APPENDIX F: WATER QUALITY MONITORING RESULTS

1. Groundwater Monitoring Program

In addition to water level monitoring and water quality sampling conducted as part of the Environmental Impact Statement (EIS) (HLA Envirosciences, 2001), Bowmans Creek Diversion Environmental Assessment (EA) (Evans & Peck, 2009) and Subsidence Management Plan (SMP) investigations; a Site Groundwater Management Plan (GWMP) has been in place since 2005. The GWMP includes the regular ongoing monitoring of a large number of piezometers. These piezometers form part of the current monitoring network displayed in **Figure F1**.

Groundwater levels and pressures are measured in these piezometers monthly to assess seasonal baseline variations and identify impacts as a response from mining activity. Water quality samples for key indicator parameters pH, electrical conductivity (EC) and total dissolved solids (TDS), suspended solids (TSS) and alkalinity as $CaCO_3$ are collected on a quarterly basis, and samples for comprehensive water quality analysis are collected bi-annually.

The comprehensive laboratory analysis includes the following parameters:

- pH, EC and TDS;
- major cations and anions; and
- dissolved metals (As, B, Cd, Cr, Cu, Fe, Ni, Pb, Mn, Se, Zn, Hg).

Groundwater quality monitoring results are provided in **Table F1,** and interpretations discussed below.

2. Groundwater Quality

2.1 Salinity

The groundwater in much of the coal measures aquifer system is saline. Typical EC ranges from around 6,000µS/cm to more than 11,000µS/cm within some of the less permeable Permian overburden layers. Some samples taken from shallower horizons, or near subcrop areas, can be much less saline. Samples from the Pikes Gully (PG) Seam taken near the subcrop recorded values as low as 1,100µS/cm. This reflects the influence of rainfall recharge on the subcrops and in some areas of the weathered Permian overburden.

Samples taken from the colluvium on the flanks of the hills were also generally saline, with values recorded between 8,000 and 17,000µS/cm EC. This reflects the generally impermeable nature of the surface of the colluvium (which limits rainfall recharge), combined with the slow seepage and evaporation of groundwater from underlying Permian strata.

Salinity within the Glennies Creek and Bowmans Creek alluvium is generally moderate to low, particularly in the more permeable alluvium that contains a higher rate of through flow from surface recharge. In these areas the salinity is generally below 2,000µS/cm, and reflects the combined influence of rainfall recharge and the influx of more saline water from the underlying Permian and/or from the flanking colluvium. Higher ECs (up to 6,000µS/cm) have been recorded in some parts of the alluvium. These generally correspond to areas that are covered with low hydraulic conductivity clays (that reduces rainfall recharge), which have poor recharge and movement of groundwater.

The EIS (HLA Envirosciences, 2001) assumed that Bowmans Creek was a high quality resource, with alluvial groundwater flowing downwards into the underlying Permian. In comparison, it is now known that salinity within both the Glennies Creek and Bowmans Creek alluvium can be relatively high, resulting in poor water quality. This is particularly prevalent within Bowmans Creek and around the margins of the alluvium on the eastern side of Glennies Creek.

2.2 pH

Field pH for all samples were near neutral or slightly alkaline, indicating a lack of acid forming conditions in the area. There is some correlation between higher pH and higher salinity within the Glennies Creek alluvial samples, although this is relatively weak. The pH of groundwater from Permian strata, including coal seams, shows a fairly wide variation and no discernable relationship between pH and salinity.

2.3 Dissolved Metals

Comparison of the analysis results for dissolved metals against the ANZECC guideline values for Freshwater Ecosystem Protection (ANZECC, 2000) shows occasional exceedences of the guideline values as follows:

- The guideline value for cadmium (0.0002mg/L) was exceeded at alluvium bores RA18, RA27, T1-A, T2-A, T3-A, T10, WML252, at colluvium bores RA8 and RA16, and in Permian bores T4-P and WML111B.
- The copper guideline value (0.0014mg/L) was exceeded at alluvium bores RA10, T7, T10 and WML248, at colluvium bore RA16, and Permian bore WML110B.
- The lead guideline value (0.0034mg/L) was exceeded in alluvium bore T10 and Permian bore WML110B.
- The nickel guideline value (0.001mg/L) was exceeded at alluvium bore RA10.
- Many bores reported zinc concentrations above the guideline value (0.008mg/L), including alluvium bores RA14, RA17, RA18, RA27, T2-A, T10, WML248, WML249, and WML250, colluvium bore RA16, and Permian bores T2-P, T3-P and WML110B.

