



**TABLE G1  
HISTORIC WELL GAUGING DETAILS  
MMG ROSEBERY  
1/2/5 DAM TSF FINAL HYDROGEOLOGICAL INVESTIGATION REPORT**

Well ID	Easting	Northing	Top of Well Casing Elevation	Well stick-up	SWL mAHD	SWL mAHD	SWL mAHD	SWL mAHD	SWL mAHD	Comments
	MGA94	MGA94	(mAHD)	(m)	18-Apr-12	16-Oct-12	17-Dec-13	4-Feb-13	12-Apr-13	
GB1	379229.844	5373106.4	143.633	0.38	142.36	142.44	-	142.25	142.4	
GB2	379365.648	5372751.21	149.626	0.25	148.66	148.71	-	148.63	146.4	
GB3	379084.313	5372221.45	169.665	0.24	168.55	168.64	-	168.51	168.54	
GB10	378571.412	5372726.95	167.449	0.58	166.16	166.08	166.09	166.02	164.83	
GB11S	378916.635	5372524.32	165.899	0.76	163.26	164.12	163.55	162.92	162.88	
GB11D	378916.353	5372526.74	165.927	0.68	161.93	162.43	161.98	161.63	159.41	
GB12S	379438.805	5372515.9	150.424	0.65	148.85	149	148.99	148.33	148.69	
GB12D	379443.81	5372525.29	149.918	0.73	141.18	146.63	146.10	146.88	146.44	
GB13	378930.754	5373132.43	160.586	0.66	156.92	156.83	156.36	155.98	156.01	
GB14S	379292.947	5373003.36	147.592	0.78	145.99	145.9	145.88	145.59	145.45	
GB14D	379290.986	5373004.32	147.823	0.73	146.36	146.2	146.17	145.44	145.76	
GB15	379713.988	5372831.98	149.756	0.72	142.7	142.72	-	140.15	140.19	
GB16	379413.409	5373215.07	143.202	0.74	141.57	141.66	141.53	141.44	141.41	
GB18S	378649.229	5373053.34	162.249	0.58	160.22	159.94	-	159.99	160.12	
GB18D	378647.383	5373055.78	162.387	0.61	160.54	160.32	-	160.02	160.1	
GB20	378681.973	5372902.15	161.44	0.57	160	159.96	159.86	159.78	159.17	
GB47S	378727.5	5372976	161.48		-	-	-	159.78	159.89	
GB47D	378727.7	5372978	161.42		-	-	-	159.64	159.73	
GB48	378758.8	5373035	163.2		-	-	-	159.78	159.85	
GB49	379232.2	5372795	164.11		-	-	-	159.97	160.39	
GB50	379193.8	5372565	168.92		-	-	-	164.87	162.82	

**Notes:**

\*below top of well casing

ID = identification

mAHD = metres above Australia Height Datum (AMG datum)

m = metres



Format Guideline Exceedances



TABLE G3a  
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY  
MMG ROSEBERY  
1/2/5 DAM TSF HYDROGEOLOGICAL INVESTIGATION

Table with columns: Chem\_Group, ChemName, Units, EQL, Ecosystem Protection (1), Background Concentration (Minimum and maximum values from GB3 and GB15) (2), and 24 sampling locations (GB1, GB2, GB3, GB10, GB11-D, GB11-S, GB12-D, GB12-S).

Notes:  
\*\*\* = See Lab Methods & Description Table  
- = Analysis not requested  
EQL = Estimated Quantitation Limit (= Method Detection Limit)  
NE = Guideline not established  
NA = Not Applicable  
#1 Theoretically the total result should be greater or equal to the dissolved concentration. However the difference reported is within the uncertainty of the individual tests  
Shaded cells represent results exceeding the background concentration range

Nominated Investigation Criteria:  
(1) ANZECC/NHMRC (2000) "Australian Water Quality Guidelines for Fresh and Marine Waters". Prepared for the National Water Quality Management Strategy. (Freshwater - 95% level of protection)  
(2) Background concentrations sourced from up-gradient well locations GB3 and GB15. Where all concentrations in well locations GB3 and GB15 were below detection limit, the detection limit was adopted.







