VD	very dense



Sheet

TP41

1 of 1

Project No:

GEOTSGTE20248AA

Client

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

Excavation No.

1.6.2007 1.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

RJP

Test pit location:

REFER TO FIGURE 1

Checked by:

////

						Pit Orientation:	Easting:	m				Surface:	3.63	- 1	
excavation dime	ensio	ns: 2	2m lor	ng 0,4	45m wi	de		Northing:	m			da	tum:	AHD	
excavation i	infor	mation			mat	erial s	ubstance								
method t penetration support	water	notes samples, tests, etc	RL I	depth metres:	graphic log	= 0 0 0 0								structure and lonal observations	
BH Z		D D	_3.5	1.0		CI SP	Sandy CLAY: medium grey-brown, sand fine to medium grey-brown, sand fine to medium grained, sand fine to mottled.  Sand content increasing light grey-browntled.  SAND: fine to medium grained, lissome orange mottled, cemented.	grained.  iight grey-brown medium grained.  bwn and orange  y-brown and oran		M >Wp	St	X		dwater inflow below nic odour.	
		D		2.5			Test pit TP41 terminated at 2.5m	·.···							_]

Sketch

Test pit TP41 terminated at 2.5m

Form GEO 5.2 Issue 3 Rev.2

### Excavation No.

TP42

Sheet

1 of 1 GEOTSGTE20248AA

Cliont

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

1.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

1.6.2007 RJP

Test pit location:

REFER TO FIGURE 1

Checked by:

M

equipment	type	and	model: 4	4WD I	Backho	е		Pit Orientation:	Easting:	m			R.L	Surface:	2.82	
excavation	dim	ensid	ons: 2	2m lor	ng 0.4	45m wi	de		Northing:	m			dat	um:	AHD	
excavat	ion	info	rmation			mat	erial s	ubstance								
method 1 7 penetration		water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particl colour, secondary and min	or components.		moisture condition	consistency/ density index	100 pocket 200 d penetro- 300 meter		structure and itional observations	S
Н8	Z		D D	2.5	0.5 1.0 1.5		CI	TOPSOIL: Silty Sandy CLAY, lov plasticity, sand fine to medium g grey-brown.  Sandy CLAY: medium plasticity, orange mottled, sand fine to medium plasticity, some orange mottled, sand fine sand content increasing.  SAND: fine to medium grained, with Becoming grey-grey-brown, with	grey-brown and dium grained.  grey-grey-brown to medium graine	ed,	Wp Wp	St	X		Root affected.	- - - - - 1.1m -
				_1.0	2. <u>0</u>	,		Test pit TP42 terminated at 1.7n	1							_ _
				_0.5	2.5											- - -

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade C R ripper B E excavator	support S shoring N nil n penetration 1 2 3 4 no resistance ranging to resistance ranging to	notes, samples, tests  U <sub>so</sub> undisturbed sample 50mm diameter  U <sub>sa</sub> undisturbed sample 63mm diameter  D disturbed sample  V vane shear (kPa)  Bs bulk sample  E environmental sample	classification symbols and soil description based on unified classification system  moisture O dry	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard	
om GEO 5.2 k	water evel on date shown  water inflow water outflow	R refusal	M moist W wet Wp plastic limit W <sub>L</sub> liquid limit	Fb friable VL very loose L loose MD medium dens D dense VD very dense	se

Excavation No.

TP43

# **Engineering Log - Excavation**

Sheet

1 of 1

Project No: Date started: GEOTSGTE20248AA

Principal:

TATTERSALL SURVEYORS PTY LTD

Date completed:

1.6.2007 1.6.2007

Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

RJP

Test pit location:

REFER TO FIGURE 1

Checked by:

equipment type and	l model:	4WD E	Backho	е		Pit Orientation:	Easting:	m			R,L	Surface:	4.75	$\Box$
excavation dimension	ons: 2	2m lon	g 0.4	45m wi	de		Northing:	m			dat	lum:	AHD	
excavation info	rmation			mate	erial s	ubstance								
method  c penetration support water	notes samples, tests, etc	RL i	depth netres	graphic log	= N 0 4							structure and tional observations		
BH 2		_4.5	0. <u>5</u>		SP	SAND: fine to medium grained, g  Becoming light grey-brown.	rey-brown.		М			AEOLIAN	Root affected to 0.15	m
	D	_4.0	1.0		SP	SAND: fine to medium grained, go	rey-brown and			·	TO SECURE AND A SECURE AND A SECURE AS A S			-
	D	_3.5												- -
<b>L</b>	D	_3.0	1. <u>5</u> - -		SP	SAND: fine to medium grained, lig some weakly cemented nodules,	grey-brown.		w			Very slow	water inflow below 1.7	 7m
		2.5	2. <u>0</u> -			Test pit TP43 terminated at 1.85n	n							
Sketch		_2.5	- 2,5			·								-

method		support	notes, s	samples, tests	clas	sification symbols and	consisten	cy/density index
N	natural exposure	S shoring N nil	$U_{50}$	undisturbed sample 50mm diameter	soil	description	V\$	very soft
Х	existing excavation		Ues	undisturbed sample 63mm diameter	base	ed on unified classification	S	soft
BH	backhoe bucket	penetration	D	disturbed sample	syst	em	F	firm
В	bulldozer blade	1234	V	vane shear (kPa)	├	,	St	stiff
R	ripper	no resistance ranging to	Bs	bulk sample	moi	sture	VSt	very stiff
E	excavator	ranging to refusal	Ε	environmental sample	D	dry	Н	hard
3		water	R	refusal	М	moist	Fb	friable
{ <b> </b>		water level			w	wet	VL	very loose
ś <b>l</b>		on date shown			Wp	plastic limit	L	loose
<b>∤ </b>		i.			W <sub>L</sub>	liquid limit	MD	medium dense
:		water inflow	1		ŀ		D	dense
5		── water outflow			1		VD	very dense

Excavation No.

Project No:

**TP44** 

Sheet

1 of 1

GEOTSGTE20248AA

Client:

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

1.6.2007 1.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

RJP

Test pit location:

REFER TO FIGURE 1

Checked by:

y. ////

excavation dimered excavation imered excavation imered excavation imered excavation imered excavation imered excavation imered excavation dimered excavation dimered excavation dimered excavation dimered excavation imered excavat		es les,	depth metres	mat Bol pidde		ubstance material soil type: plasticity or partic colour, secondary and mi		m	ure tion	stency/ ly index		atum:	Structure and		
method 1 2 3 support	note	es les,	depth metres	aphic log	classification symbol	material			ure tion	stency/ ty index	pocket penetro-	meter eter			
123	samo	les, etc	depth metres	graphic log	ı	soil type; plasticity or partic			ure tion	stency/ ty index	pocket penetro-	meter			
BH 2			-		~~~		nor components.		moisture condition	consit	A A B A B Additional observation				
M00003 1 1			0. <u>5</u>			SAND: fine to medium grained,  Becoming light grey-brown.	dark grey-brown.		М			AEOLIAI	N Root affected to 0.3m. - - - - -		
	None Observed	_3.5	1. <u>0</u>		SP	SAND: fine to medium grained, sit / Silty SAND.	dark brown, some					INDURA	TED SAND		
	D		1. <u>5</u>			Becoming cleaner and less cen	nented, brown.				AMERIKA AN ARAMIN'A AN AN AN AN AN AN AN AN AN AN AN AN AN		- 		
		_2.5	2.0	-		Test pit TP44 terminated at 1.8	'n				MARINEN MANA SERVANA A PEREN A MARINEN MANAGERIA MANAGER		- - -		
		_2.0	2.5								***************************************				

ı									
ľ	method		support	notes, s	amples, tests	clas	sification symbols and	consister	ncy/density index
ı	N	natural exposure	S shoring N nil	$U_{50}$	undisturbed sample 50mm diameter	soil	description	VS	very soft
ı	Х	existing excavation		U <sub>63</sub>	undisturbed sample 63mm diameter	base	d on unified classification	S	soft
ı.	BH	backhoe bucket	penetration	D	disturbed sample	syste	em	F	firm
ı	В	bulldozer blade	1234	ν	vane shear (kPa)			St	stiff
,	R	ripper	no resistance ranging to	Bs	bulk sample	mois	sture	VSt	very stiff
ł	E.	excavator	refusal	E	environmental sample	D	dry	Н	hard
1			water	R	refusal	M	moist	Fb	friable
1			water level			W	wet	VL	very loose
			on date shown			Wp	plastic limit	L	loose
į						W.	liquid limit	MD	medium dense
1			water inflow			`		D	dense
1			→ water outflow					VD	very dense



Borehole No.

BH45

**Engineering Log - Borehole** 

Sheet Project No: 1 of 2 GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Date started:

Date completed:

5.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENSLogged by:

5.6.2007 RJP

M

Borehole	e Lo	catio	n: <i>REF</i>	ER	TO F	IGUI	RE 1			(	Checke	ed by:	
drili model	and	mou	nting:					Easting: slope	e: -90°			R.	Ł. Surface: 3,20
hole diame				mm				Northing bear	ing:			da	atum; AHD
drilling	info	rma	tion	_	i	mate		ubstance					
method  t penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle charact	nents.	moisture condition	consistency/ density index	200 A pocket 300 a penetro-	
Н	С			_3	_		SP	SAND: fine to medium grained, grey-brow	n.	M	D		AEOLIAN SAND
			SPT 2,5,7 N*=12	_2	1 2			Becoming light grey-brown.					-
	SPT 5.6,8 N*=140				3 1 1			Becoming dark grey-brown.		W			
			SPT 3,15,21 N*=36	-1	4		SP	SAND: fine to coarse grained, dark brown gravel fine grained and silt.	trace of		VD		
	SPT 9,21,20 N*=41		5			With a trace fine grained gravel.					20 blows for 100mm penetration.		
				7 - - - - 8			Becoming fine to medium grained, light brobrown.	own and				21 blows for 100mm penetration.	
method AS AD RR W CT HA DT B V T *bit shown b e.g.	auger screwing* auger drilling* roller/tricone washbore cable tool hand auger diatube blank bit V bit TC bit own by suffix							notes, samples, tests  U <sub>so</sub> undisturbed sample 50mm diameter  U <sub>so</sub> undisturbed sample 63mm diameter  D disturbed sample  N standard penetration test (SPT)  N' SPT - sample recovered  NC SPT with solid cone  V vane shear (kPa)  P pressuremeter  Bs bulk sample  E environmental sample  R	soil desc based on system  moisture D dry M mo W we Wp pla	unified o			consistency/density index  VS very soft  S soft  F firm  St stiff  VSt very stiff  H hard  Fb friable  VL very loose  L loose  MD medium dense  D dense  VD very dense



Borehole No.

**BH45** 

Sheet

2 of 2 GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Project No: Date started:

Date completed:

5.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS ogged by:

RJP

M	
<i>''   </i>	

5.6.2007

Boı				on: <b>REF</b>					NOOLOT AT PLICATION, I			Check	-	;	M	
duli	modei	and	mou	nting:					Easting: slo	pe:	-90°			R.L. Su	face:	3.20
	diame				mm					aring:				datum:		AHD
method	penetration <b>Gu</b>	upport	water	notes samples, tests, etc	RI	depth	aphic log	classification symbol	material soil type: plasticity or particle chara		moisture condition	consistency/ density index	oo y pocket	a		ucture and lal observations
HF m	123	18 C	W	SPT 5,13,17 N*=30 SPT 1,6,15	5 6	9 10	16	SP	colour, secondary and minor com SAND: fine to coarse grained, dark brov gravel fine grained and silt. (continued)			0 D	100 200 300	400		
			Collapsed back to 2.3ml◀	N*=21	10	11 12 14 15 16 16 16 16 16 16 16 16 16 16 16 16 16			Borehole BH45 terminated at 10.45m							
metl AS AD RR W CT HA DT B V T *bit s e.g.	aod shown b	au rol wa ca ha dia bla V	ger d ler/trice shbo ble to and au ank bi bit bit bit	re ol ıger	M C pei 1.2	ter 10/1/98	n resista anging to efusal 3 water I e shown	evel	notes, samples, tests  U <sub>50</sub> undisturbed sample 50mm diamet  U <sub>61</sub> undisturbed sample 63mm diamet  D disturbed sample  N standard penetration test (SPT)  N* SPT - sample recovered  NC SPT with solid cone  V vane shear (kPa)  P pressuremeter  Bs bulk sample  E environmental sample  R refusal	er soi er bas sys		classifica			consistency VS S F St VSI H Fb VL L MD D VVD	very soft soft soft firm stiff very stiff hard friable very loose loose medium dense dense very dense



Sheet

**BH46** 1 of 1

Project No:

Borehole No.

GEOTSGTE20248AA

TATTERSALL SURVEYORS PTY LTD

Date started: Date completed: 6.6.2007 6.6.2007

Principal: Project:

RIVERSIDE ESTATE PROJECT APPLICATION, TEA GARDENS Logged by:

RJP

Borehole Location: REFER TO FIGURE 1

MA

Boreh	hole	Loc	catio	n: REF	ER	TO F	IGU	RE 1			_ <	Checke	ed by:	///8	<i>g'</i>	
drill mo	odei a	and	mou	ating:					Easting: slop	e: -90°			R	L. Surface	: 1.07	
hole di	iamet	ter:			mm				Northing bear	ring:			da	atum:	AHD	
drilli	ing i	nfo	rma	ion			mat	erial s	ubstance							
쁜ㅣ	ທ penetration ພ	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle charact colour, secondary and minor compe	teristics, onents.	moisture condition	consistency/ density index	200 A pocket 300 B penetro-		structure a ditional obser	
±		C		SPT 3,2,2 N*=4  SPT 7,12,14 N*=26  SPT 5,16,23 N*=39  SPT 2,9,18 N*=27		3 3 5 6		SP SP	TOPSOIL: Sandy CLAY / Clayey SAND, I plasticity, dark grey, sand fine to medium some silt.  SAND: fine to medium grained, grey-brown.  Becoming light grey-brown.  SAND: fine to medium grained, dark brown silt.  SAND: fine to medium grained, some clay and dark brown, trace fine grained gravel.  SAND: fine to medium grained, light brownship fine to medium grained gr	grained, /n.  in, trace	W	MD VD		TOPSO		-
method AS AD RW CT HA DT B V T * bit show e.g.		aug roll wa cat har dia bla V to TC	ger dr er/trio shbor ole too nd au lube nk bit oit bit	e ol ger	M C per	ter 10/1/98	n resista anging to efusal 3 water l e shown	evel	Becoming fine to coarse grained, trace fin gravel, light grey-brown.  Borehole BH46 terminated at 7.45m  notes, samples, tests  U <sub>so</sub> undisturbed sample 50mm diameter undisturbed sample 63mm diameter D disturbed sample N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone V vane shear (kPa) P pressuremeter Bs bulk sample E environmental sample R refusal	classificati soil descrip based on u system moisture D dry M mois W wet Wp plast	ption nified c			consil VS S F VSt H Fb VL L MD D VD	stency/density in very so soft firm stiff very sti hard friable very loc loose mediun dense very de	ft ff ose n dense

CL	IEN	Т	С	righton	Prop	ertie	s Pty I	_td		COMMENCED	25.09.12	COMPLETE	<b>D</b> 2	5.09.12			REF		BH2	201
PR	OJE	СТ	H	ydroge	ologic	al In	vestig	atio	n	LOGGED	NF	CHECKED	G	ST/DM			Sheet '	<b>1</b> of	1	
SIT			M	RD, Te	_			'		GEOLOGY	Marine Sands	VEGETATIO	_	edges and	Grasse	es	PROJEC1	r no. P	0902346	
	IPME		NINAT N	SIONS	+	lic Auge				EASTING NORTHING	NA	RL SURFAC	E -				01.005		-0/	
EXC				ION DA		10 X 5.5	5m depth		M	TERIAL DA	NA NA	ASPECT	-		9/	MDIIN	SLOPE		5% <b>2</b>	
Н							<b>(D</b>	z	1817-	TI LITIAL DA	NA .		×		T .	THE LINE	<u> </u>	011110		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L PENETRATION	. ω	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pl anics, secondary a entamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)		WATER	R WELL	DETAI	<b>US</b> Well Cover
v	Nil	N	М	- 0.25		T ^	× ^ × ^ :	OL	ORGANIC SILT - D			VS- S		D	0.0	2346/20	1/ 0.0	.7† 		Concrete,
$\vdash$	_	_	$\vdash$	-0.25 -	HH	-  <del>  ^</del>		- +	organic matter preser			++	_		0.3	2346/20	1/0.3 —			
v	Nil	N	М	_ _ _		-		CL	SANDY CLAY - Me grey, with some fine minor organic i Sand content	to medium g matter preser	rained sand and nt (rootlets).	St VSt		D D	0.6	2346/20			V///	entonite Seal
L				1.0	$\perp \mid \perp \mid$	-   -		_	becoming h	nigh plasticity	>0.7m.	St		_	1.1	2346/20		- 10 A	) 1.	).8m bgl UPVC Pipe. 0m bgl 1.
٧	Nil	N	М	_ 1.3		12 2.7 3.5 3.5		SP	SAND - Medium grai	ent increasing	/			D	''	Hydrogen odour pr	sulfide			
V	Nil	N	D	-	$\Pi\Pi$	T		CL	SANDY CLAY - Low			† <del>-</del> †	_	+ -	1.4	2346/20	1/ 1.4			
v	Nil	N	м	1.6				SC SC	dark brown, with set of the s	ome medium	grained sand.  um grained sand, nic matter present,	St					4.0m bgl			2. Sand Pack.  JPVC Screen.  3. Ul end plug.
	OLUBA TO THE TOTAL THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TO	MENT.	- ME		800.0		MATER		Borehole terminated a				VINC.						QLASSIE.	6 <u>.</u> 7 <u>.</u> 8 <u>.</u>
N X B E H P	Na E: H Ba Ex A Ha T Pu Au C Tur	atural oxisting ickhoe icavato ind au ish tub iger igsten	exposi excar bucki or ger e	ure SI vation So et RI	JPPORT H Shorii C Shoto B Rock I No su	ng rete Bolts ipport	WATER N None X Not n  ▼ Wate  Wate	neasu er leve er outfl	rved D Dry L Lo red M Moist M M.   W Wet H Hig   Wp Plastic limit R Re ow WI Liquid limit	w VS oderate S gh F ifusal St VSt H	SISTENCY	Dense A Au  B Bu  Dense U Ur  D Dis  se M Mo  Ux Tu	iger san ilk san ndistur sturbe pisture ibe sa	& TESTING ample nple bed sample d sample content mple (x mm nental samp	p S V D	p Pocket p Standard S Vane sh CP Dynam penetro D Field der	nic cone ometer nsity		Y US	S AND SCRIPTION
						EXC	CAVATIC	N LC	OG TO BE READ IN CONJU	INCTION WITH	ACCOMPANYING REP	ORT NOTES	S AN	D ABBRE	VIATI	ONS				
			7							MARTENS &	ASSOCIATES PTY LTD		Т			-	ovin			