Baseline sampling has shown that exceedances occur naturally within a range of aquifer levels and types, both within Permian and alluvium groundwater.

2.4 Major Ion Composition

Major ion chemistry can assist with comparing natural waters to identify whether they are derived from the same or different sources, or a mixtures of sources. The Piper Trilinear Diagram is useful for this purpose, as it enables each groundwater sample to be graphically plotted at a unique point on the basis of the relative concentrations of the major ions found in solution.

Piper Trilinear Diagrams created for the Bowmans Creek investigations (Aquaterra, 2008) and Glennies Creek SEOC investigations (Aquaterra, 2009) show a general progression from sodium chloride groundwater within the Permian strata and colluvium through to a calcium bicarbonate type within the more actively recharged alluvium (**Figures F2** to **F4**). This reflects a progression from old, mineralised groundwater with low rainfall recharge content in the Permian and colluvium, to more recent rainfall recharge influenced groundwater within the alluvium that

is hydraulically connected to the creeks. Supporting the general observations drawn from the salinity readings described previously.

3. Surface Water Quality

Surface water quality has been monitored for pH, EC and TSS at 16 sites on a monthly basis since 2003. This includes six sites on Bowmans Creek, five sites on the Hunter River, three sites on Glennies Creek and two sites on Betty's Creek (**Figure F5**).

Additionally, a NSW Office of Water (NoW) flow gauge on Bowmans Creek upstream of the underground mine area (Foybrook 210130) has provided continuous monitoring information up to the start of January 2008. Whilst there have been some reliability issues with this flow gauge, it has provided useful data on the EC values within the Creek during periods of high and low flow.

A summary of the surface water quality monitoring results for Bowmans Creek, Glennies Creek and the Hunter River is provided in **Table F2** with the monitoring station locations in **Figure F5**.

Table F2 Baseline Surface Water Quality Data Summary 2003 - 2011

Water Source	Sample Location	pH		Electrical Conductivity (µS/cm)		TDS (mg/L)	
		Mean	Range	Mean	Range	Mean	Range
Bowmans Creek	SM3	7.6	4.5 - 8.8	1127	386 - 1750	629	264 - 984
	SM4	7.9	7.2 - 8.8	2663	175 - 14400	1243	212-8080
	SM4A	7.9	7.5 - 8.5	996	396 - 1980	596	308 - 920
	SM5	7.8	7.4 - 8.3	1244	381 - 2040	725	419 - 926
	SM6	8.0	7.5 - 8.5	970	367 - 2000	485	333 - 668
Hunter River	SM9	8.2	7.9 - 8.5	732	236 - 1270	388	266 - 598
	SM10	8.2	7.1 - 8.5	775	319 - 1290	388	272 - 526
	SM12	8.1	7.6 - 8.4	627	293 - 1080	293	178 - 410
	SM13	8.2	7.8 - 8.5	697	239 - 1260	380	260 - 548
	SM14	8.2	7.8 - 8.4	816	449 - 1260	390	240 - 526
Glennies Creek	SM7	7.8	7.2 - 8.3	399	207 - 903	203	134 - 386
	SM8	7.7	7.3 - 8.4	397	219 - 887	204	131 - 396
	SM11	7.9	7.3 - 8.5	404	208 - 888	207	138 - 408

The results indicate that salintity levels within the Hunter River and Glennies Creek are generally low. This is associated with the constant surface water supply that is released into those two watercourses by the upstream dams. Water in those dams is fed by rainfall runoff, which is reflected by low salinity levels.