Format Guideline Exceedances



TABLE G3b  
HISTORICAL SURFACE WATER AND SEEPAGE WATER ANALYTICAL SUMMARY  
MMG ROSEBERY  
1/2/5 DAM TSF HYDROGEOLOGICAL INVESTIGATION

Field ID	Sampled Date	2/SEEP-10		2/SEEP-11		2/SEEP-7		2/SEEP-8		2/SEEP-9(2SP06)		2P6		5/SEEP-10		5/SEEP-11		5/SEEP-12		5/SEEP-13								
		20/04/2012	18/10/2012	20/04/2012	16/10/2012	12/04/2013	20/04/2012	17/10/2012	19/04/2012	16/10/2012	12/04/2013	19/04/2012	16/10/2012	12/04/2013	20/04/2012	18/10/2012	12/04/2013	20/04/2012	17/10/2012	12/04/2013	20/04/2012	17/10/2012	10/04/2012	20/04/2012	17/10/2012	10/04/2013		
TPH	F2-NAPHTHALENE	mg/L	0.05	NE	NE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	TRH >C10-C16	mg/L	0.05	NE	NE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
BTEX	Benzene	µg/L	1	950	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
	Ethylbenzene	µg/L	1	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
PAH	Naphthalene	µg/L	20	16	NE	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
	Bicarbonate as CaCO3	mg/L	5	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Inorganics	Alkalinity (Bicarbonate as CaCO3)	mg/L	20	NE	NE	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
	Alkalinity (Carbonate as CaCO3)	mg/L	10	NE	NE	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Ions	Calcium	mg/L	0.5	NE	NE	0.8 - 3.1	5.2	<0.5	24	36	44	22	26	97	110	130	82	98	78	26	7.7	7.2	8.9	9.3	7.9	7.6	40	16
	Magnesium	mg/L	0.5	NE	NE	0.6 - 1	0.9	0.8	8.2	11	12	4.7	5.7	42	52	52	69	49	13	2.3	1.5	2.4	2.3	1.7	2.3	4.8	2.4	
Metals	Aluminium (Filtered)	mg/L	0.01	0.055	0.2	0.08 - 0.27	0.91	0.45	3.1	6.1	6.4	0.08	0.2	16	37	28	32	64	27	8.6	0.11	0.15	0.13	0.19	0.24	0.06	<0.05	0.07
	Antimony	mg/L	0.001	NE	NE	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TPH	TRH >C10-C16	mg/L	0.1	NE	NE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	TRH >C14-C34	mg/L	0.1	NE	NE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes:  
 \*\* = See Lab Methods & Description Table  
 - = Analysis not requested  
 \*ppm\* = Parts per million by volume  
 EQL = Estimated Quantitation Limit (= Method Detection Limit)  
 NE = Guideline not established  
 NA = Not Applicable  
 #1 Theoretically the total result should be greater or equal to the dissolved concentration. However the difference reported is within the uncertainty of the individual tests

Ecosystem Protection (1)	Shaded cells represent results exceeding the ANZECC 2000 Freshwater 95% Guideline
	Shaded cell represents results exceeding the ANZECC 2000 Recreational Water Quality and Aesthetics Guideline
Recreational Water (2)	Shaded cells represent background concentrations based on CSW01 results. Background concentrations have been applied to surface water samples along the Stitt River only
Background Concentrations (3)	

Nominated Investigation Criteria:  
 (1) ANZECC/NHMRC (2000) "Australian Water Quality Guidelines for Fresh and Marine Waters". Prepared for the National Water Quality Management Strategy. (Freshwater - 95% level of protection)  
 (2) ANZECC (2000) "Australian Water Quality Guidelines for Fresh and Marine Waters". Prepared for the National Water Quality Management Strategy. (Recreational Water Quality and Aesthetics Guideline)  
 (3) Background concentrations sourced from up-gradient surface water sampling location CSW01. Where all concentrations for CSW01 were below detection limit, the detection limit was adopted.