CLI			+		•	ties Pty			COMMENCED	25.09.12		COMPLETED	25.09.				REF	В	H202	
PR		СТ	1			I Investi		n	LOGGED	NF		CHECKED	GT/DM				Sheet 1	of 1		
SIT		uT.	M	RD, Tea	Hydraulic	ens, NSV	<u>v</u>		GEOLOGY EASTING	Marine Sands	3	VEGETATION RL SURFACE	_	es and F	-erns	Į'	PROJECT N	O. P090	02346	_
			IMENS	SIONS	-	X 7.0m depth	) 1		NORTHING	NA		ASPECT	-			s	LOPE	<5%		-
				ON DA		X 7 Iom dopar		MA	TERIAL DA						SA		& TES	_		_
МЕТНОD	SUPPORT	WATER	MOISTURE	DЕРТН (M)	FENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIF Soil type, texture, structure, re	PTION OF STR.	ATA asticity, rocks, o	oxidation, ponents,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH(M)		WATER V		ETAILS  Well Cover	Ĺ
<u>v</u>	Nil	<u>N</u>	D.	0.1	+	2 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	SP	LOAMY SAND - I			rey,	+		_ D	0.0	2346/202/	0.0	9 5	Zoncrete -	
V	Nil	N	D M	- - - - - - 0.85			SP	SAND - Medium grain	prganic matter ned, pale grey c matter pres	to grey, w	ith some		MD- D	D D	0.3	2346/202/0			Back fill UPVC Pipe.	
V	Nil	N	м	1.0 - - - - - - - 1.8			SP	SAND - Medium gra very minor sl	ined, pale gre hell fragment		ıraded,			D	1.0	2346/202/ Hard panatra coffee ro 2346/202/	ation/ ck.		Bentonite Seal	1.0
v	Nil	N	-1	<u>2.0</u> - 2.3			SP	SAND - Mediun dark orange brow roots and		occasiona									Sand Pack	2 <u>.0</u>
<b>v</b>	Nil	Υ Υ	w				SC SC	SAND - Medium graii with some sh			brown,			D	3.5	2346/202/3	3.5 5.4m bgl			5.0 6.0
				<u>7.0</u> -		January C. Jack C. J		Borehole termi	inated at 7 On	n in cond							F.	<u> </u>	``}	<u>7.0</u> –
				- - - - - - - - - - - - -				Dorellote (ettil	macu at 1.01	III Sallu.										8.0
F	UIP	/ENT	/ MET	0.0 HOD SU	JPPORT	WATER	<u> </u>	MOISTURE PENET	TRATION CONS	SISTENCY	DENSITY	SAMPLI	NG & TE	STING				CL.	ASSIFICATION	9. <u>0</u>
N BH E H/ P1 A T(	Na Ex Ex Ha Pu Au	itural existing ckhoe cavate nd aug sh tub ger gsten	exposu excav bucke or ger	re SI ation S( E RI Ni	H Shoring C Shotcret B Rock Bo I No supp	N Nor e X Not ofts <u>Ψ</u> War ort <u>-</u> War	ne obse measu ter leve ter outf ter inflo	rved         D         Dry         L         Lov           red         M         Moist         M         Mc           I         W         Wet         H         Hig           Wp         Plastic limit         R         Rei           low         WI         Liquid limit         R	w VS oderate S gh F Ifusal St : VSt H F	Very Soft Soft Firm Stiff Very Stiff Hard Friable	VL Very Loos L Loose MD Medium Di D Dense VD Very Dense	se A Aug B Bulk ense U Und D Dist e M Mois Ux Tube E Envir	er sample sample sturbed s urbed sam sture conte e sample ( onmental	ample nple ent (x mm) sample	pp S VS DC FD	S Vane shea CP Dynamic penetrom Field densi S Water sam	enetration te r cone neter ity	SY	ASSIFICATION MBOLS AND IL DESCRIPTIO USCS Agricultural	
			)						MARTENS & A	ASSOCIATE	S PTY LTD				20	iino	rina	<u>, , , , , , , , , , , , , , , , , , , </u>	200	

CLI			_				les Pty I			LOGGED			COMPLETEL					KEF		3H2(	<b>J</b> 3
PRO		СТ	1				Investig		n —		NF		CHECKED	GT/I				Sheet 1			
SIT			MI	RD, Tea	Hydrau		ıs, NSW			GEOLOGY	Marine Sar	ds	VEGETATIO	_	sses and	Ferns		PROJECT	NO. PO	902346	
EQUI			IMENS	IONS	_		7.0m depth			EASTING NORTHING	NA NA		RL SURFACE ASPECT	=  -			s	LOPE	<5%	, n	
				ON DA			7.om depar		MA	TERIAL D			7.0. 20.			SA	MPLING				
МЕТНОБ	SUPPORT	WATER	MOISTURE	DEPTH (M)	L PENETRATION	RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIF Soil type, texture, structure, re particle characteristics, orga	PTION OF STF	RATA lasticity, rocks and minor co	s, oxidation, mponents,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH(M)		WATER		DETAIL	S /ell Cover
V	Nil	N	D			П		SP	LOAMY SAND - Medi					VL- L	D	0.0	2346/203/	0.0	1	$\mathcal{L}_{\text{Co}}$	ncrete, -
V	Nil	N	М	- - - - - - - - -				sc	CLAYEY SAND - M grading to low pla	ledium grain	ed, dark b	rown,		L- MD	D	0.3	2346/203/	0.3	•	U	onite Seal — PVC Pipe. — m bgl
v	Nil	N	м	<u>1.0</u>				CL	SANDY CLAY - grey brown to da						Ď	1.0	2346/203/	1.0	## 		1.0
v	Nil	Υ	w	 - - -				SP	SAND - Medium orange brown and	<u>n grained sa</u> grained, dark d yellow brov	ind preser grey, mo vn, with so	it /			D -	1.3	2346/203/	1.3	(7) /√2 /2d≡≡	1.5n	Sand Pack
V	Nil	Y	w	1.7				SP	SAND - Medium with some sh	grained, gre	y to dark y				D	1.8	2346/203/	1.8 4.5m bgl		38.55.50.50.50.50.50.50.50.50.50.50.50.50.	2.0
				7.0 -		Н			Danah da tamai	:									(1,50 ± 30) ±	[2]	7.0
				- - - - - - - - - - - - - - -					Borehole termi	mated at 7.0	iii in sand										8.0 
Щ	N. P.	45.5		0.0	IDDS:	Ш			MOIOTURE	DATION CO.	101075	DEMO:=:				Ш					9.0
N X BH E HA PT A TO	Na Ex Ex Ha Pus Au	tural e disting ckhoe cavato nd aug sh tube ger gsten	ger	re SH ation SC RE Nil	JPPOR I Short C Shote B Rock No si	ing crete Bolts uppor	S <u>▼</u> Wate d Wate → Wate	measur er lever er outfl er inflo	ved D Dry L Loved M Moist M Mc W Wet H Hig Wp Plastic limit R Rei	w VS oderate S yh F fusal St VSt H F	ISISTENCY Very Soft Soft Firm Stiff Very Stiff Hard Friable  H ACCOMF	DENSITY VL Very Loos L Loose MD Medium Di D Dense VD Very Dense	se A Aug B Bull Jense U Und D Dis e M Moi Ux Tub E Envi	ger sample k sample disturbed turbed s isture co be sampl ironment	e di sample ample ample ntent e (x mm) tal sample	pp S VS DC FD	Pocket pen Standard p Standard p CV ane shea CV Dynamic penetrom Field densi S Water sam	enetration to r cone neter ity	test S	y USC	AND CRIPTION
			)							MARTENS &		ES PTY LTD					iino		~ <i>I</i>	~~	

CL	IEN	Т	С	righton	Proper	ties Pty	Ltd		COMMENCED	25.09.12	COMPLETE	D 25	5.09.12		REF	BH204
PR	OJE	СТ	H	ydroge	ological	Investiç	gatio	n	LOGGED	NF	CHECKED	G <sup>-</sup>	T/DM		Sheet 1	
SIT	Έ		М	RD, Tea	a Garde	ns, NSV	ı		GEOLOGY	Marine Sands	VEGETATIO	N Gr	rasses and	Ferns	PROJECT	NO. P0902346
	IPME				Hydraulic /				EASTING	NA	RL SURFAC	E -				
EXC				SIONS	1	X 1.0m depth			NORTHING	NA	ASPECT	-			SLOPE	<5%
⊢	EX	CA	/AT	ON DA			-	M.A	ATERIAL DA	ATA				SA	MPLING & TES	STING
МЕТНОВ	SUPPORT	WATER	MOISTURE	DEPTH (M)	L PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, orga	PTION OF STR mottling, colour, pl anics, secondary a ontamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)		SULTS AND LL OBSERVATIONS
V	Nil	N	М				SP	ORGANIC LOAM dark brown, black and		organic matter			D	0.1	2346/204/ 0.1	- - - -
v	Nil	N	М	0.3 			SP	LOAMY SAND - N with mi	Medium grain inor fines pre			_	D D	0.4	2346/204/ 0.4	
v	Nil	N Y	M W				SP	ORGANIC LOAM dark brown to blac					D	0.6	2346/204/ 0.6	- - - -
V	Nil	N	М	0.8 - - - 1.0			SC	CLAYEY SAND - N with minor sh	ledium grain lell fragments	ed, pale brown, s present.		_	D	0.9	2346/204/ 0.9	
					JPPORT	WATER			TRATION CON	SISTENCY DENSITY			\$ TESTING			
N B E H P A T	Na Ex H Ba Ex A Ha T Pu Au C Tur	atural existing ckhoe cavate ind au sh tub iger igsten	exposi excav bucke or ger e	ure SI vation S0 et RI	JPPORT  H Shoring C Shotcrete B Rock Bo I No suppe	N None ≥ X Note Its	e obse measur er lever er outfl	rved D Dry L Lo red M Moist M Mi I W Wet H Hig Wp Plastic limit R Re ow WI Liquid limit	ow VS oderate S gh F efusal St VSt H	Very Soft VL Very Soft L Loose	Loose A Au e B Bu um Dense U Ur e D Dis Dense M Mo Ux Tu	ger sai lk sam disturb sturbed isture be sam	mple	pr S V: D:	Pocket penetrometer Standard penetration Vane shear P Dynamic cone penetrometer Field density 8 Water sample	SYMBOLS AND
$\vdash^{\vee}$	V-E	sit				EXCAVATION	ON LC	OG TO BE READ IN CONJU	JNCTION WITH	H ACCOMPANYING R	EPORT NOTES	S AND	) ABBRE	/IATI	)NS	
$\vdash$			_							ASSOCIATES PTY LT		Т			<u>.</u>	-

CL	IEN	Τ	С	righton	Proper	ties Pty	Ltd		COMMENCED	25.09.12	con	MPLETED	25.09.12			REF	BH20	5
_	OJE	СТ	H	ydroged	ological	Investi	gatio	n	LOGGED	NF	СНЕ	ECKED	GT/DM			Sheet 1		
SI			M	RD, Tea		ns, NSV	/		GEOLOGY	Marine Sands		GETATION	Grasses and	Ferns		PROJECT N	O. P0902346	
-	JIPME		IMEN	SIONS	Hydraulic A	Auger < 1.0m depth			EASTING NORTHING	NA NA		SURFACE PECT	-			SLOPE	<5%	
Ë				ON DA	_	C 1.0m depth		M A	TERIAL D	l	ASF		-	SA		G & TEST		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRII Soil type, texture, structure, reparticle characteristics, orga	PTION OF STR	ATA asticity, rocks, oxidatio	n,	CONSISTENCY	DENSITY INDEX	DEPTH(M)		RESU	ILTS AND OBSERVATION	ıs
V	Nil	N	М	- - - 0.2			SP	ORGANIC LOAM dark grey, with so					D	0.0	2346/205	5/ 0.0		- - -
v 	Nil	N	М				SP	SAND - Med	ium grained,	pale grey.			D	0.3	2346/208	5/ 0.3		- - - 0 <u>.5</u>
V	Nil	N Y Y	w w				SP	SAND - Medium gr orange brown wi shell fragme		some minor			D	0.7	2346/208	5/0.7		- - - - - 1.0
								Borehole term	inated at 1.0	m in sand.								- - - 1.5 - - - 2.0
N E E H F	I Na E Ex IA Ha PT Pu C Tur	atural oxisting ckhoe cavate nd au sh tub iger igsten	exposi excar bucki or ger e	ure St vation SC et RE Ni	JPPORT H Shoring C Shotcrete B Rock Bol I No suppo	ts  Wat	e obser measur er level er outfl	rved D Dry L Lo red M Moist M M.   W Wet H Hig   Wp Plastic limit R Re ow WI Liquid limit	w VS oderate S gh F ifusal St VSt H	Soft         L         Lo           Firm         MD         Me           Stiff         D         De	ry Loose loose edium Dense ense ry Dense	A Auger B Bulk s U Undis D Distur M Moisti Ux Tube:	IG & TESTING Sample ample turbed sample bed sample ture content sample (x mmnmental sample)	pi S V D	o Pocket pr Standard S Vane shi CP Dynam penetro D Field der /S Water sa	ic cone meter sity	CLASSIFICA' SYMBOLS AI SOIL DESCR  Y USCS N Agricult	ND IPTION
$\Box$	v-t	/IL			E	EXCAVATI	ON LC	OG TO BE READ IN CONJU	INCTION WITH	H ACCOMPANYING	REPORT	NOTES A	ND ABBRE	VIATI	ONS			
Г			)							ASSOCIATES PTY						orina		

CL	IEN	Т	С	righton	Prope	rties Pty	Ltd		COMMENCED	25.09.12	COMPLETE	D 25	5.09.12			REF BH206
PR	OJE	СТ	H	ydroge	ologica	al Investi	gatio	on	LOGGED	NF	CHECKED	G	T/DM			Sheet 1 of 1
SIT	Έ		М	RD, Tea	a Gard	ens, NSV	٧		GEOLOGY	Marine Sands	VEGETATIO	ON G	rasses			PROJECT NO. P0902346
	IPME				Hydraulio				EASTING	NA	RL SURFAC	E -				
EXC				SIONS		X 1.0m depth	1		NORTHING	NA	ASPECT	-				SLOPE <5%
⊢	EX	CA	/AT	ION DA			7	M <i>A</i>	ATERIAL DA	ATA			_	SA	MPLIN	G & TESTING
МЕТНОВ	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR mottling, colour, pla anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH(M)	A	RESULTS AND DDITIONAL OBSERVATIONS
v	Nil	N	М	_ _ _ _ _ 0.25			SP	ORGANIC LOAM dark brown, with so					D	0.1	2346/20€	9/0.1
V	Nil	N	М	- - - 0.5			SP	ORGANIC LOAMY SAI to black,	ND - Medium with some orถุ				D	0.3	2346/200	9/0.3 - - 0.5
v	Nil	N Y	M W	0.7 0.8			SP	SAND - Med with	ium grained, minor organio			_	D	0.7	2346/206	6/0.7
v	Nil	Υ	w	_ _ _ 1.0			SP	LOAMY SAND parci	- Medium gra ally cemented	ined, black, d.					Hard pana	
	OLIIDE A	MENT	, ME	1.5 - - - - - - - - - - - - - - - - - - -	IDDP/ADT	WATER		Borehole term			SAMP		o Tecting			1.5 1.5 2.0
N B E H P A T	Na E: H Ba Ex A Ha T Pu Au C Tur	atural oxisting ickhoe icavate ind au ish tub iger igsten	expos exca buck or ger e	ure St vation S0 et RI	JPPORT H Shoring C Shotcre B Rock B I No sup	ete X Not olts ∇ Wa	ne obso measo ter levo ter out	erved D Dry L Lo ured M Moist M M- el W Wet H Hip Wp Plastic limit R Re flow WI Liquid limit	ow VS oderate S gh F efusal St VSt H	SISTENCY	Dense A Au B Bu Dense U Ur D Di DSE M Mo Ux Tu	iger sa ilk sam idisturbed sturbed sisture be san	& TESTING Imple Iple Ded sample d sample content Inple (x mm ental samp	pr S V: D	D Pocket p Standard S Vane shi CP Dynam penetro D Field der S Water sa	ic cone Y USCS meter sity N Agricultural
$\vdash$	V-E	Bit				EXCAVATI	ON I	OG TO BE READ IN CONJU	JNCTION WITH	ACCOMPANYING REF	PORT NOTES	S ANI	) ABBRF	VIATI	ONS	
$\vdash$			_							ASSOCIATES PTY LTD		Т			•	

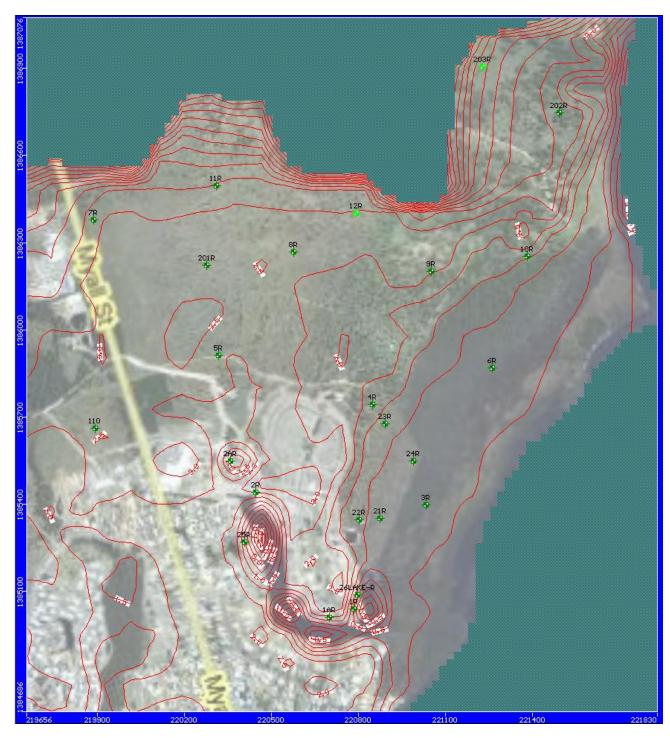
CL	IEN	Τ	Cı	ighton	Pro	per	ties Pty	Ltd		COMMENCED	25.09.12		COMPLETE	D 2	25.09.12			REF	BH207	
PF	OJE	СТ	Н	droge	olog	gica	l Investi	gatio	n	LOGGED	NF		CHECKED	C	GT/DM			Sheet 1		
SI			M	RD, Tea	_		ns, NSV	<b>V</b>		GEOLOGY	Marine Sar		VEGETATION	_	Grasses			PROJECT N	O. P0902346	
-	JIPME		NAC N	CIONE		raulic				EASTING	NA		ASPECT	CE -				SLOPE	-50/	
EXC				ON DA		mmø.	X 0.7m depth		MΔ	NORTHING TERIAL D	ΝΑ ΔΤΔ		ASPECT	-   -		SA		G & TEST	<5% TING	_
METHOD	SUPPORT	WATER	MOISTURE	DEPTH(M)	O E A O E E A O E	H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRII Soil type, texture, structure, reparticle characteristics, orga	PTION OF STI	RATA  blasticity, rocks	s, oxidation, mponents,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)		RESU	JLTS AND OBSERVATIONS	
V	Nil	N	D	- - - 0.2				SP	ORGANIC LOAM dark grey, with so						D	0.0	2346/207	7/0.0		
V	Nil	N N Y	D W	- - - - 0.5 - 0.6				SP	SAND - Med	ium grained	, pale grey	<i>.</i>			D	0.3	2346/207	7/0.3		0.5
							18782 - 88 ·		Borehole term	inated at 1.0	om in sand									1.0
				 - - -																
																				- - 1.5
				- - -																
				- - -																-
																				2.0
				_ _ 															2	.25
P E E H F	E Ex BH Ba E Ex HA Ha PT Pu A Au C Tur	atural existing ckhoe cavate ind au sh tub iger igsten	exposition excave bucket or ger e	re SF ation SC t RE Nil	Sh Ro	PRT loring lotcret lock Bo supp	Its V Wat	e obse measu ter leve	rved D Dry L Lo red M Moist M M.   W Wet H Hig   Wp Plastic limit R Re ow WI Liquid limit	w VS oderate S gh F	VSISTENCY Very Soft Soft Firm Stiff Very Stiff Hard Friable	DENSITY VL Very Loose L Loose MD Medium Do D Dense VD Very Dense	se A Au B Bu ense U Ui D Di e M Me Ux Tu	uger s ulk sar ndistur isturbe oisture ube sa	& TESTING ample nple rbed sample ed sample e content mple (x mm nental samp	pi S V D	p Pocket pi Standard S Vane shi CP Dynam penetro D Field der /S Water sa	ic cone meter sity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural	1
	/ V-E	JIC					EXCAVATI	ON LO	OG TO BE READ IN CONJU				ORT NOTE:	S AN						_
1										MARTENS &	ASSOCIAT	ES PTY LTD		- 1	_	'-a a		arina	1	