The pattern in EC fluctuations in Bowmans Creek reflects the climatic conditions quite strongly, in particular higher EC during periods of no or reduced rainfall runoff and lower EC at times of

high runoff. The higher ECs during times of low runoff are influenced by groundwater baseflow discharges from Permian, either locally or from higher up the catchment, during very low flow periods. Outside of drought periods, EC levels reduce significantly due to surface runoff and the presence of 'fresher' groundwater within the alluvium. During high flows and floods, the Foybrook monitoring station on Bowmans Creek shows that EC values reduce dramatically, to around 200 to 300µS/cm.

In Glennies Creek, the reverse is true, as it exhibits an increase in salinity during wet periods. It is thought that this is caused by the fact that the 'baseflow' during dry climatic periods is actually due to the release of fresher water from Glennies Creek Dam. During wetter periods there is a proportionally greater contribution from the lower catchment, which is thought to contain some higher salinity soils.

References

ANZECC 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture Resource Management Council of Australia and New Zealand.

Aquaterra, 2008. 'Ashton Underground Mine: Bowmans Creek Alluvium Investigation'. Report submitted to ACOL.

Aquaterra, 2009. 'Ashton South East Open Cut Project: Hydrogeological Impact Assessment' Report submitted to ACOL in support of the SEOC EA.

Evans & Peck Pty Ltd, 2009. 'Bowmans Creek Diversion Environmental Assessment'.

HLA Envirosciences, 2001. 'Ashton Coal Project: Groundwater Hydrology and Impact Assessment'. Appendix H Report Submitted in Support of the 2002 Ashton Coal Project EIS.

Standards Australia, 1998. 'AS/NZS 5667.11:1998 Water quality – Sampling. Part 11: Guidance on sampling of ground waters'. Standards Australia, New South Wales.