**TABLE A2a**  
**GROUNDWATER QUALITY FIELD PARAMETERS - MONITORING ROUND 3 (April 2013)**  
**MMG ROSEBERY**  
**1/2/5 DAM TSF HYDROGEOLOGICAL INVESTIGATION**

Well ID	Date Measured	Time Measured	Event	Dissolved Oxygen	Electrical Conductivity	Redox Potential	pH	Total Dissolved Solids <sup>^</sup>	Temperature	Purge Volume	Comments
				(mg/L)	( $\mu$ S/cm)	(mV)		(mg/L)	( $^{\circ}$ C)	(L)	
GB1	11-Apr-13	1:50 PM	Post-purge	0.80	381	1	6.4	247.7	13.5	50	
GB2	12-Apr-13	2:45 PM	Post-purge	2.70	852	71	5.7	553.8	15.2	21	
GB3	11-Apr-13	11:45 AM	Post-purge	4.62	146	180	6.3	94.9	13.5	50	
GB10	10-Apr-13	4:20 PM	Post-purge	4.91	380	77	6.1	247.0	16.0	20	
GB11S	11-Apr-13	10:20 AM	Post-purge	3.13	108	89	7.0	70.2	14.5	20	
GB11D	11-Apr-13	10:15 AM	Post-purge	4.55	3,431	55	12.8	2,230.2	13.2	27	
GB12S	11-Apr-13	4:30 PM	Post-purge	3.01	133	150	5.3	86.5	14.3	15	
GB12D	11-Apr-13	4:30 PM	Post-purge	2.15	330	-1	6.7	214.5	13.1	29	
GB13	11-Apr-13	12:50 PM	Post-purge	4.03	57	81	5.7	37.1	13.5	26	
GB14S	11-Apr-13	2:35 PM	Post-purge	5.21	29	12	5.3	18.9	15.1	24	
GB14D	11-Apr-13	3:20 PM	Post-purge	3.51	88	42	6.1	57.2	13.3	40	
GB15	12-Apr-13	4:05 PM	Post-purge	1.60	236	42	5.8	153.4	12.1	20	
GB16	12-Apr-13	4:50 PM	Post-purge	2.91	109	90	5.0	70.9	13.2	30	
GB18S	10-Apr-13	3:20 PM	Post-purge	1.17	367	238	4.2	238.6	15.8	21	
GB18D	10-Apr-13	2:20 PM	Post-purge	4.81	342	56	5.6	222.3	15.3	30	
GB20	10-Apr-13	11:55 AM	Post-purge	5.96	4,314	401	3.4	2,804.1	17.6	6	
GB47S	10-Apr-13	1:20 PM	Post-purge	3.14	1,693	51	5.8	1,100.5	17.9	21	
GB47D	10-Apr-13	12:20 PM	Post-purge	5.96	1,436	-54	5.7	933.4	16.4	40	
GB48	11-Apr-13	8:00 AM	Post-purge	5.34	728	248	4.3	473.2	15.0	35	
GB49	12-Apr-13	10:00 AM	Post-purge	3.66	280	40	5.9	182.0	14.6	40	
GB50	12-Apr-13	11:00 AM	Post-purge	2.50	63	47	5.3	41.0	14.5	30	

**Notes:**

- ID = identification
- mg/L = milligrams per litre
- L = litres
- $\mu$ S/cm = microsiemen per centimetre
- mV = millivolts
- $^{\circ}$ C = degrees Celsius
- <sup>^</sup> Approximate value determined using the following equation: TDS (mg/L) = EC x 0.65
- \* water quality meter was calibrated to verify results, calibration ok

**Field Equipment Used:**

TPS 90 FLMV (SN ) and Disposable bailer



**TABLE B2b**  
**SURFACE WATER QUALITY FIELD PARAMETERS - MONITORING ROUND 3 (April 2013)**  
**MMG ROSEBERY**  
**1/2/5 DAM TSF HYDROGEOLOGICAL INVESTIGATION**