CLIENT		Cı	righton	Prop	erti	es Pty l	Ltd		<b>COMMENCED</b> 25.09.12 <b>C</b>			COMPLETED		25.09.12			REF	BH208	
PROJECT		Ну	Hydrogeological Invest			nvestig	jatio	n	LOGGED	NF		CHECKED		GT/DM		Sheet 1			
SITE		M	MRD, Tea Gardens, NSW						GEOLOGY	Marine San		VEGETATIO	_	Grasses PROJECT NO. P0902346			). P0902346		
EQUIPMENT		NAC N	Hydraulic Auger						EASTING	NA		RL SURFACE		-			el one	-59/	
EXCAVATION DIMENSIONS 100mmØ X 1.0m depth  EXCAVATION DATA				NORTHING NA  MATERIAL DATA				ASPECT	SAMPLING & TESTING										
МЕТНОВ	SUPPORT	WATER	MOISTURE	DEPTH(M)	F PENETRATION THE RESISTANCE	2	GRAPHIC LOG	CLASSIFICATION	DESCRII Soil type, texture, structure, r particle characteristics, org.	PTION OF STE	RATA lasticity, rocks and minor cor	, oxidation, nponents,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH(M)		RESU	LTS AND OBSERVATIONS
v	Nil	N	D	_ _ _ _ 		200		SP	ORGANIC LOAM dark grey, with sc						D	0.0	2346/208	8/ 0.0	
V	Nil	N N Y	M M W	- - - 0.5 - - 0.7				SP	SAND - Med	lium grained,	pale grey				D	0.4	2346/201	8/ 0.4	- - 0.5 - - - - - - - - - - -
				- - - - - 1.5 - - - - - 2.0					Borehole term	inated at 1.0	m in sand								1.5
EQUIPMENT / METHOD SUPPORT WATER MOISTURE PENETRATION CONSISTENCY DENSITY NOT NATURAL exposure SH Shoring N None observed D Dry L Low VS Very Soft VL VO X Existing excavation SC Shotcrete X Not measured M Moist M Moderate S Soft L LC BH Backhoe bucket RB Rock Bolts V Water level W Wet H High F Firm MD M E Excavator Nil No support						MD Medium Do	e A Au B Bul ense U Un D Dis e M Mo Ux Tul	iger s ilk sar idistur sturbe sisture be sa	& TESTING ample mple rbed sample ed sample e content mple (x mm nental samp	pi S V D	p Pocket p Standard S Vane sh ICP Dynam penetro D Field der VS Water sa	nic cone ometer nsity	CLASSIFICATION SYMBOLS AND						
	V-E	οIL				Ε×	KCAVATIO	ON LC	OG TO BE READ IN CONJU	JNCTION WITI	H ACCOMP	ANYING REPO	ORT NOTES	S AN	D ABBRE	VIATI	ONS		
			7							MARTENS &				Т				orino	. 1

**Attachment 6A – Groundwater Assessment Figures** 20



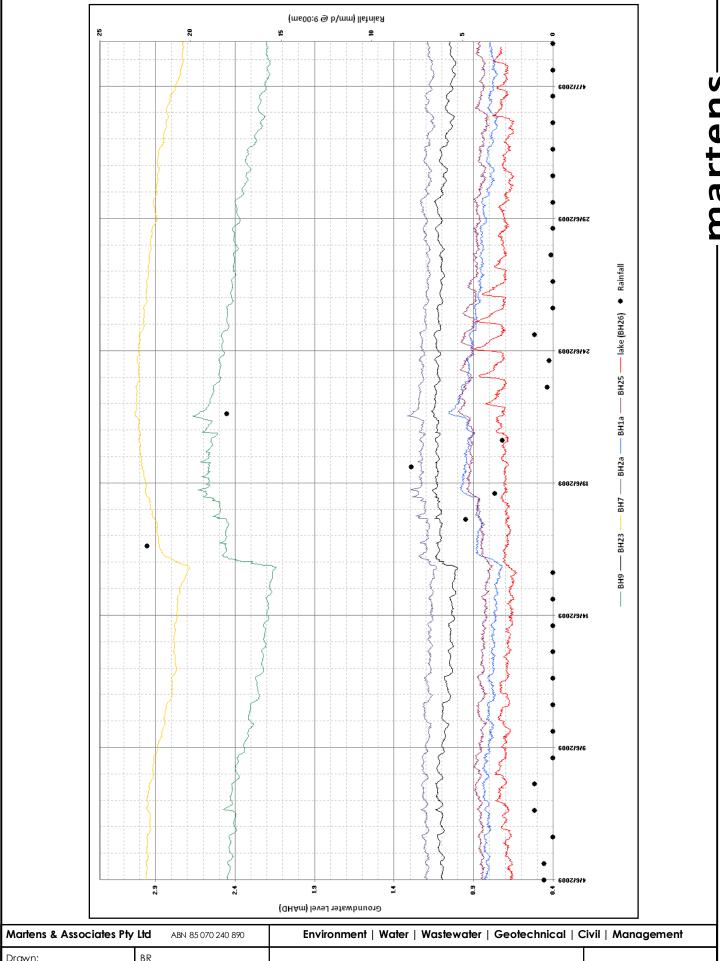




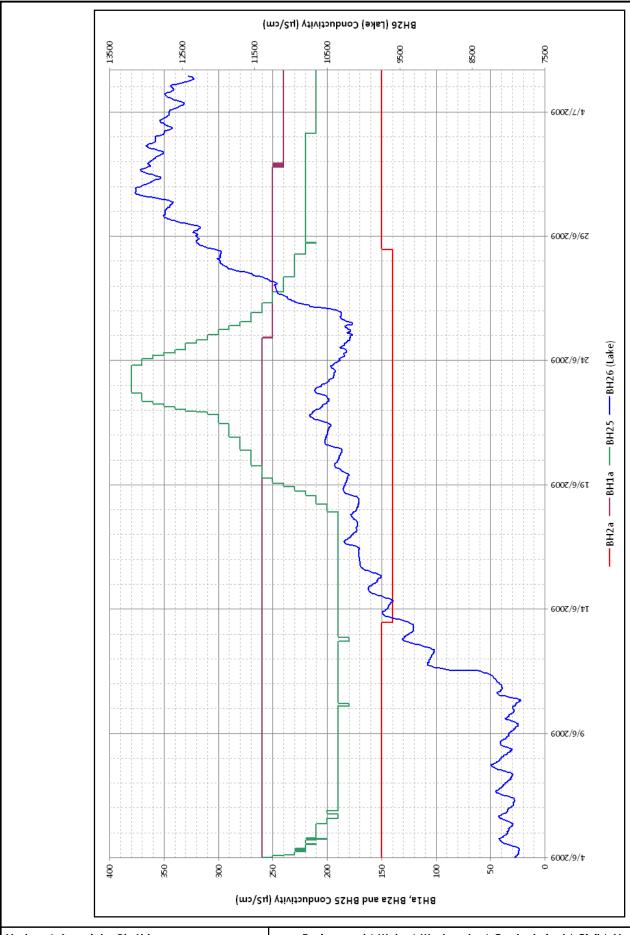
#### Note:

Image shows location of all installed GMBs to date (with a postfix of R). GMBs 1, 2, 2A and 26ILAKE are no longer available. GMB 201, 202 & 203 installed September 2012. GMB 110 forms part of groundwater model but not included in reporting.

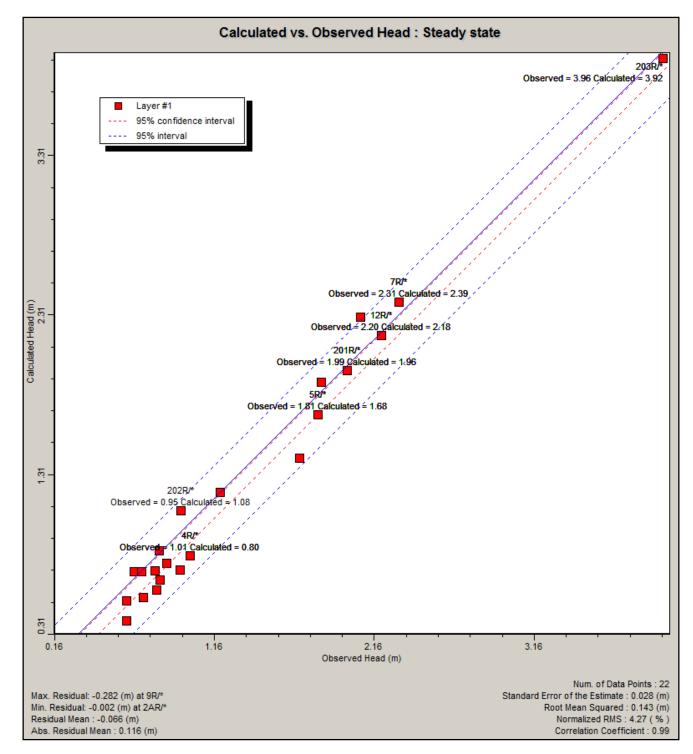
Martens & Associates Pty	<b>Ltd</b> ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management				
Drawn:	GMH					
Approved:	DMM	SITE GROUNDWATER MONITORING BORES (GMBS) AND EXISTING SITE CONTOURS	Figure 3			
Date:	26.11.2012					
Scale:	NA		Job No: P0902346			



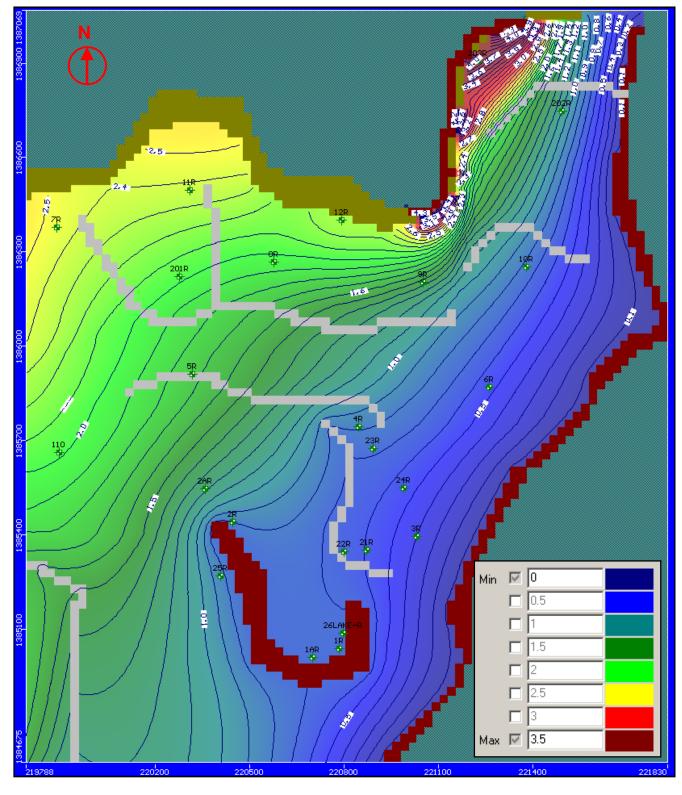
Martens & Associates	Pty Ltd ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management					
Drawn:	BR						
Approved:	DMM	RIVERSIDE GROUNDWATER LEVEL OBSERVATIONS: BORES 1A, 2A, 7, 9, 23, 25 AND 26 (Lake)	Figure 4				
Date:	22.11.2012	PERIOD: 04/06/09 - 06/07/09					
Scale:	NA		Job No: P0902346				



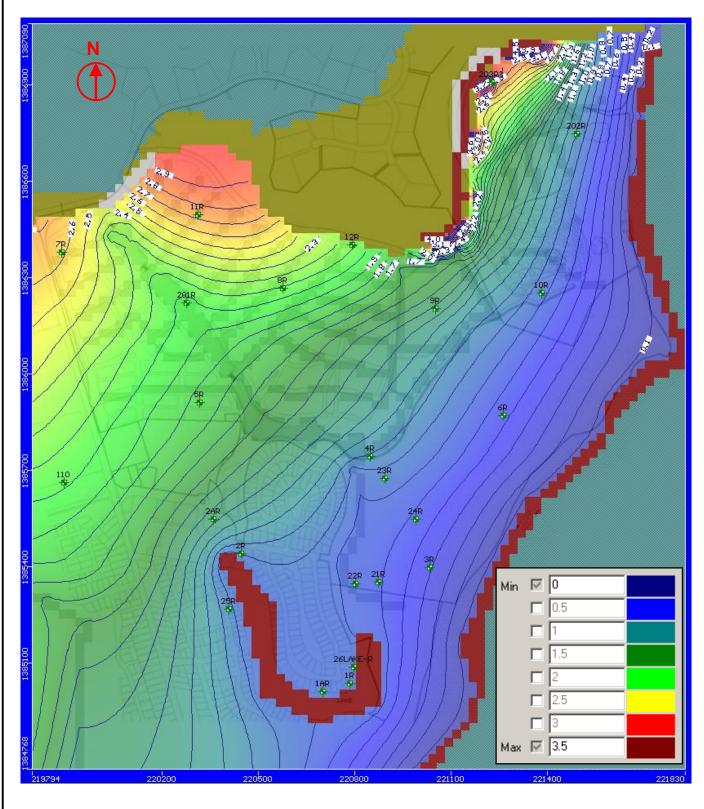
Martens & Associa	ites Pty Ltd ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management					
Drawn:	BR		Figure 5				
Approved:	DMM	RIVERSIDE GROUNDWATER EC (µS/CM) OBSERVATIONS: BORES 1A, 2A, 25 AND 26 (Lake)					
Date:	22.11.2012	PERIOD: 04/06/09 - 06/07/09					
Scale:	NA		Job No: P0902346				



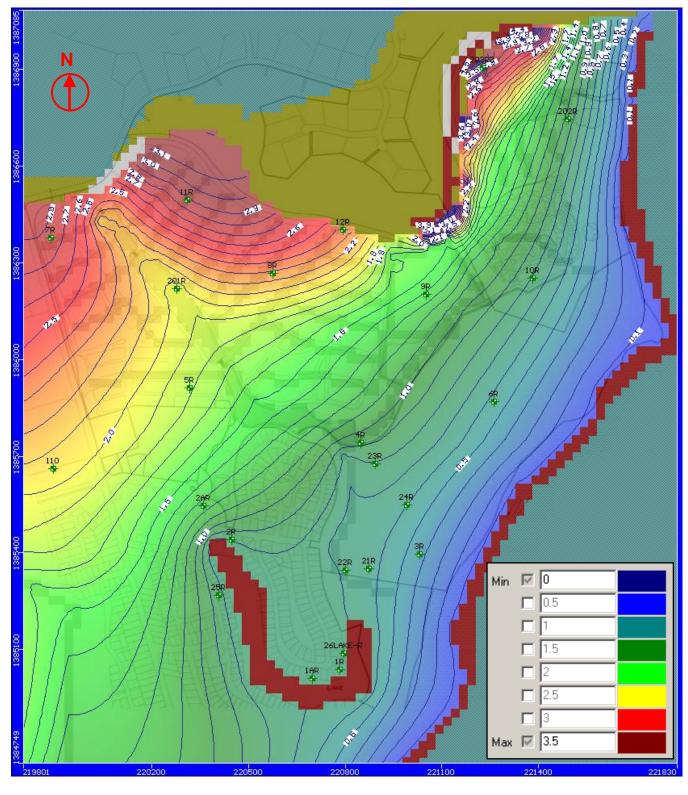
Martens & Associates Pty	<b>Ltd</b> ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management				
Drawn:	GMH		Figure 6			
Approved:	DMM	M0 CALIBRATION				
Date:	26.11.2012					
Scale:	NA		Job No: P0902346			



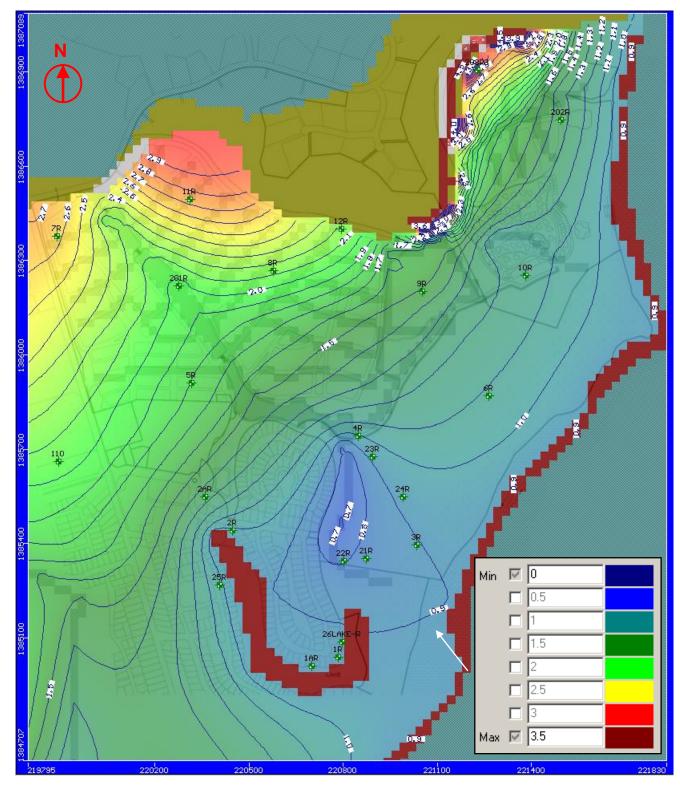
Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   C	Civil   Management			
Drawn:	BR					
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL CONTOURS: M1a- EXISTING SITE, MEAN RAINFALL CONDITIONS	Figure 7			
Date:	22.11.2012	·				
Scale:	NA		Job No: P0902346			