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				WML261	WML262	AP243	AP244	RM02				RM04				RM05				RM06			
Parameter	**Units**	**LOR**	**ANZECC***	**24-Feb-11**	**24-Feb-11**	**25-Feb-11**	**25-Feb-11**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																							
pH Value (Lab)	pH unit	0.01																					
pH Value (field)	pH unit	0.01		6.90	7.54	6.82	6.66	6.52	6.91	6.78	7.87	6.84	7.30	7.19	8.18	6.44	6.87	6.83	8.00	7.15	7.40	7.26	8.18
Conductivity (field)	µS/cm	1		932	6410	3400	852	2290	5228	5040	8400	722	1203	1150	1760	1070	2229	2270	2550	1170	1255	1240	1340
Lab Conductivity @ 25°C	µS/cm	1														1270	1372	1345	1470				
Total Dissolved Solids (TDS)	mg/L	1		714	4510	2160	676	2560	4514	4240	9680	572	746	679	1060	28	406	45	1670	752	839	839	926
Suspended Solids (TSS)	mg/L	1		28	66	330	372	700	700	700	700	140	189	202	226	295	295	295	295	7	7	7	7
Total Hardness as CaCO3	mg/L	1		202	52	644	197					275	275	275	275					257	257	257	257
Turbidity	NTU	0.01																					
Major Ions																							
Calcium	mg/L	1		33	11	106	36	170	170	170	170	37	43	43	60	34	40	40	46	50	58	58	65
Magnesium	mg/L	1		29	6	92	26	236	236	236	236	17	21	19	30	44	48	48	51	32	34	34	35
Sodium	mg/L	1		162	1590	577	176	1130	1130	1130	1130	129	157	146	210	452	483	483	514	172	176	176	180
Potassium	mg/L	1		2	7	2	1	9	9	9	9	2	3	3	4	4	5	5	6	3	4	4	4
Chloride	mg/L	1		245	1830	938	90	1820	1820	1820	1820	148	188	170	280	468	532	532	596	204	213	213	222
Hydroxide Alkalinity as CaCO3	mg/L	1		<1	<1	<1	<1																
Carbonate as CaCO3	mg/L	1		<1	<1	<1	<1	<1	1	1	1	<1	1	1	4	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		188	861	368	374	135	135	135	135	144	202	204	231	317	344	344	371	146	182	182	217
Total Alkalinity	mg/L	1																					
Sulphate	mg/L	1		38	<1	155	31	602	602	602	602	<1	67	76	80	107	126	126	145	104	128	128	152
Metals																							
Aluminum	mg/L	0.01	0.055	0.12	0.16	6.52	2.82																
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.004	0.002	<0.001					<0.001	0.003	0.001	0.010								
Boron - Filtered	mg/L	0.05	0.37																				
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001	0.00010	0.00040	<0.0001					<0.0001			<0.005								
Chromium - Filtered	mg/L	0.002		<0.001	0.003	0.006	0.002					<0.001	0.002	0.001	0.010								
Copper - Filtered	mg/L	0.0005	0.0014	<0.001	0.002	0.011	0.009					<0.001	0.018154	0.004	0.14								
Iron - Filtered	mg/L	0.05		0.13	0.61	7.11	3.01																
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.005	0.008	0.003					<0.001	0.003	0.001	0.015								
Manganese - Filtered	mg/L	0.001	1.9	0.010	0.166	0.884	0.265																
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001	<0.0001	<0.0001	<0.0001					<0.0001	0.0001	0.0001	0.0002								
Nickel - Filtered	mg/L	0.001	0.011	0.001	0.002	0.011	0.004					<0.003	0.008	0.008	0.015								
Selenium - Filtered	mg/L	0.01	0.005	<0.01	<0.01	<0.01	<0.01																
Zinc - Filtered	mg/L	0.005	0.008	0.100	0.034	0.144	0.026					<0.005	0.046	0.016	0.309								
Nutrients																							
Ammonia as N	mg/L	0.01	0.9	0.03	0.66	0.12	0.07																
Nitrate as N	mg/L	0.01	0.7	0.16	<0.01	1.74	2.52	0.20	0.20	0.20	0.20	<0.01	0.20	0.21	0.35	<0.01			<0.01	<0.01			<0.01
Nitrite as N	mg/L	0.01		<0.01	<0.01	0.02	0.08																
Nitrite + Nitrate as N	mg/L	0.01																					
Total Phosphorus as P	mg/L	0.01																					
Other																							
Silica	mg/L							34.4	34.4	34.4	34.4	9.9	21.22143	21.5	24.9	38.3	38.3	38.3	38.3	23.5	23.5	23.5	23.5
Fluoride	mg/L	0.02		2.30	2.90	0.80	0.70																
Total Cyanide	mg/L	0.004	0.007																				
Calculated Parameters																							
Total Anions	meq/L	0.01		11.10	70.40	38.00	11.60					13.60	13.60	13.60	13.60	26.20	26.20	26.20	26.20	12.40	12.40	12.40	12.40
Total Cations	meq/L	0.01		11.50	68.90	37.00	10.60					14.70	14.70	14.70	14.70	28.40	28.40	28.40	28.40	13.00	13.00	13.00	13.00
Ionic Balance	%	0.01		1.56	1.00	1.29	4.36					0.04	0.04	0.04	0.04								

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%)