Seepage Sampling Location ID	Date Measured	Time Measured	Dissolved Oxygen	Electrical Conductivity	Redox Potential	pH	Total Dissolved Solids <sup>^</sup>	Temperature	Comments
			(mg/L)	( $\mu$ S/cm)	(mV)		(mg/L)	( $^{\circ}$ C)	
<b>CSW-01</b>	09-Apr-13	11:45 AM	10.71	65	183.7	7.6	42	12.80	
<b>CSW-02</b>	09-Apr-13	10:20 AM	10.60	47	122.3	8.08	31	12.80	
<b>CSW-03</b>	09-Apr-13	10:50 AM	10.70	62	171.9	8.06	40	12.50	
<b>CSW-04</b>	09-Apr-13	9:20 AM	10.68	84	149.9	7.27	55	13.13	

**Notes:**

ID = identification

mg/L = milligrams per litre

L = litres

$\mu$ S/cm = microsiemen per centimetre

mV = millivolts

$^{\circ}$ C = degrees Celsius

<sup>^</sup> Approximate value determined using the following equation: TDS (mg/L) = EC x 0.65

**Field Equipment Used:**

TPS 90 FLMV (SN ) and Sampling Pole

**TABLE B2c**  
**SEEPAGE WATER QUALITY FIELD PARAMETERS - MONITORING ROUND 3 (April 2013)**  
**MMG ROSEBERY**  
**1/2/5 DAM TSF HYDROGEOLOGICAL INVESTIGATION**

Seepage Sampling Location ID	Date Measured	Time Measured	Dissolved Oxygen	Electrical Conductivity	Redox Potential	pH	Total Dissolved Solids <sup>^</sup>	Total Dissolved Solids Laboratory	Temperature	Comments
			(mg/L)	(µS/cm)	(mV)		(mg/L)	(mg/L)		
5/SEEP-10	09-Apr-13	2:45 PM	4.15	272	139	7.38	177		20.20	
5/SEEP-11	12-Apr-13	9:25 AM	1.50	187	114	7.65	122		12.60	
2/SEEP-7	Not Sampled									
2/SEEP-8	09-Apr-13	4:00 PM	6.37	3713	470	3.03	2413		21.9	
2/SEEP-9 (aka 2SP06)	09-Apr-13	3:25 PM	3.14	2904	283	3.85	1888		20.2	
5/SEEP-12 (aka 5SP03)	10-Apr-13	10:00 AM	9.51	582	204	6.03	378		15.9	
5/SEEP-13 (aka 5SP04)	10-Apr-13	9:30 AM	6.89	442	208	6.01	287		16.2	
2/SEEP-10	Not Sampled									
2/SEEP-11	09-Apr-13	4:50 PM	9.15	1163	262	4.55	756		20.1	

**Notes:**

ID = identification

mg/L = milligrams per litre

L = litres

uS/cm = microsiemen per centimetre

mV = millivolts

°C = degrees Celsius

<sup>^</sup> Approximate value determined using the following equation: TDS (mg/L) = EC x 0.65

**Field Equipment Used:**

TPS 90 FLMV (SN ) and Sampling Pole

**TABLE B2d**  
**CUT-OFF DRAIN WATER QUALITY FIELD PARAMETERS - MONITORING ROUND 3 (April 2013)**  
**MMG ROSEBERY**  
**1/2/5 DAM TSF HYDROGEOLOGICAL INVESTIGATION**

Seepage Sampling Location ID	Date Measured	Time Measured	Dissolved Oxygen	Electrical Conductivity	Redox Potential	pH	Total Dissolved Solids <sup>^</sup>	Total Dissolved Solids Laboratory	Temperature	Comments
			(mg/L)	( $\mu$ S/cm)	(mV)		(mg/L)	(mg/L)		
<b>COD-1</b>	12-Apr-13	1:17 PM	10.21	104	111	5.35	68		19.60	
<b>COD-2</b>	12-Apr-13	1:45 PM	9.40	111	148	5.50	72		16.10	
<b>COD-4</b>	10-Apr-13	10:30 AM	10.09	471	188	5.99	306		15.60	
<b>COD-5</b>	09-Apr-13	12:45 PM	10.71	311	187	6.42	202		17.60	
<b>COD-6</b>	10-Apr-13	9:00 AM	-	326	185	6.17	211.9		13.8	