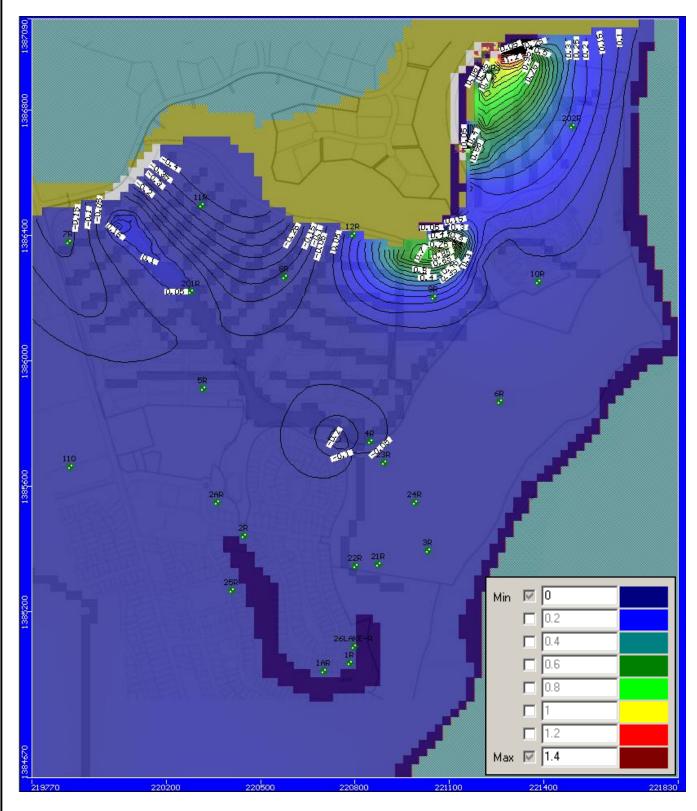
Martens & Associates Pty	<b>Ltd</b> ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management						
Drawn:	BR							
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL CONTOURS: M2a- DEVELOPED SITE, MEAN RAINFALL CONDITIONS	Figure 8					
Date:	22.11.2012							
Scale:	NA		Job No: P0902346					



Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management							
Drawn:	BR								
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL CONTOURS: M2b- DEVELOPED SITE, WET RAINFALL CONDITIONS	Figure 9						
Date:	22.11.2012								
Scale:	NA		Job No: P0902346						

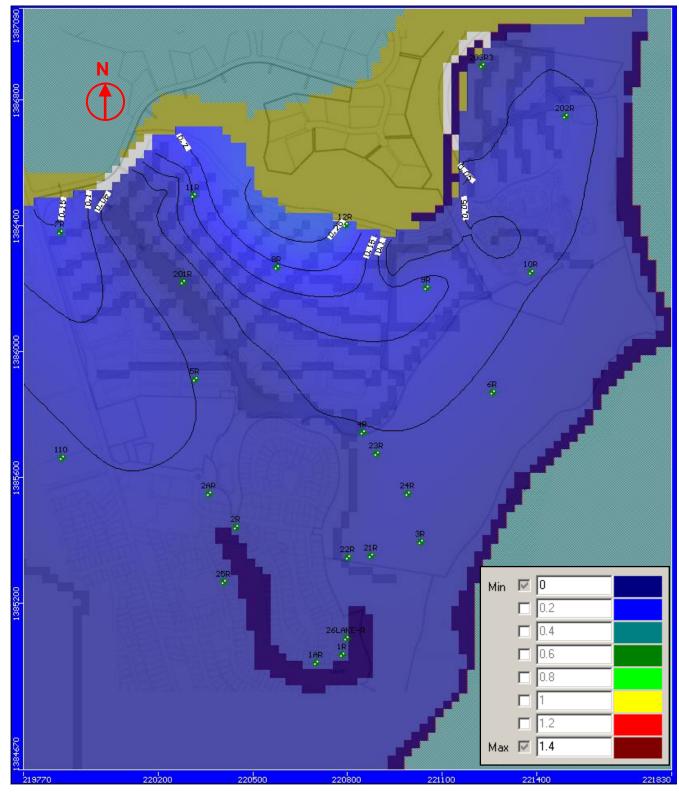


Martens & Associates Pty	<b>Ltd</b> ABN 85 070 240 890	Environment   Water   Wastewater   Geotechnical   Civil   Management							
Drawn:	BR								
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL CONTOURS:  M2c- DEVELOPED SITE, MEAN RAINFALL CONDITIONS WITH	Figure 10						
Date:	22.11.2012	SEA LEVEL RISE							
Scale:	NA		Job No: P0902346						



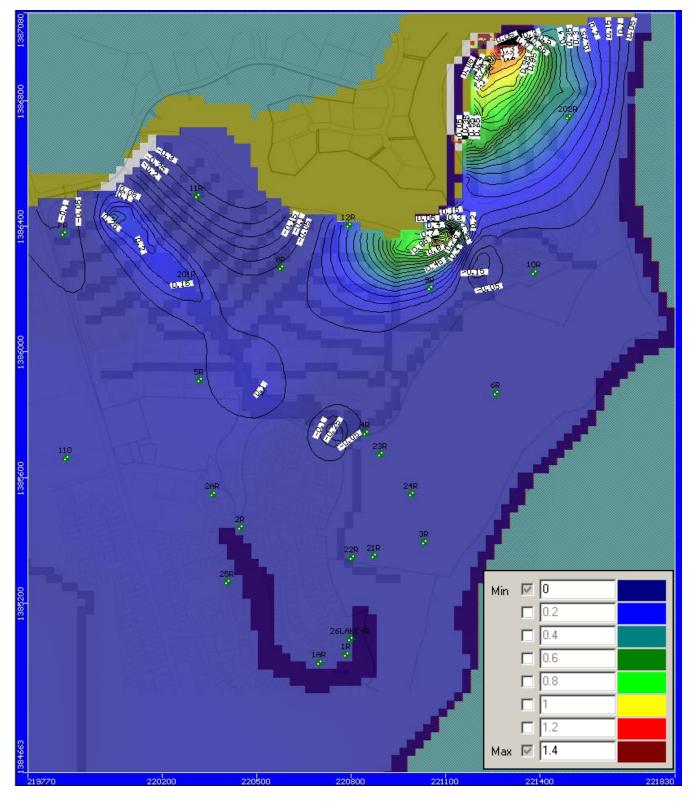
**Key**Black lines - Drawdown contour (0.05 m contour interval)

Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management							
Drawn:	GMH								
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL DRAWDOWN PLOT BETWEEN DEVELOPED (M2a) AND EXISTING (M1a) WITH	Figure 11						
Date:	26.11.2012	MEAN RAINFALL CONDITIONS							
Scale:	NA		Job No: P0902346						



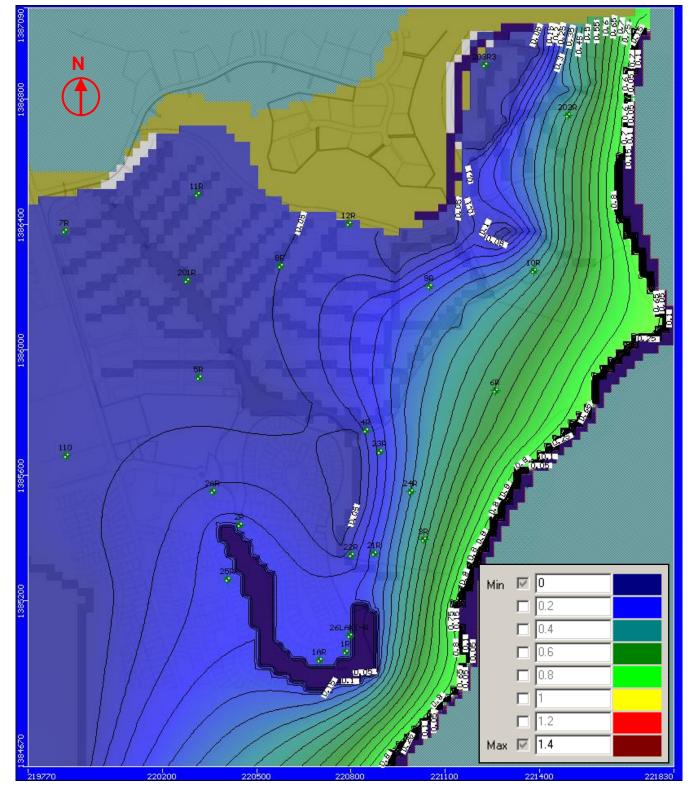
**Key**Black lines - Drawdown contour (0.1 m contour interval)

Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management							
Drawn:	GMH								
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL DRAWDOWN PLOT BETWEEN DEVELOPED MEAN RAINFALL (M2a) & WET	Figure 12						
Date:	26.11.2012	RAINFALL CONDITIONS (M2b)							
Scale:	NA		Job No: P0902346						



**Key**Black lines - Drawdown contour (0.1 m contour interval)

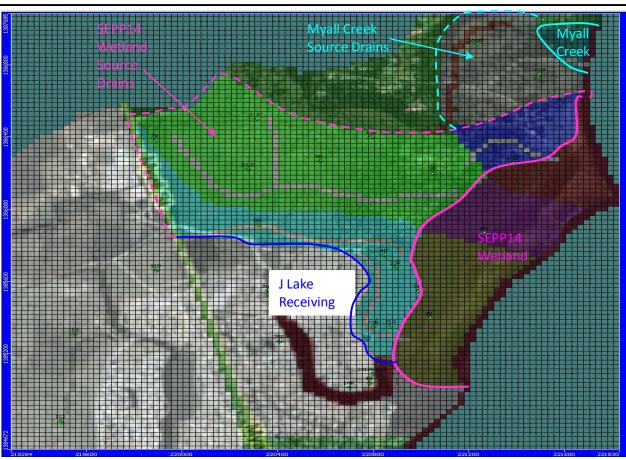
Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management							
Drawn:	GMH								
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL DRAWDOWN PLOT BETWEEN DEVELOPED (M2c) & EXISTING (M1c) WITH MEAN	Figure 13						
Date:	26.11.2012	RAINFALL CONDITIONS & SEA LEVEL RISE							
Scale:	NA		Job No: P0902346						

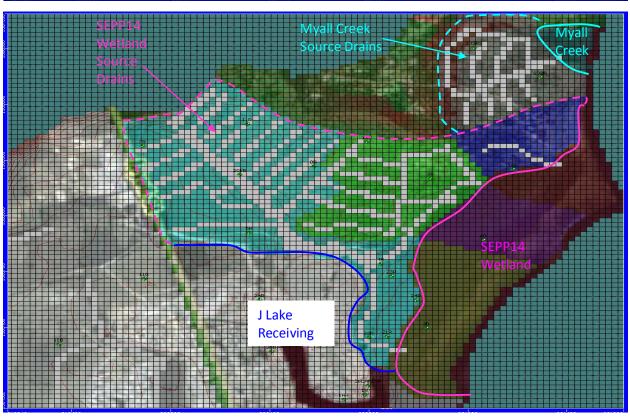


**Key** Black lines - Drawdown contour (0.1 m contour interval)

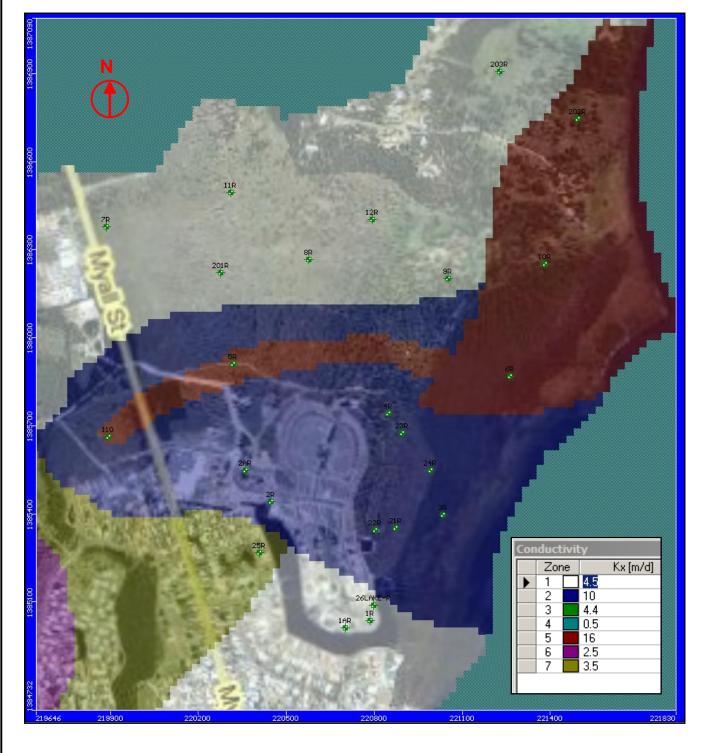
Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management						
Drawn:	GMH							
Approved:	DMM	GROUNDWATER HEAD EQUIPOTENTIAL DRAWDOWN PLOT BETWEEN DEVELOPED MEAN RAINFALL WITH (M2c) &	Figure 14					
Date:	26.11.2012	WITHOUT (M2a) SEA LEVEL RISE						
Scale:	NA		Job No: P0902346					



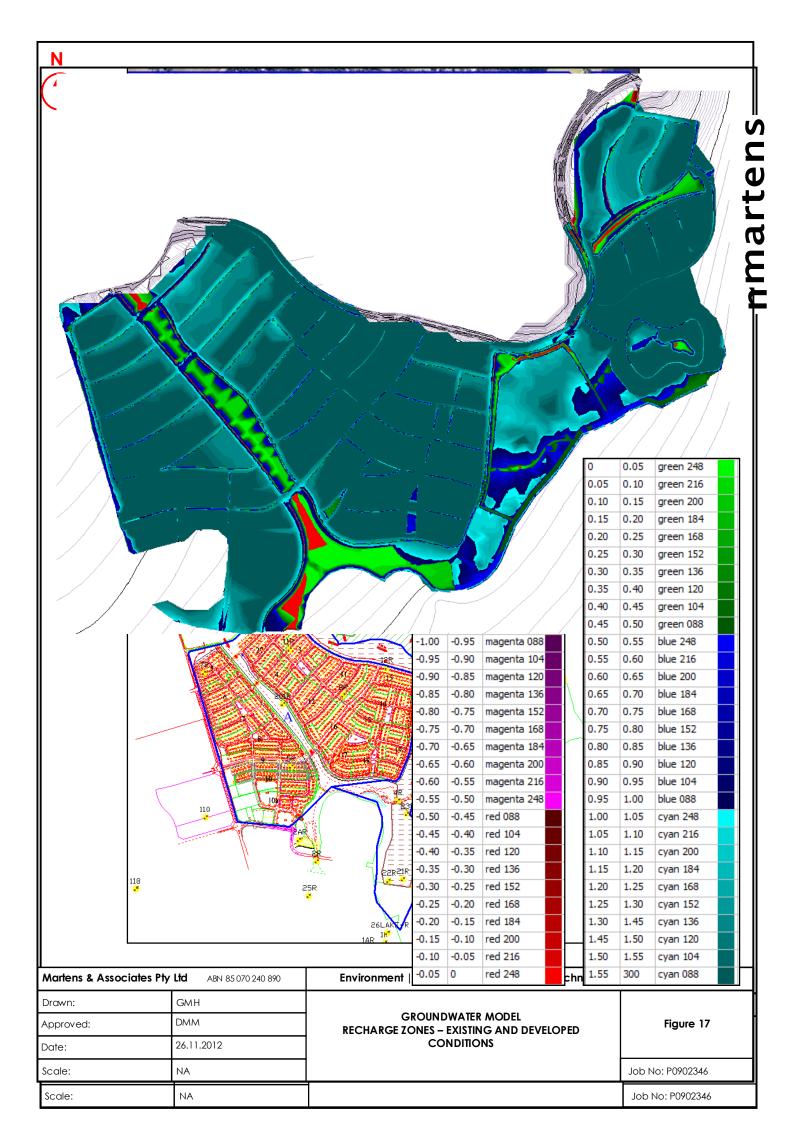




Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management								
Drawn:	GMH									
Approved:	DMM	GROUNDWATER MODEL WATER BALANCE ZONES AND DRAINS	Figure 15							
Date:	26.11.2012									
Scale:	NA		Job No: P0902346							



Martens & Associates Pty Ltd ABN 85 070 240 890		Environment   Water   Wastewater   Geotechnical   Civil   Management								
Drawn:	GMH									
Approved:	DMM	GROUNDWATER MODEL HYDRAULIC CONDUCTIVITY ZONES	Figure 16							
Date:	26.11.2012									
Scale:	NA		Job No: P0902346							