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				RM07				RM08	RM09				RM10				PB1				PB2	GM1			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**29-Nov-00**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**28-Nov-00**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																									
pH Value (Lab)	pH unit	0.01																							
pH Value (field)	pH unit	0.01		6.94	7.30	7.21	8.17	7.10	6.77	7.22	7.10	8.18	6.83	7.23	7.11	8.15	7.08	7.42	7.22	8.22	8.03	6.81	7.69	7.78	8.38
Conductivity (field)	µS/cm	1		813	1671	1320	9920	1300	848	1248	1160	5810	883	1335	1260	3700	1020	1386	1540	1600	1420	295	4882	5315	9370
Lab Conductivity @ 25°C	µS/cm	1																				18	38	39	70
Total Dissolved Solids (TDS)	mg/L	1		478	876	692	3610	736	536	823	668	3640	594	913	860	2240	614	827	827	1040	852	216	2886	3280	5920
Suspended Solids (TSS)	mg/L	1		4	19	11	63		2	11	8	28	18	91	65	192	6	6	6	6		21	65	29	183
Total Hardness as CaCO3	mg/L	1		133	181	148	274		165	202	201	269	160	231	202	390	362	362	362	362		62	82	85	103
Turbidity	NTU	0.01		5.30	40.40	17.90	98.00																		
Major Ions																	81	81	81	81					
Calcium	mg/L	1		27	55	49	168	53	34	42	42	58	34	46	45	88	39	327	327	614	852	14	16	16	20
Magnesium	mg/L	1		16	38	29	218	34	17	22	22	30	15	21	20	41	31	31	31	31	34	7	9	8	13
Sodium	mg/L	1		129	243	158	1540	182	129	153	152	192	137	173	167	256	189	224	224	258	265	1080	1258	1265	1420
Potassium	mg/L	1		<1	3	3	5	3	2	3	2	7	2	4	3	8	3	9	9	14	24	6	6	6	6
Chloride	mg/L	1		130	378	235	3120	213	124	179	179	230	141	205	189	363	69	213	213	356	86	1290	1493	1500	1680
Hydroxide Alkalinity as CaCO3	mg/L	1		<1	83	76	171		<1			<1	<1			<1						<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1	<1			<1	<1			<1	<1			<1	<1	<1	6	1	20
Bicarbonate as CaCO3	mg/L	1		<1	183	199	623	197	139	199	196	275	154	225	215	424	3	86	86	168	3	503	592	595	675
Total Alkalinity	mg/L	1		168	185	188	198																		
Sulphate	mg/L	1		58	136	108	536	90	54	89	86	183	25.6	83	81	162	173	196	196	219	207	<1	15	12	34
Metals																									
Aluminum	mg/L	0.01	0.055	0.28	0.28	0.28	0.28		0.42	0.42	0.42	0.42	<0.01	0.24	0.28	0.38						0.25	0.50	0.52	0.74
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.004	0.001	0.040		<0.001	0.003	0.001	0.010	<0.001	0.003	0.001	0.010	20	20.000	20.000	20.000	17.500	0.002	0.003	0.003	0.004
Boron - Filtered	mg/L	0.05	0.37	<																					
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001	0.00078	0.00100	0.00200		<0.0001	0.00111	0.00100	0.00600	<0.0001	0.00094	0.00100	0.00500						<0.0001	0.00033	0.00035	0.00050
Chromium - Filtered	mg/L	0.002		<0.001	0.023	0.002	0.191		<0.001	0.017	0.001	0.280	<0.001	0.010	0.001	0.155						<0.001	0.002	0.001	0.004
Copper - Filtered	mg/L	0.0005	0.0014	<0.001	0.015471	0.002	0.217		<0.001	0.00355	0.001	0.012	<0.001	0.00445	0.003	0.015						0.002	0.006	0.003	0.016
Iron - Filtered	mg/L	0.05		0.3	0.57	0.51	0.89		<0.05	0.33	0.25	0.95	<0.05	0.89	0.89	2.08						<0.12	0.51	0.53	0.88
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.013	0.001	0.145		<0.001	0.002	0.001	<0.01	<0.001	0.002	0.001	0.010						<0.001	0.002	0.002	0.002
Manganese - Filtered	mg/L	0.001	1.9	0.021	0.086	0.051	0.186		0.015	0.077	0.051	0.221	0.206	0.370	0.367	0.574						0.134	0.141	0.136	0.158
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001	0.0001	0.0001	0.0002		<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0002						<0.0001	0.0801	0.0001	0.3200
Nickel - Filtered	mg/L	0.001	0.011	<0.001	0.017	0.002	0.182		<0.001	0.004	0.002	0.012	<0.001	0.002	0.002	0.010						<0.001	0.002	0.002	0.003
Selenium - Filtered	mg/L	0.01	0.005	<0.01	0.01	0.01	0.01		<0.01			<0.01	<0.01			<0.01						<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008	<0.001	0.075	0.009	0.911		0.003	0.015	0.009	0.056	0.003	0.021	0.017	0.069						0.014	0.025	0.023	0.041
Nutrients																									
Ammonia as N	mg/L	0.01	0.9	<0.01	0.02	0.01	0.03		<0.01	0.03	0.04	0.06	1.5	5.63	4.99	11.50						0.9	1.66	1.90	1.95
Nitrate as N	mg/L	0.01	0.7	<0.01	0.22	0.07	2.02	0.12	<0.01	0.09	0.09	0.39	<0.01	0.08	0.04	0.82	<0.01			<0.01	<0.01	<0.01	0.32	0.01	1.24
Nitrite as N	mg/L	0.01		<0.01	0.08	0.09	0.13		<0.01	0.15	0.09	0.39	<0.01	0.06	0.03	0.16						<0.01	0.04	0.04	0.06
Nitrite + Nitrate as N	mg/L	0.01		0.05	0.09	0.09	0.13																		
Total Phosphorus as P	mg/L	0.01		<0.01	0.04	0.05	0.06																		
Other																									
Silica	mg/L			9.5	24.76429	22.4	74.7	19.3	11.5	23.46	23.5	27.7	0.05	22.17	24.4	27.9	146	146	146	146	216				
Fluoride	mg/L	0.02		0.18	0.19	0.20	0.20		0.15	0.39	0.20	1.20	0.2	0.59	0.23	2.00						<0.004	0.68	0.85	1.01
Total Cyanide	mg/L	0.004	0.007	<0.004	0.008	0.004	0.016																		
Calculated Parameters																									
Total Anions	meq/L	0.01		9.07	10.46	9.12	14.00		9.70	10.64	10.60	12.80	10.10	12.76	12.10	16.70						49.20	54.70	54.20	61.20
Total Cations	meq/L	0.01		8.85	10.64	9.27	15.20		9.32	10.92	10.70	13.80	10.00	12.79	11.10	18.40						0.40	41.98	52.15	63.20
Ionic Balance	%	0.01		0.00	0.37	0.01	1.08		0.02	0.98	0.35	3.70	0.00	0.02	0.02	0.05						0.01	0.01	0.01	0.02