**Notes:**

ID = identification

mg/L = milligrams per litre

L = litres

$\mu$ S/cm = microsiemen per centimetre

mV = millivolts

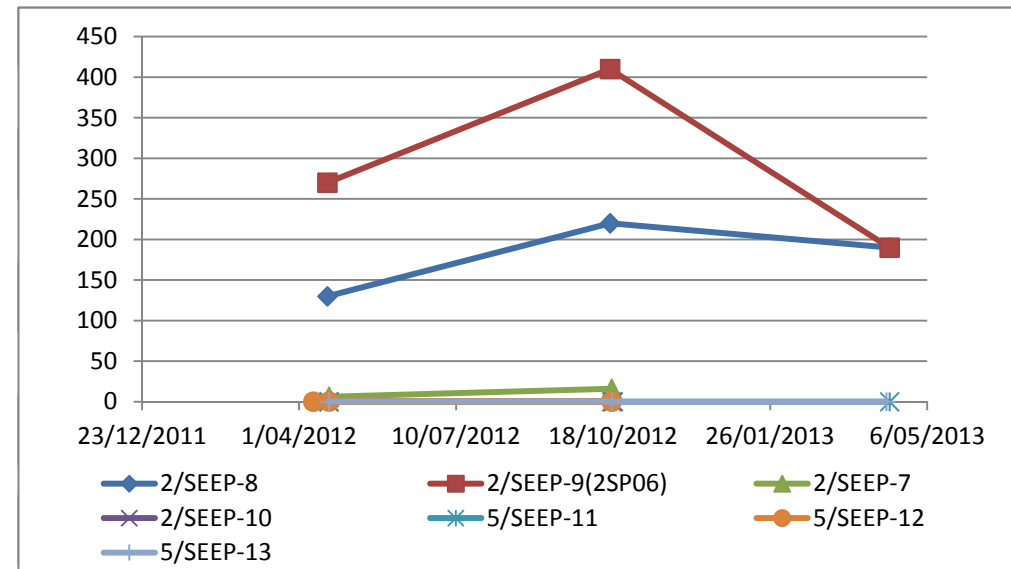
$^{\circ}$ C = degrees Celsius

<sup>^</sup> Approximate value determined using the following equation: TDS (mg/L) = EC x 0.65

**Field Equipment Used:**

TPS 90 FLMV (SN ) and Sampling Pole

			2/SEEP-10			2/SEEP-11			2/SEEP-7		2/SEEP-8			2/SEEP-9(2SP06)			
			20/04/2012	18/10/2012	20/04/2012	16/10/2012	12/04/2013	20/04/2012	17/10/2012	19/04/2012	16/10/2012	12/04/2013	19/04/2012	16/10/2012	12/04/2013		
Zinc (Filter)	mg/L	0.001	0.008	0.5	0.035	0.018	23	44	34	6.2	16	130.00	220	190	270.00	410	190



2P6	5/SEEP-10			5/SEEP-11			5/SEEP-12			5/SEEP-13			CSW-01			CSW-02		
20/04/2012	20/04/2012	18/10/2012	12/04/2013	20/04/2012	17/10/2012	12/04/2013	20/04/2012	17/10/2012	10/04/2012	20/04/2012	17/10/2012	10/04/2013	19/04/2012	18/10/2012	9/04/2013	19/04/2012	18/10/2012	9/04/2013
40	0.066	0.12	0.086	0.11	0.14	0.023	0.31	0.2	0.16	0.12	0.13	0.054	0.011	0.009	0.004	0.012	0.011	0.009

CSW-03			CSW-04		
19/04/2012	18/10/2012	9/04/2013	19/04/2012	18/10/2012	9/04/2013
0.038	0.022	0.018	0.081	0.041	0.086