Attachment 6B – Groundwater Level Data



# 1 - lost or destroyed sometime between 2004 and 2007.

# 2 - installed by BR. 3 - ground elevations taken from Martens (july, 2009)

		1	1	1														2	2	2	2			
	GMB	GMB1	GMB2	GMB3	GMB4	GMB5	GMB6	GMB7	GMB8	GMB9	GMB10	GMB11	GMB12	GMB21	GMB22	GMB23	GMB24	GMB1A	GMB2A	GMB25	Lake 26	GMB201	GMB202	GMB203
	Ground level (mAHD)	1.020	2.370	0.845	2.045	2.608	0.861	2.963	2.598	2.859	1.490	3.395	3.261	1.026	1.095	1.111	0.834	1.708	2.479	1.798	0.492	2.740	3.690	5.140
	Concrete cap level (mAHD)	1.020	2.375	0.840	2.131	2.638	1.020	3.163	2.598	2.909	1.310	3.547	3.311											
Source	Date																							
	8/11/1994	0.570	0.850			1.488			1.388	1.459	0.700	1.837	1.951									_		
	24/11/1994	0.410	0.785	0.260		1.338		1.713	1.268	1.319		1.657	1.761											
	6/12/1994	0.300	0.735	0.300		1.268		1.593	1.188	1.319		1.597	1.621											
	22/12/1994	0.250	0.685	0.060		1.188		1.553	1.108	1.229	0.390	1.457	1.481											
	6/01/1995	0.650	0.835	0.720		1.298		1.733	1.258	1.449	0.620	1.437	1.591											
	21/02/1995	0.570	0.765	0.550		1.138		1.563	1.078	1.329	0.480	1.347	1.371											
	8/03/1995	0.240	1.525	0.550		1.658		2.568	0.728	1.159	0.760	2.047	2.332											
	14/03/1995	0.855	1.295	0.780		2.278		2.593	2.098	1.749	0.800	2.127	2.421											
	31/03/1995	0.595	1.020	0.660		1.713		2.243	1.578	1.549	0.615	1.952	1.921											
	19/04/1995	0.440	0.985	0.525		1.433		1.938	1.328	1.399	0.485	1.717	1.646											
	2/05/1995	0.370	0.800	0.250		1.363		1.803	1.218	1.329	0.395	1.562	1.486											
	17/05/1995	0.910	0.995	0.760		1.823		2.133	1.628	1.429	0.830	1.697	1.831											
	18/05/1995	0.930	1.375	0.760		2.328		2.403	2.258	1.699	0.910	2.237	1.601											
Coffey (feb, 1996)	19/05/1995	0.900	1.365	0.760		2.358		2.443	2.208	1.699	0.890	2.067	1.681											
	22/05/1995	0.925	1.795	0.790				2.703	2.458	1.859	1.110	2.257	2.761											
	23/05/1995	0.920	1.825	0.780		2.558		2.723	2.408	1.899	1.070	2.337	2.971											
	24/05/1995	0.920	1.715	0.780		2.538		2.733	2.368	1.859	1.030	2.337	3.051											
	25/05/1995	0.910	1.685	0.780		2.548		2.763	2.348	1.839	1.020	2.477	2.931											
	26/05/1995	0.920	1.695	0.770		2.548		2.743	2.368	1.829	1.050	2.447	2.951											
	21/06/1995 13/07/1995	0.880 0.710	2.015 1.965	0.785 0.760		2.228		2.803 2.713	2.428 2.188	1.969 1.939	1.210 1.230	2.777 2.747	3.041 2.721											
	26/07/1995	0.710	0.925	0.740		1.898		2.413	1.958	1.749	1.030	3.007	2.721											
	11/08/1995	0.580	0.825	0.740	1.071	1.608	0.670	2.183	1.778	1.719	0.970	1.967	2.261											
	28/08/1995	0.510	0.023	0.460	0.821	1.478	0.280	1.953	1.528	1.559	0.760	1.837	2.071											
	19/09/1995	0.600		0.740	0.021	2.328	0.200	2.423	2.328	1.869	1.160	2.377	2.491											
	20/09/1995	0.620		0.750	1.301	1.598	0.750	2.603	2.278	1.929	1.140		2.641											
_	Late July 1994 - mid Nov 1994						0.500															_		
_	Late July 1994 - late Sept 1994				1.100																	_		
	7/04/2004			0.298	1.144	2.043	0.768	2.816	2.314	2.111	1.101	2.562	2.708									_		
Coffey (Oct, 2007)	11/05/2004			0.232	0.928	1.451		2.081	1.774	1.880	0.836	1.939	2.120	0.778	0.876	0.930	0.681							
	29/03/2007				0.823	1.303			1.534	1.657	0.541	1.689	1.655	0.813	0.826	0.760	0.628							
Martens & Associates (July, 2009)	04/06/2009 - 6/7/2009							2.891		2.375						1.270		0.838	1.198	0.872	0.708			
Martens & Associates (Early Sept 2012)	03/09/2012 or 04/09/2012		_	0.745	0.985	1.928	0.743	2.383	2.268	2.059	0.975	2.495	2.541	0.803	0.766	0.831	0.834	0.738		0.753		_		
Martens & Associates (Late Sept 2012)	25/09/2012 & 26/09/2012				0.905	1.748	0.563	2.233	2.098	1.959	0.890	2.295										2.08	1.00	4.11
Tattersall Lander (Oct 2012)	11/10/2012																					1.90	0.90	3.82
	Minimum Level (mAHD)	0.24	0.69	0.06	0.82	1.14	0.28	1.55	0.73	1.16	0.39	1.35	1.37	0.78	0.77	0.76	0.63	0.74	1.20	0.75	0.71	1.90	0.90	3.82
	Median Level (mAHD)	0.63	1.02	0.74	0.99	1.71	0.67	2.41	1.96	1.73	0.89	2.06	2.19	0.80	0.83	0.88	0.68	0.79	1.20	0.81	0.71	1.99	0.95	3.97
	Mean Level (mAHD)	0.66	1.24	0.61	1.01	1.81	0.61	2.31	1.83	1.69	0.86	2.08	2.20	0.80	0.82	0.95	0.71	0.79	1.20	0.81	0.71	1.99	0.95	3.97
	Maximum Level (mAHD)	0.93	2.02	0.79	1.30	2.56	0.77	2.89	2.46	2.38	1.23	3.01	3.05	0.81	0.88	1.27	0.83	0.84	1.20	0.87	0.71	2.08	1.00	4.11
	Min Depth (m) to GW	0.09	0.36	0.06	0.74	0.05	0.09	0.07	0.14	0.48	0.26	0.39	0.21	0.21	0.22	-0.16	0.00	0.87	1.28	0.93	-0.22	0.66	2.69	1.03
	Depth range	0.69	1.33	0.73	0.48	1.42	0.49	1.34	1.73	1.22	0.84	1.66	1.68	0.03	0.11	0.51	0.21	0.10	0.00	0.12	0.00	0.18	0.10	0.29
	Mean Depth (m) below Ground level	0.36	1.13	0.24	1.04	0.80	0.25	0.65	0.77	1.17	0.63	1.32	1.06	0.23	0.27	0.16	0.12	0.92	1.28	0.99	-0.22	0.75	2.74	1.18

estimated median based on visual observation of plot

mean from martens diver monitoring

Source	Sample date		GMB1	GMB2	GMB3	GMB4	GMB5	GMB6	GMB7	GMB8	GMB9	GMB10	GMB11	GMB12	GMB13	GMB21	GMB22	GMB23	GMB24	GMB1A	GMB2A	GMB25	Lake 26	Lake	GMB201	GMB202	GMB203
		рН	6.40	5.30	6.20			6.00				5.60	6.00	5.30													
		TDS (mg/L)	490.00	190.00	13900.00			1900.00				420.00	2300.00	220.00													
Coffey	Average result 13/12/94 to	Chloride (mg/L)	220.00	82.00	7600.00			1100.00				150.00	1200.00	60.00													
(Feb, 1996)	29/8/1995	Sulphate (mg/L)	33.00	16.00	1200.00			170.00				5.00	170.00	25.00													
		Magnesium (mg/L)	36.00	6.00	540.00			76.00				8.40	85.00	5.20													
		Calcium (mgLL)	9.00	1.20	160.00			33.00				7.20	22.00	2.20													
		рН				5.32								5.02		5.62	6.05	5.60	5.46								
		TDS (mg/L)				155.00								1210.00		11500.00	1350.00	212.00	2250.00								
		Chloride (mg/L)				50.40								64.60		5300.00	430.00	58.70	800.00								
		Sulphate (mg/L)				10.00								22.00		702.00	39.00	6.00	344.00								
Coffey (Oct, 2007)	29/03/2007	Magnesium (mg/L)				4.00								6.00		420.00	23.00	7.00	54.00								
		Calcium (mgLL)				2.00								2.00		126.00	11.00	3.00	31.00								
		EC (us/cm)				202.00								268.00		15500.00	1610.00	234.00	2730.00								
		TN (mg/L)				0.93								3.07		12.13	7.24	2.51	9.33								
		TP (mg/L)				0.14								0.76		1.38	0.79	0.32	1.12								
		рН									3.99													5.83			
		TDS (mg/L)									200.00													129.00			
		Chloride (mg/L)									34.40													37.40			
0.46		Sulphate (mg/L)									13.00													12.00			
Coffey (Oct, 2007)	30/03/2007	Magnesium (mg/L)									3.00													3.00			
(301, 2007)		Calcium (mgLL)									1.00													8.00			
		EC (us/cm)									178.00													182.00			
		TN (mg/L)									2.53													0.72			
		TP (mg/L)									1.00													0.08			
		рН									4.30							5.70		6.20	5.10	5.60	6.30				
		TDS (mg/L)									96.00							180.00		170.00	120.00	160.00	11000.00				
		Chloride (mg/L)									37.00							65.00		30.00	50.00	25.00	5800.00				
Martens and		Sulphate (mg/L)									5.00							5.00		39.00	5.00	5.00	850.00				
Associates (July,	6/07/2009	Magnesium (mg/L)									2.90							7.80		8.20	3.40	4.40	360.00				
2009)		Calcium (mgLL)									0.30							3.60		5.60	1.20	3.60	110.00				
		EC (us/cm)									160.00							280.00		280.00	200.00	260.00	14000.00				
		TN (mg/L)									1.00							0.60		7.10	3.80	30.00	0.60				
		TP (mg/L)									1.90							0.05		6.10	2.80	1.20	0.05				
		рН			6.7	6.20	6.30	6.40		5.80	4.00		6.10									6.30	7.30				
		TDS (mg/L)			7300	120.00	200.00	3500.00		200.00	160.00		2800.00									130.00	10000.00				
		Chloride (mg/L)			5500	75.00	49.00	1700.00		62.00	27.00		1300.00									36.00	4900.00				
Martens and		Sulphate (mg/L)			760	4.00	10.00	210.00		20.00	1.00		170.00									1.00	600.00				
Associates (Sept,	4/09/2012	Magnesium (mg/L)			370	6.10	2.10	130.00		4.80	3.10		77.00									4.20	300.00				
2012)		Calcium (mgLL)			110	2.40	0.90	49.00		2.80	0.50		18.00									4.20	97.00				
		EC (us/cm)			18000	320.00	260.00	6400.00		310.00	170.00		4700.00									240.00	16000.00				
		TN (mg/L)			2.2	1.90	1.90	0.90		1.90	2.80		0.70									5.30	0.90				
		TP (mg/L)			0.05	0.05	0.09	0.05		0.10	1.30		0.50									0.20	0.05				
		рH					5.80	5.70	5.50	5.20	4.10	6.00	5.60												5.30	5.40	5.30
		TDS (mg/L)					180.00	4900.00	120.00	160.00	150.00	160.00	2700.00												65.00	1200.00	110.00
		Chloride (mg/L)					44.00	2900.00	38.00	71.00	29.00	53.00	1400.00												640.00	18.00	43.00
Martens and		Sulphate (mg/L)					10.00	360.00	7.00	24.00	1.00	3.00	180.00												26.00	5.00	5.00
Associates (Sept,	27/09/2012	Magnesium (mg/L)					1.50	170.00	3.70	5.00	3.10	10.00	87.00												42.00	1.90	4.00
2012)		Calcium (mgLL)					0.60	67.00	3.60	3.10	0.50	6.20	21.00												13.00	1.70	1.10
		EC (us/cm)					230.00	8400.00	200.00	320.00	170.00	300.00	4600.00												2000.00	110.00	190.00
		TN (mg/L)					1.10	1.20	3.00	1.60	1.90	1.60	0.70												9.90	3.30	4.10
		TP (mg/L)					0.05	0.05	0.20	0.30	1.30	0.10	0.07												1.20	0.30	0.60

Value is less than laboratory PQL

**Attachment 6C – Groundwater Quality Data** 22

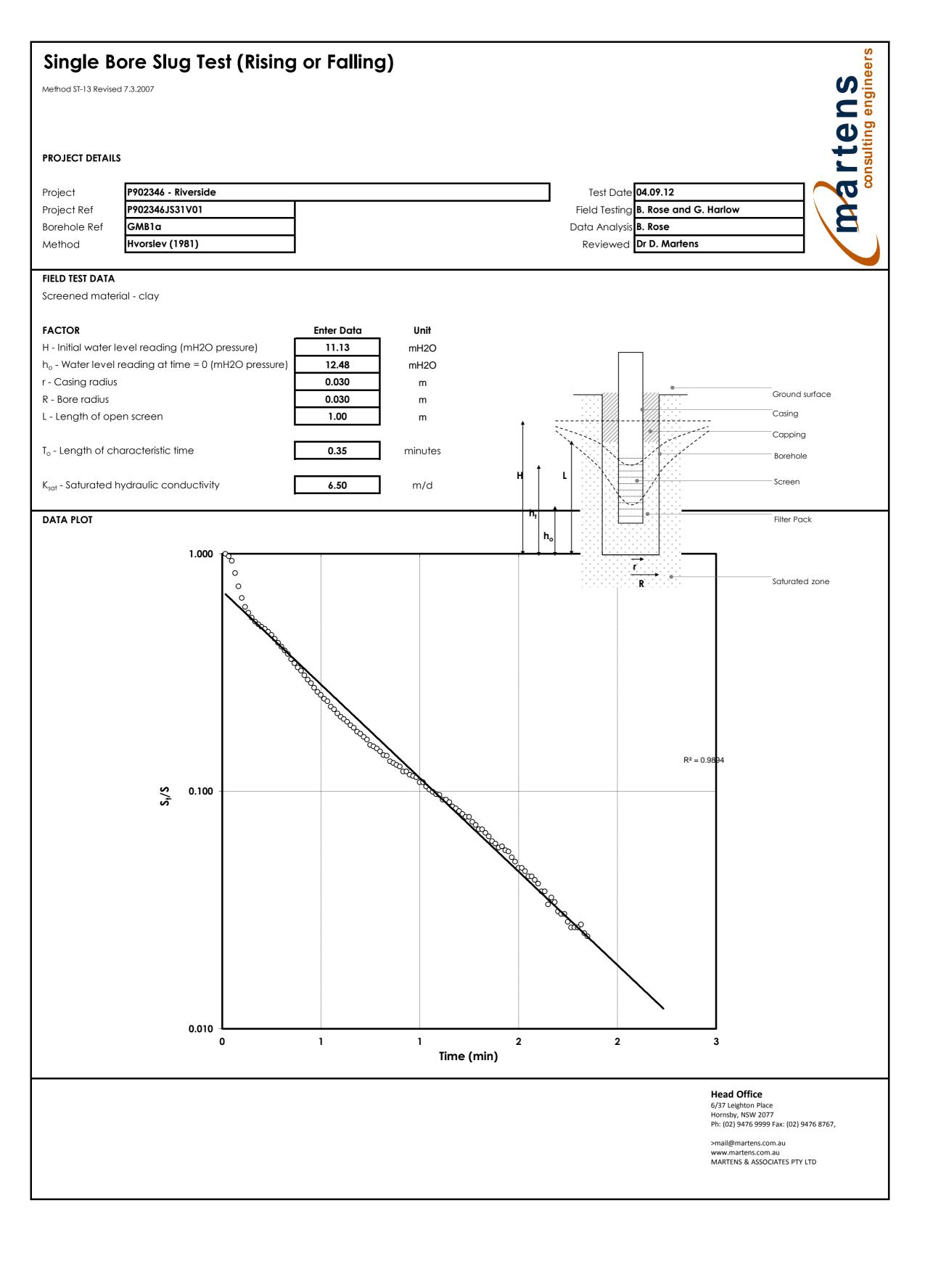


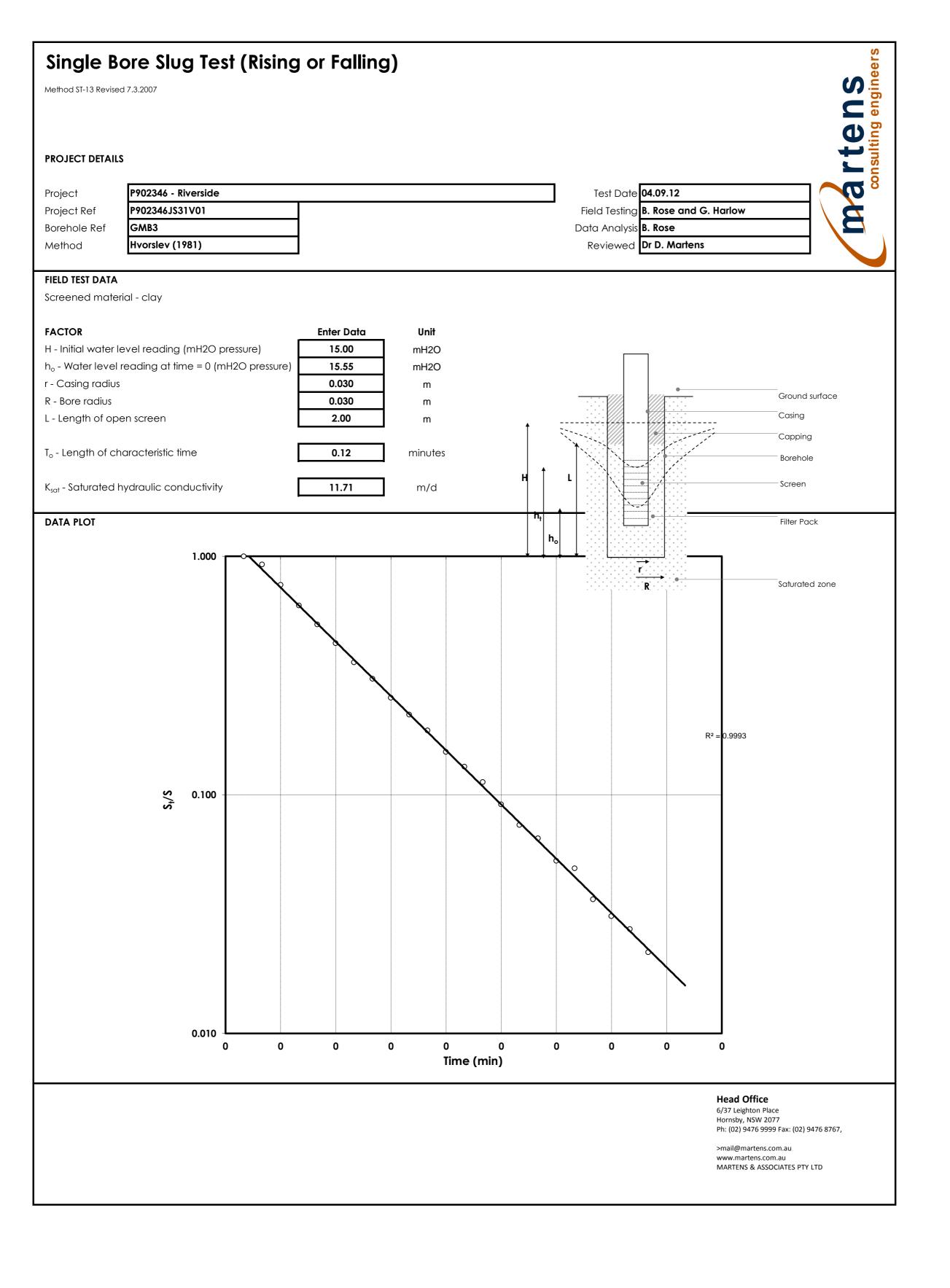
Source	Sample date		GMB1	GMB2	GMB3	GMB4	GMB5	GMB6	GMB7	GMB8	GMB9	GMB10	GMB11	GMB12	GMB13	GMB21	GMB22	GMB23	GMB24	GMB1A	GMB2A	GMB25	Lake 26	Lake	GMB201	GMB202	GMB203
		рН	6.40	5.30	6.20			6.00				5.60	6.00	5.30													
		TDS (mg/L)	490.00	190.00	13900.00			1900.00				420.00	2300.00	220.00													
Coffey	Average result 13/12/94 to	Chloride (mg/L)	220.00	82.00	7600.00			1100.00				150.00	1200.00	60.00													
(Feb, 1996)	29/8/1995	Sulphate (mg/L)	33.00	16.00	1200.00			170.00				5.00	170.00	25.00													
		Magnesium (mg/L)	36.00	6.00	540.00			76.00				8.40	85.00	5.20													
		Calcium (mgLL)	9.00	1.20	160.00			33.00				7.20	22.00	2.20													
		рН				5.32								5.02		5.62	6.05	5.60	5.46								
		TDS (mg/L)				155.00								1210.00		11500.00	1350.00	212.00	2250.00								
		Chloride (mg/L)				50.40								64.60		5300.00	430.00	58.70	800.00								
		Sulphate (mg/L)				10.00								22.00		702.00	39.00	6.00	344.00								
Coffey (Oct, 2007)	29/03/2007	Magnesium (mg/L)				4.00								6.00		420.00	23.00	7.00	54.00								
		Calcium (mgLL)				2.00								2.00		126.00	11.00	3.00	31.00								
		EC (us/cm)				202.00								268.00		15500.00	1610.00	234.00	2730.00								
		TN (mg/L)				0.93								3.07		12.13	7.24	2.51	9.33								
		TP (mg/L)				0.14								0.76		1.38	0.79	0.32	1.12								
		рН									3.99													5.83			
		TDS (mg/L)									200.00													129.00			
		Chloride (mg/L)									34.40													37.40			
0.46		Sulphate (mg/L)									13.00													12.00			
Coffey (Oct, 2007)	30/03/2007	Magnesium (mg/L)									3.00													3.00			
(301, 2007)		Calcium (mgLL)									1.00													8.00			
		EC (us/cm)									178.00													182.00			
		TN (mg/L)									2.53													0.72			
		TP (mg/L)									1.00													0.08			
		рН									4.30							5.70		6.20	5.10	5.60	6.30				
		TDS (mg/L)									96.00							180.00		170.00	120.00	160.00	11000.00				
		Chloride (mg/L)									37.00							65.00		30.00	50.00	25.00	5800.00				
Martens and		Sulphate (mg/L)									5.00							5.00		39.00	5.00	5.00	850.00				
Associates (July,	6/07/2009	Magnesium (mg/L)									2.90							7.80		8.20	3.40	4.40	360.00				
2009)		Calcium (mgLL)									0.30							3.60		5.60	1.20	3.60	110.00				
		EC (us/cm)									160.00							280.00		280.00	200.00	260.00	14000.00				
		TN (mg/L)									1.00							0.60		7.10	3.80	30.00	0.60				
		TP (mg/L)									1.90							0.05		6.10	2.80	1.20	0.05				
		рН			6.7	6.20	6.30	6.40		5.80	4.00		6.10									6.30	7.30				
		TDS (mg/L)			7300	120.00	200.00	3500.00		200.00	160.00		2800.00									130.00	10000.00				
		Chloride (mg/L)			5500	75.00	49.00	1700.00		62.00	27.00		1300.00									36.00	4900.00				
Martens and		Sulphate (mg/L)			760	4.00	10.00	210.00		20.00	1.00		170.00									1.00	600.00				
Associates (Sept,	4/09/2012	Magnesium (mg/L)			370	6.10	2.10	130.00		4.80	3.10		77.00									4.20	300.00				
2012)		Calcium (mgLL)			110	2.40	0.90	49.00		2.80	0.50		18.00									4.20	97.00				
		EC (us/cm)			18000	320.00	260.00	6400.00		310.00	170.00		4700.00									240.00	16000.00				
		TN (mg/L)			2.2	1.90	1.90	0.90		1.90	2.80		0.70									5.30	0.90				
		TP (mg/L)			0.05	0.05	0.09	0.05		0.10	1.30		0.50									0.20	0.05				
		pH					5.80	5.70	5.50	5.20	4.10	6.00	5.60												5.30	5.40	5.30
		TDS (mg/L)					180.00	4900.00	120.00	160.00	150.00	160.00	2700.00												65.00	1200.00	110.00
		Chloride (mg/L)					44.00	2900.00	38.00	71.00	29.00	53.00	1400.00												640.00	18.00	43.00
Martens and		Sulphate (mg/L)					10.00	360.00	7.00	24.00	1.00	3.00	180.00												26.00	5.00	5.00
Associates (Sept,	27/09/2012	Magnesium (mg/L)					1.50	170.00	3.70	5.00	3.10	10.00	87.00												42.00	1.90	4.00
2012)		Calcium (mgLL)					0.60	67.00	3.60	3.10	0.50	6.20	21.00												13.00	1.70	1.10
		EC (us/cm)					230.00	8400.00	200.00	320.00	170.00	300.00	4600.00												2000.00	110.00	190.00
		TN (mg/L)					1.10	1.20	3.00	1.60	1.90	1.60	0.70												9.90	3.30	4.10
		TP (mg/L)					0.05	0.05	0.20	0.30	1.30	0.10	0.07												1.20	0.30	0.60

Value is less than laboratory PQL

23	Attachment 6D – Hydraulic Conductivity Test Results







### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB4 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 13.60 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 15.00 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m

m

minutes

m/d

2.00

0.10

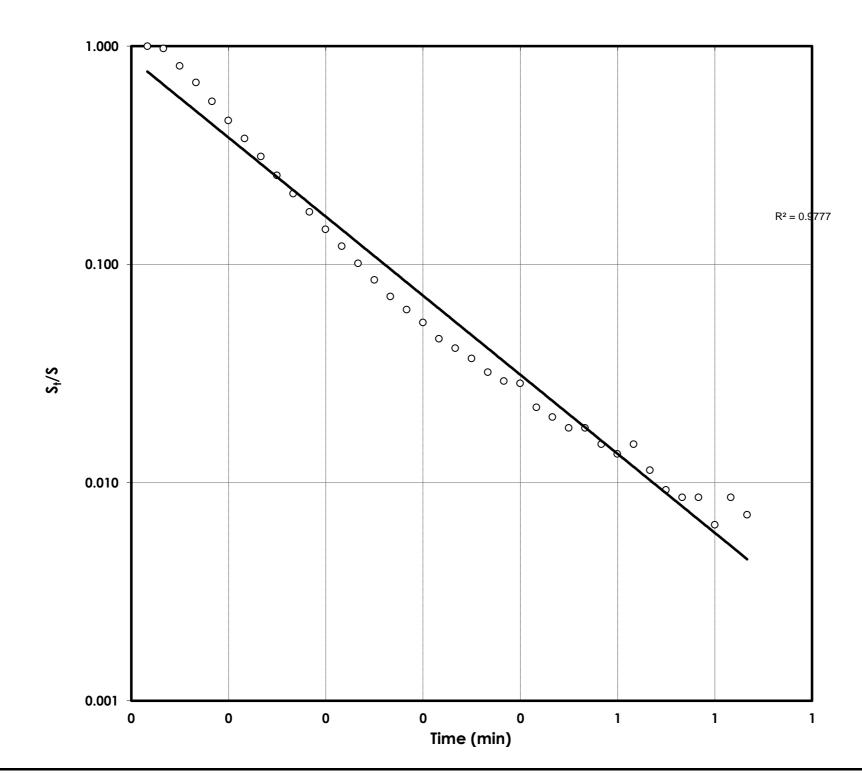
13.12



L - Length of open screen

T<sub>o</sub> - Length of characteristic time

 $K_{\text{sat}}$  - Saturated hydraulic conductivity



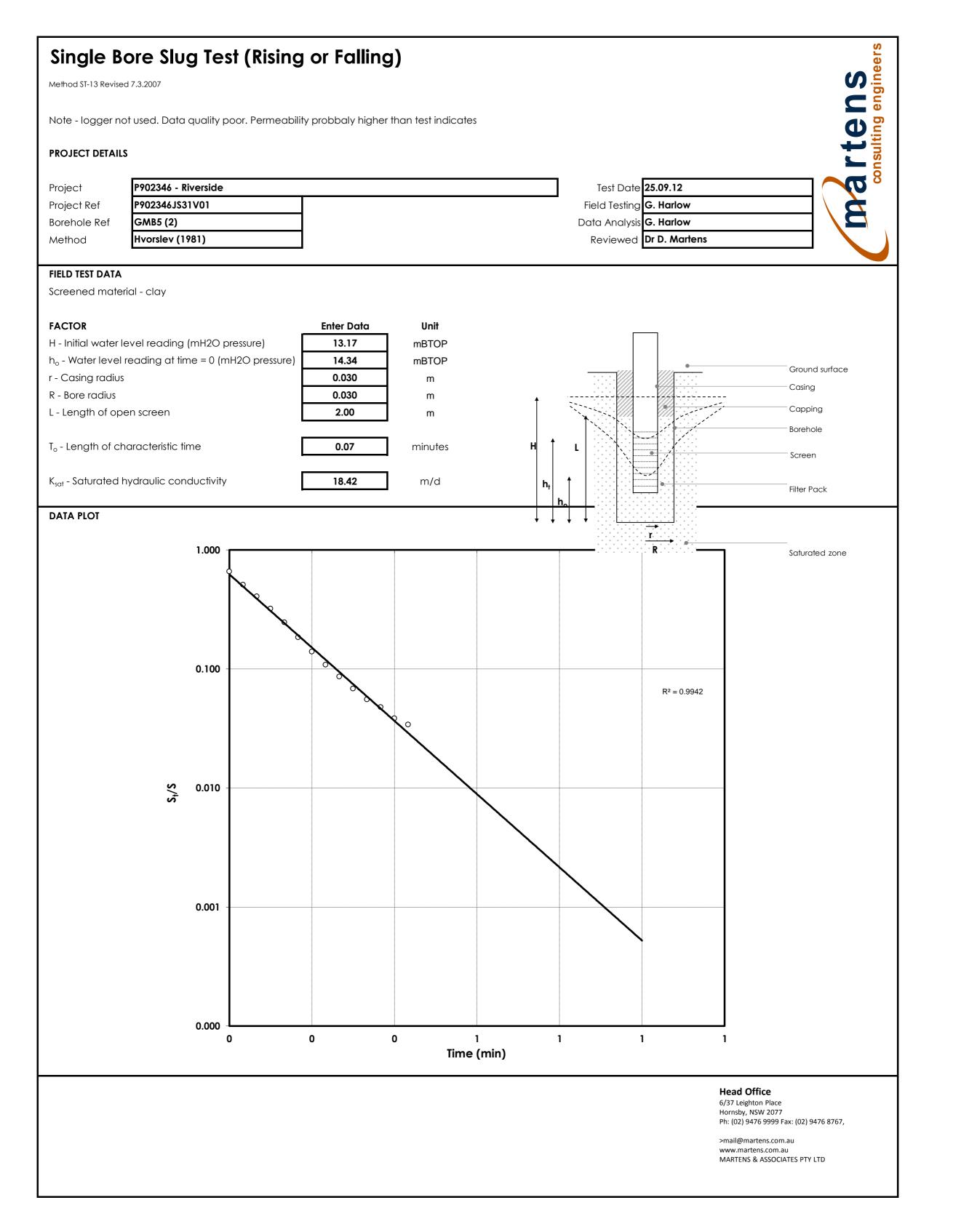
# Head Office

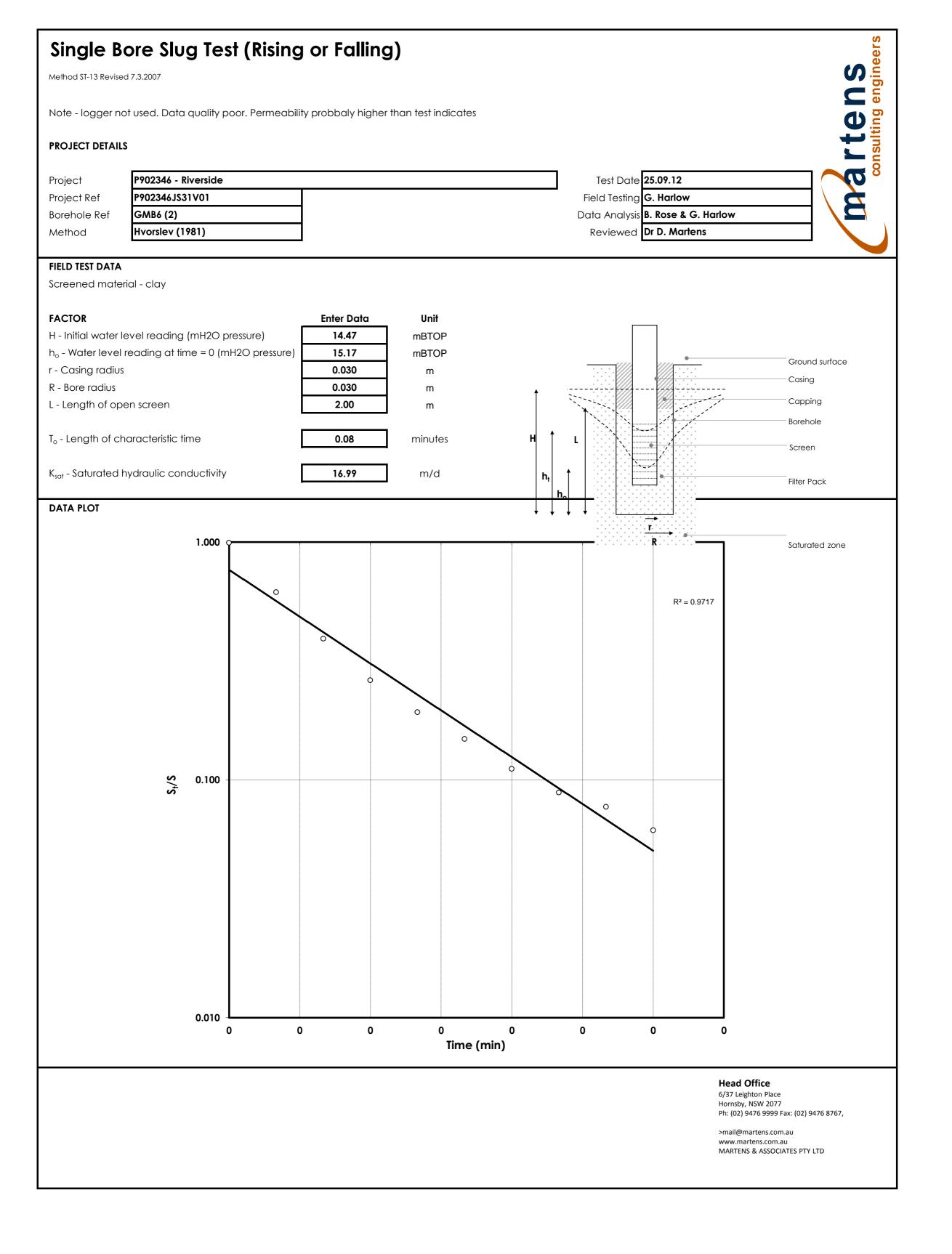
6/37 Leighton Place Hornsby, NSW 2077 Ph: (02) 9476 9999 Fax: (02) 9476 8767,

Screen

Filter Pack

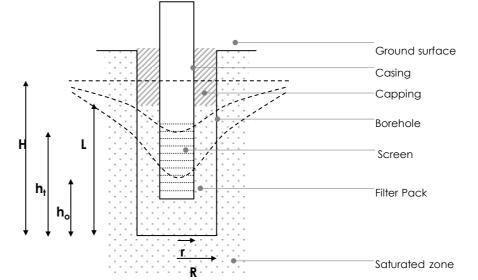
Saturated zone



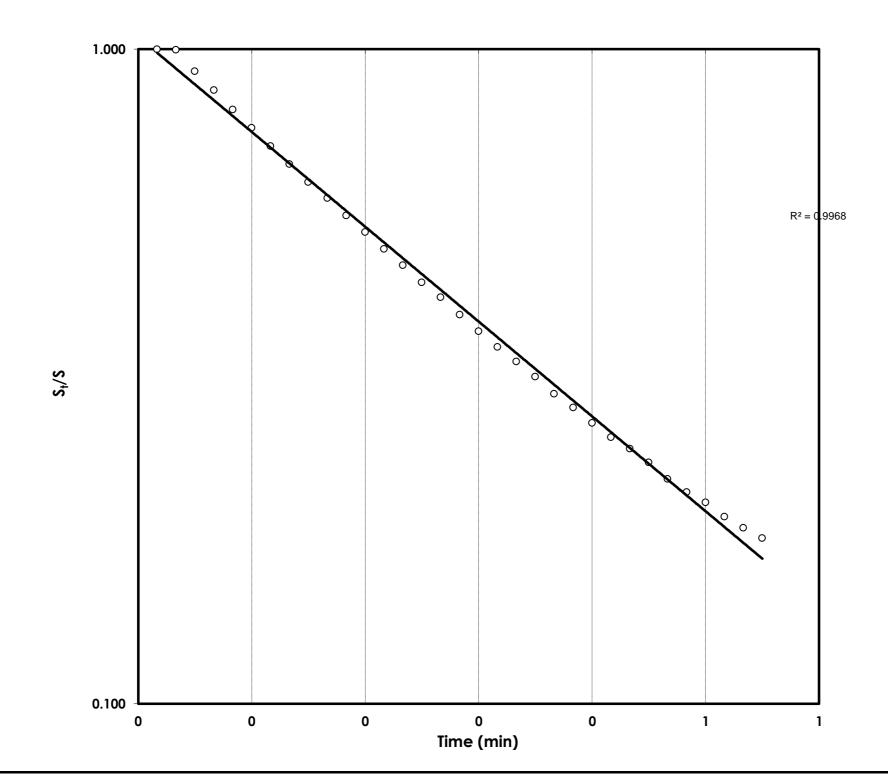


### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** Test Date **03.09.12** P902346 - Riverside Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB7 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 14.24 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 15.45 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m L - Length of open screen 2.00 m

# T<sub>o</sub> - Length of characteristic time 0.31 minutes K<sub>sat</sub> - Saturated hydraulic conductivity 4.38 m/d



# **DATA PLOT**



# **Head Office**

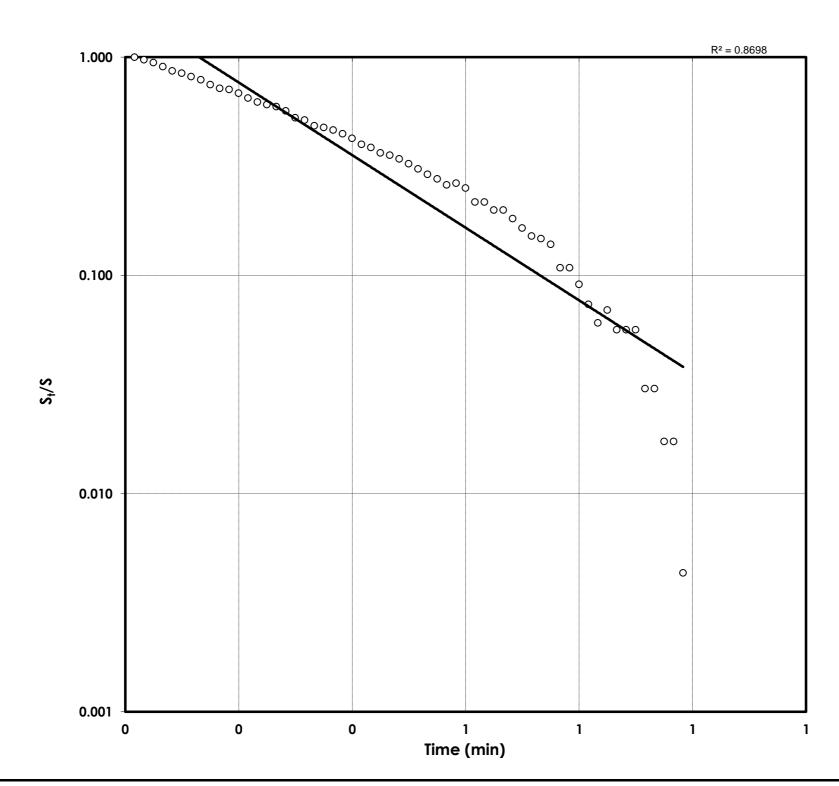
6/37 Leighton Place Hornsby, NSW 2077 Ph: (02) 9476 9999 Fax: (02) 9476 8767,

### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **03.09.12** Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB8 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 13.19 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 12.96 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m L - Length of open screen 2.00 Screen m



T<sub>o</sub> - Length of characteristic time

 $K_{\text{sat}}$  - Saturated hydraulic conductivity



minutes

m/d

0.39

3.49

# Head Office

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Filter Pack

Saturated zone

### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project P902346JS31V01 Project Ref Field Testing B. Rose and G. Harlow Borehole Ref GMB9 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 15.37 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 16.07 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m L - Length of open screen 2.00 Screen m

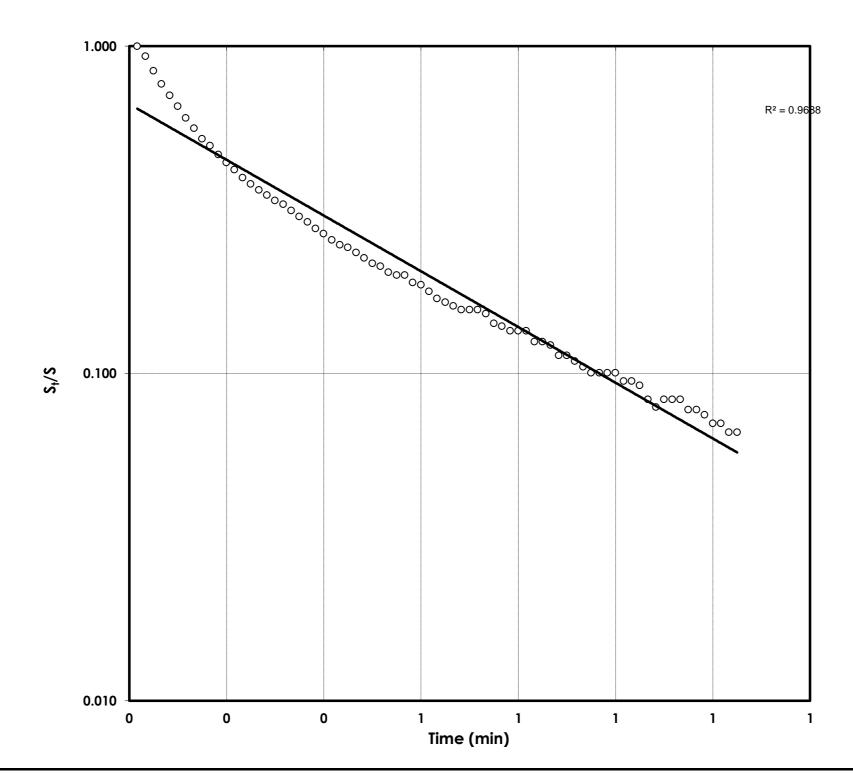
0.30

4.54



T<sub>o</sub> - Length of characteristic time

 $K_{\text{sat}}$  - Saturated hydraulic conductivity



minutes

m/d

# Head Office

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Filter Pack

Saturated zone

# Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007

# **PROJECT DETAILS**

Project Project Ref Borehole Ref Method

P902346 - Riverside P902346JS31V01 GMB10 Hvorslev (1981)

Test Date **04.09.12** Field Testing B. Rose and G. Harlow Data Analysis **B. Rose** Reviewed **Dr D. Martens** 

# **FIELD TEST DATA**

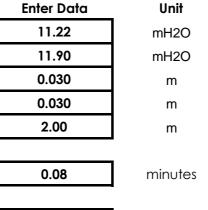
Screened material - clay

**FACTOR** H - Initial water level reading (mH2O pressure)  $h_o$  - Water level reading at time = 0 (mH2O pressure) r - Casing radius

R - Bore radius L - Length of open screen

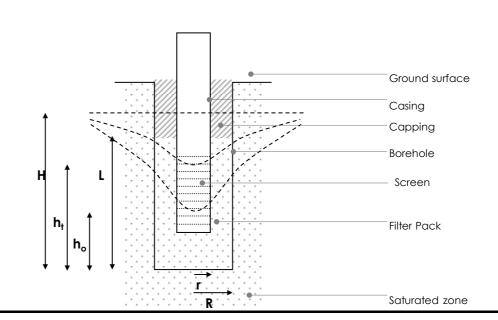
T<sub>o</sub> - Length of characteristic time

 $K_{\text{sat}}$  - Saturated hydraulic conductivity

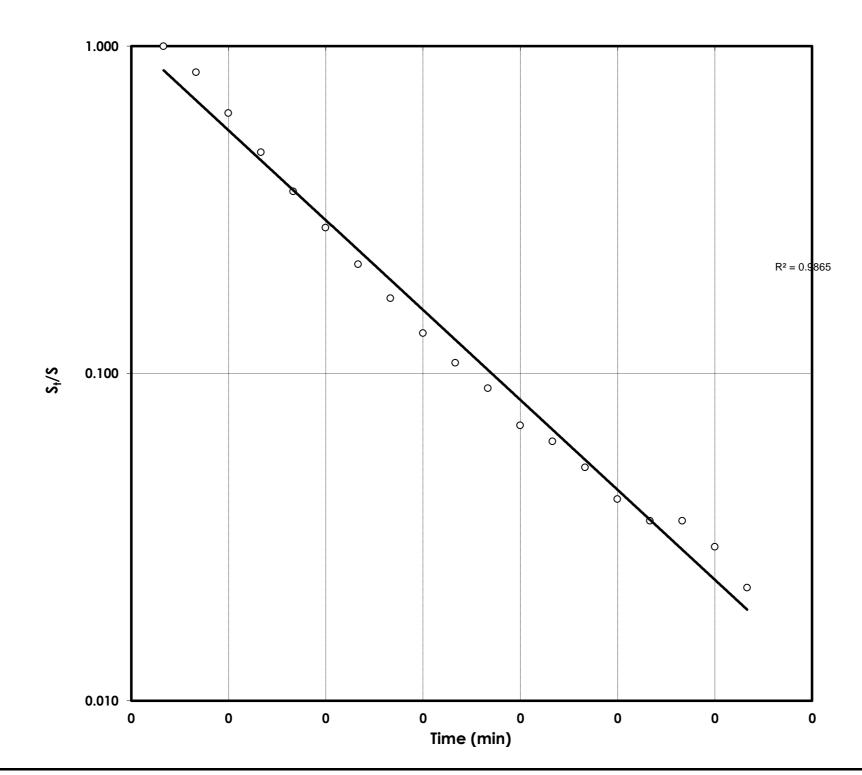


16.62

m/d



# **DATA PLOT**



# **Head Office**

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### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB11 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 13.90 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 14.71 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m L - Length of open screen 2.00 Screen m

minutes

m/d

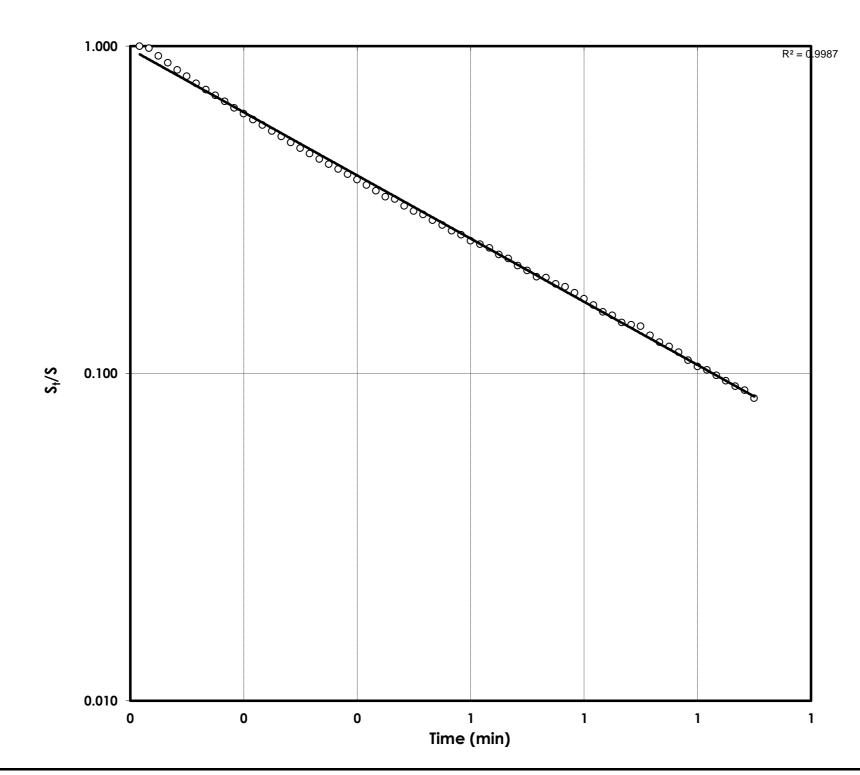
0.44

3.10

# **DATA PLOT**

T<sub>o</sub> - Length of characteristic time

K<sub>sat</sub> - Saturated hydraulic conductivity



# Head Office

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Filter Pack

Saturated zone

# Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 PROJECT DETAILS Project Project Ref Project Ref Borehole Ref GMB12 Project GMB12 Project Project Project Ref GMB12

Test Date

O4.09.12

Field Testing

B. Rose and G. Harlow

Data Analysis

Reviewed

Dr D. Martens

# martens consulting engineer

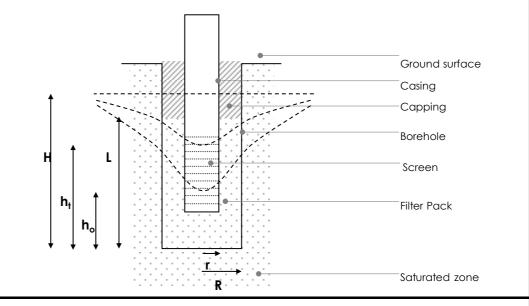
# **FIELD TEST DATA**

Method

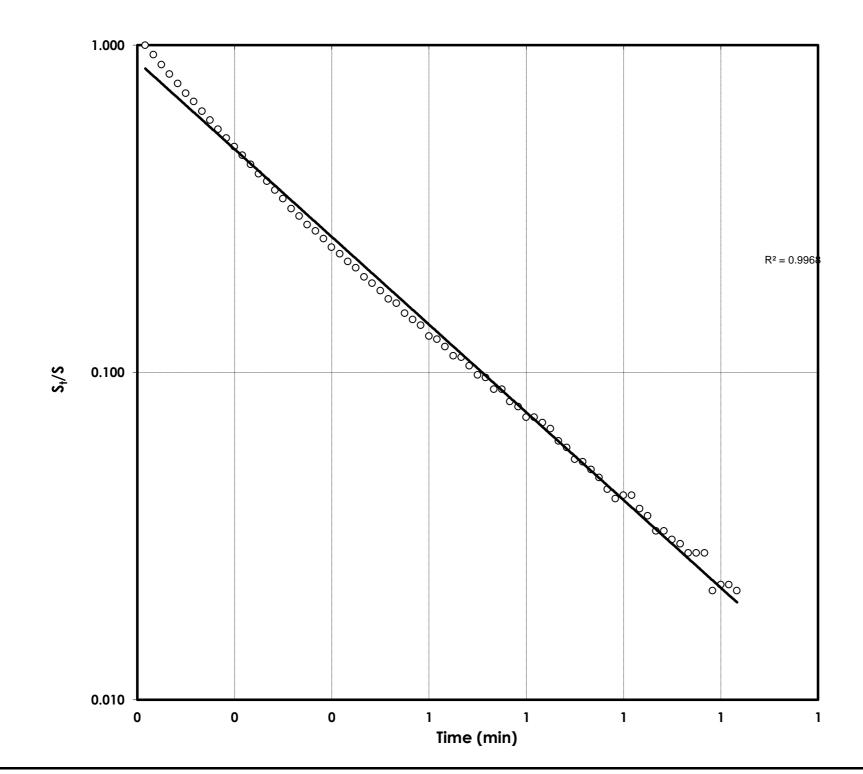
Screened material - clay

Hvorslev (1981)

#### **FACTOR Enter Data** Unit H - Initial water level reading (mH2O pressure) 12.00 mH2O $h_o$ - Water level reading at time = 0 (mH2O pressure) 13.07 mH2O r - Casing radius 0.030 m R - Bore radius 0.030 m L - Length of open screen 2.00 m T<sub>o</sub> - Length of characteristic time 0.29 minutes K<sub>sat</sub> - Saturated hydraulic conductivity 4.77 m/d



# **DATA PLOT**



# Head Office

6/37 Leighton Place Hornsby, NSW 2077 Ph: (02) 9476 9999 Fax: (02) 9476 8767,

### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB21 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 12.11 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 13.27 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m

m

minutes

m/d

2.00

0.14

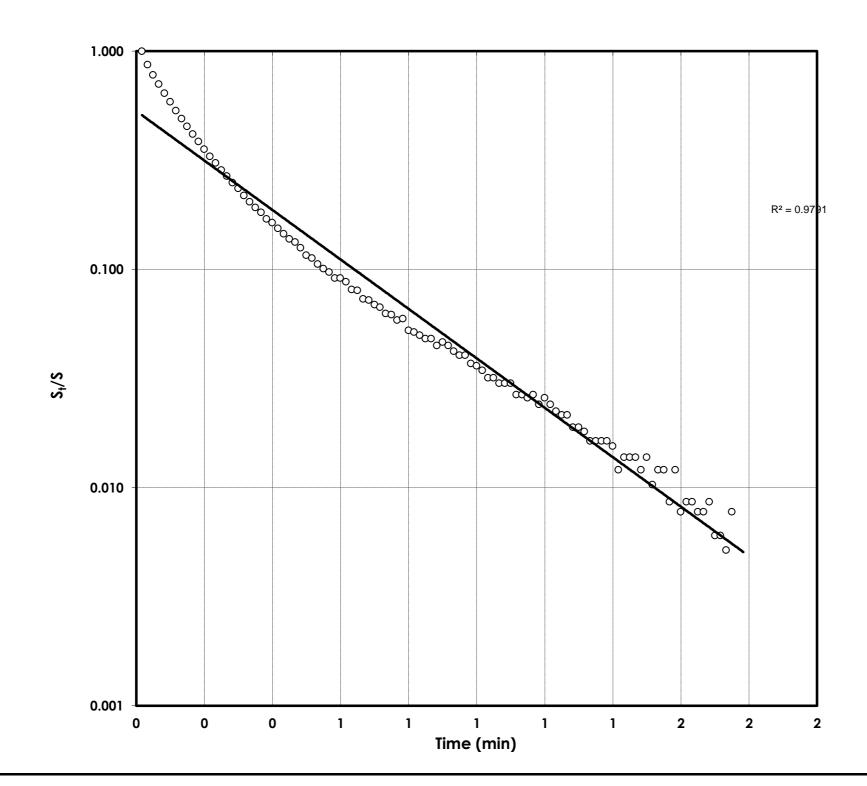
9.78

# DATA PLOT

L - Length of open screen

T<sub>o</sub> - Length of characteristic time

 $K_{\text{sat}}$  - Saturated hydraulic conductivity



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Screen

Filter Pack

Saturated zone

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minutes

m/d

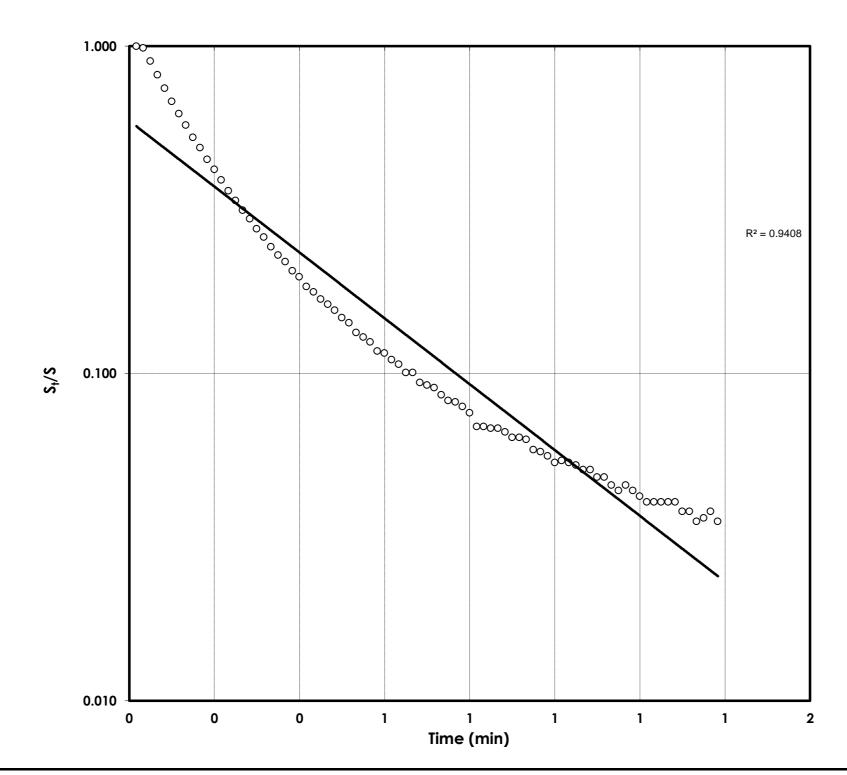
0.20

6.70

# **DATA PLOT**

T<sub>o</sub> - Length of characteristic time

K<sub>sat</sub> - Saturated hydraulic conductivity



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Filter Pack

Saturated zone

### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB23 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 12.14 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 13.04 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m

m

minutes

m/d

2.00

0.16

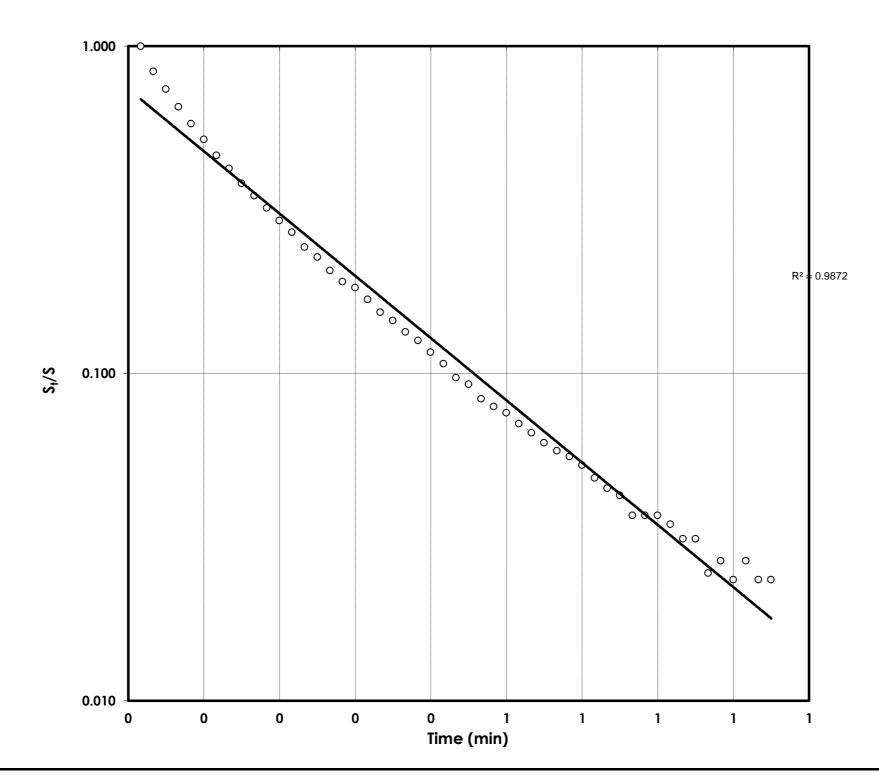
8.60



L - Length of open screen

T<sub>o</sub> - Length of characteristic time

K<sub>sat</sub> - Saturated hydraulic conductivity



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Screen

Filter Pack

Saturated zone

### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project P902346JS31V01 Field Testing B. Rose and G. Harlow Project Ref Borehole Ref GMB24 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 11.84 mH2O Casing $h_o$ - Water level reading at time = 0 (mH2O pressure) 13.01 mH2O Capping r - Casing radius 0.030 m Borehole R - Bore radius 0.030 m L - Length of open screen 2.00 Screen m

minutes

m/d

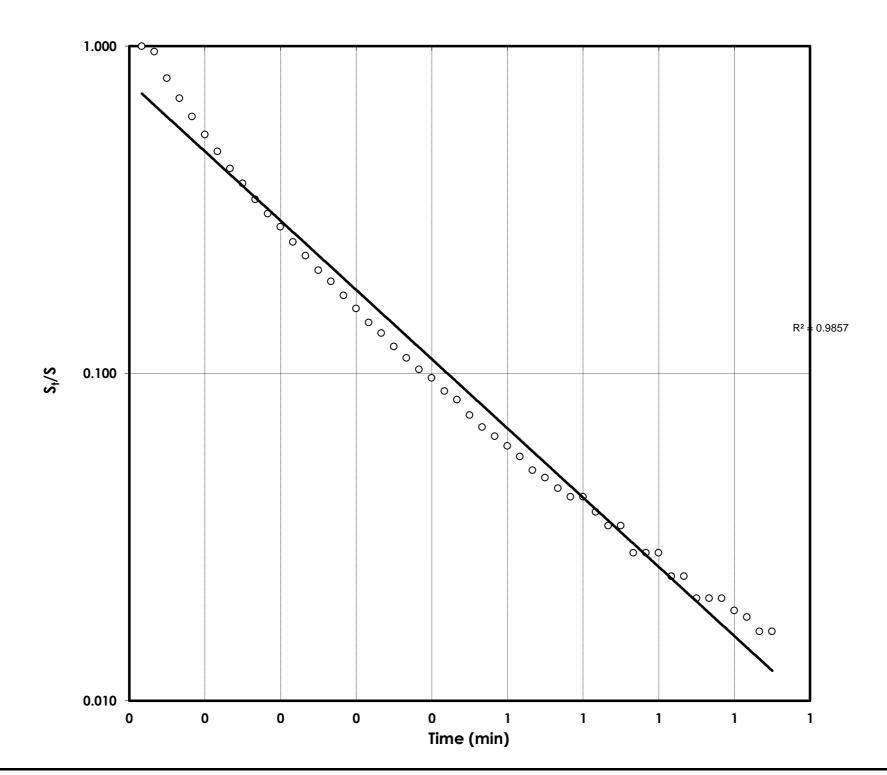
0.15

8.94

# DATA PLOT

T<sub>o</sub> - Length of characteristic time

K<sub>sat</sub> - Saturated hydraulic conductivity



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Filter Pack

Saturated zone

### Single Bore Slug Test (Rising or Falling) Method ST-13 Revised 7.3.2007 **PROJECT DETAILS** P902346 - Riverside Test Date **04.09.12** Project Field Testing B. Rose and G. Harlow P902346JS31V01 Project Ref Borehole Ref GMB25 Data Analysis **B. Rose** Reviewed **Dr D. Martens** Method Hvorslev (1981) **FIELD TEST DATA** Screened material - clay **FACTOR Enter Data** Unit Ground surface H - Initial water level reading (mH2O pressure) 11.65 mH2O $h_o$ - Water level reading at time = 0 (mH2O pressure) 13.42 mH2O Casing r - Casing radius 0.030 Capping m R - Bore radius 0.030 m Borehole L - Length of open screen 1.00 m Screen

minutes

m/d

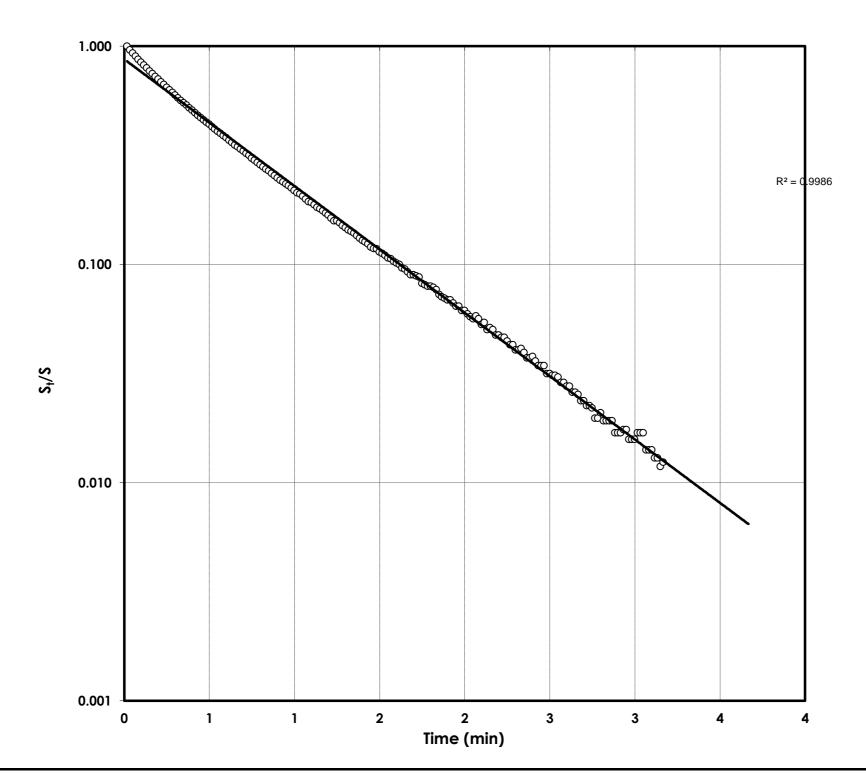
0.64

3.55



T<sub>o</sub> - Length of characteristic time

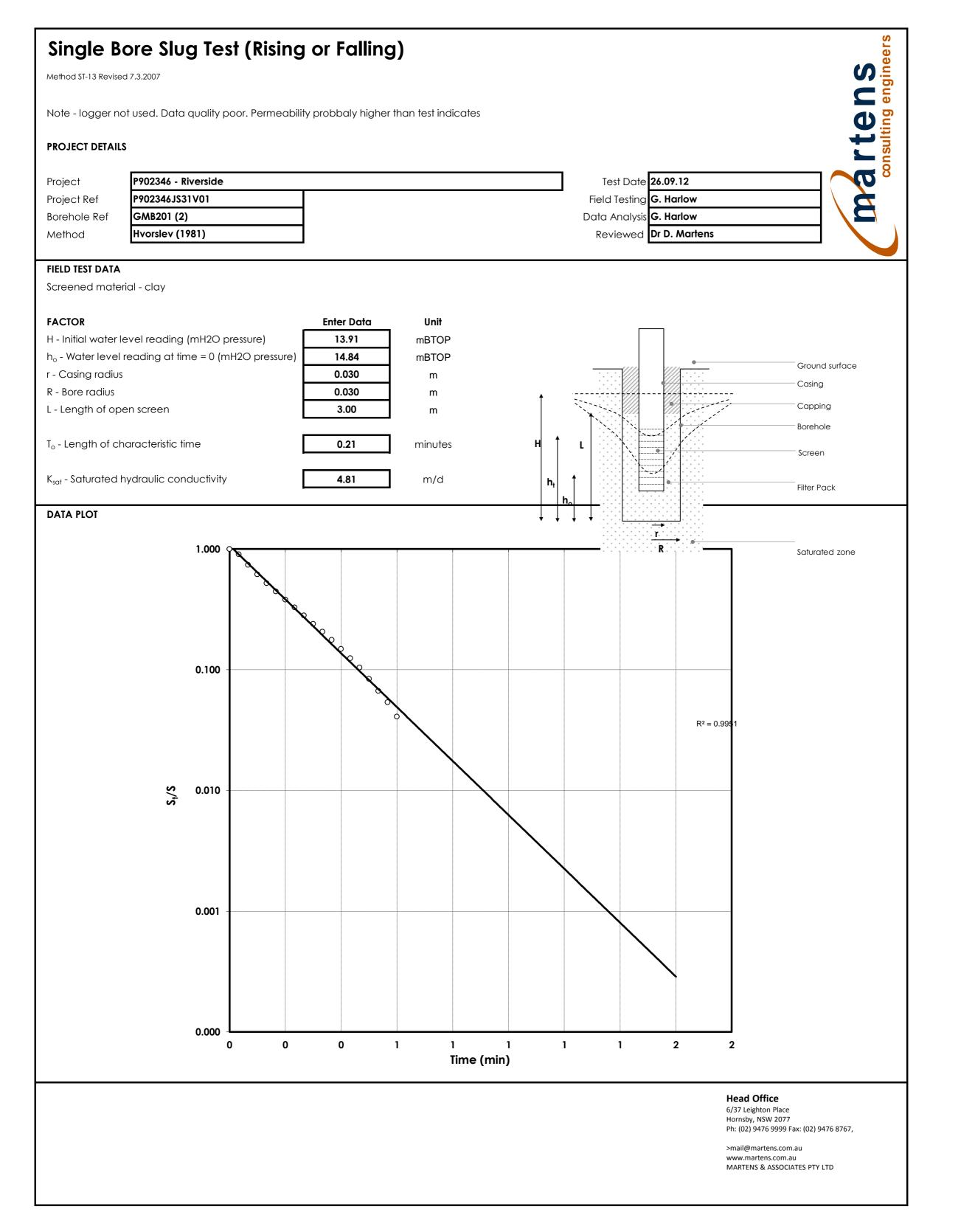
 $K_{\text{sat}}$  - Saturated hydraulic conductivity

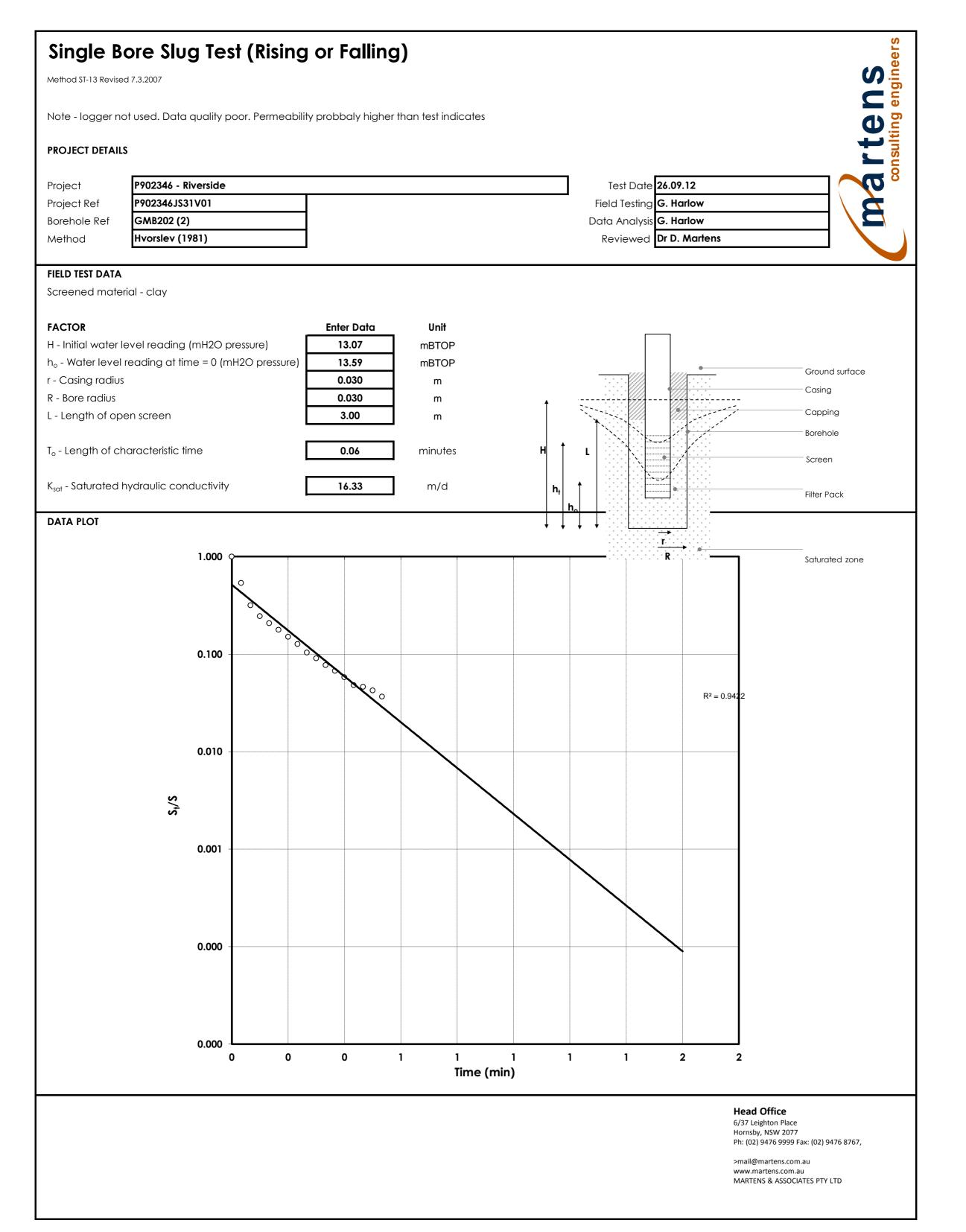


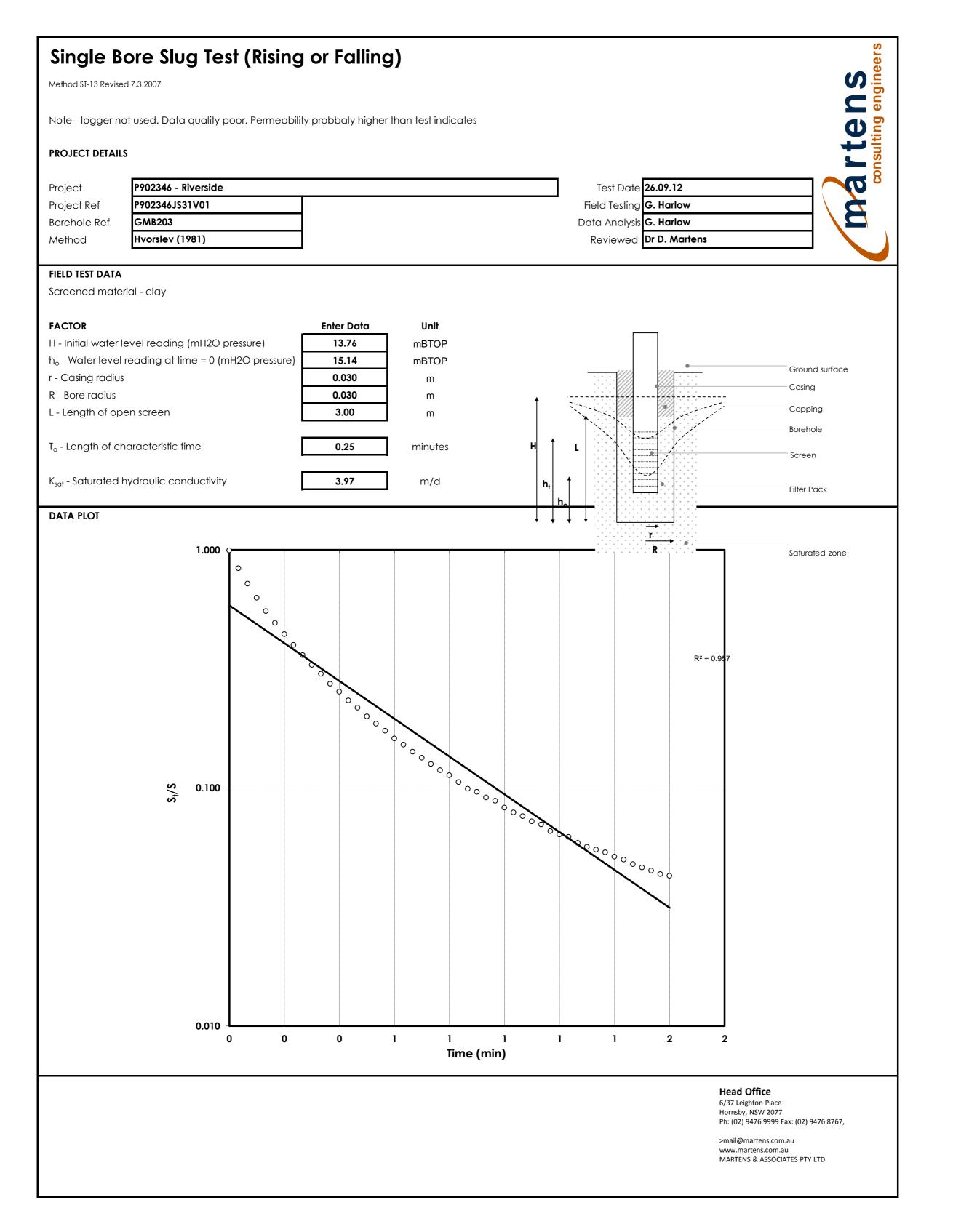
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Filter Pack







24 Attachment 7 - Concept Drainage Layout Design and Flood Assessment (Tattersall Lander Pty Ltd)