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				GM2				GM3A				T1-A				T1-P				T2-A				T2-P			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																											
pH Value (Lab)	pH unit	0.01																									
pH Value (field)	pH unit	0.01		6.76	6.98	7.01	7.18	7.63	7.88	7.71	8.48	7.08	7.37	7.29	7.82	6.91	7.25	7.33	7.50	7.09	7.26	7.26	7.49	6.77	7.19	7.25	7.60
Conductivity (field)	µS/cm	1		1460	5504	6010	8600	5720	7343	7540	8660	1080	1334	1120	2230	2740	7302	8000	9390	1160	1333	1270	1597	320	771	648	1308
Lab Conductivity @ 25°C	µS/cm	1										2040	2040	2040	2040	9220	9220	9220	9220	1680	1680	1680	1680	1070	1070	1070	1070
Total Dissolved Solids (TDS)	mg/L	1		822	1934	2360	2620	3200	3833	3915	4300	590	806	684	1390	1600	4630	5130	5990	780	1435	1250	2580	194	475	426	854
Suspended Solids (TSS)	mg/L	1																									
Total Hardness as CaCO3	mg/L	1																									
Turbidity	NTU	0.01																									
Major Ions																											
Calcium	mg/L	1										68	68	68	68	117	117	117	117	78	78	78	78	75	75	75	75
Magnesium	mg/L	1										49	49	49	49	247	247	247	247	40	40	40	40	36	36	36	36
Sodium	mg/L	1										377	377	377	377	1690	1690	1690	1690	242	242	242	242	74	74	74	74
Potassium	mg/L	1										4	4	4	4	11	11	11	11	<2			<2	2	2	2	2
Chloride	mg/L	1										608	608	608	608	2650	2650	2650	2650	393	393	393	393	237	237	237	237
Hydroxide Alkalinity as CaCO3	mg/L	1										<1	1	1	1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1										<1	1	1	1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1										216	216	216	216	<855	855	855	855	154	154	154	154	102	102	102	102
Total Alkalinity	mg/L	1																									
Sulphate	mg/L	1										176	176	176	176	<495	495	495	495	141	141	141	141	56	56	56	56
Metals																											
Aluminum	mg/L	0.01	0.055																	<0.01			<0.01	0.15	0.15	0.15	0.15
Arsenic - Filtered	mg/L	0.001	0.013									0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001	0.001	0.001	0.001	0.010	0.010	0.010	0.010
Boron - Filtered	mg/L	0.05	0.37									0.05	0.05	0.05	0.05	0.13	0.13	0.13	0.13	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium - Filtered	mg/L	0.00005	0.0002									0.0003	0.00030	0.00030	0.00030	0.0001	0.00010	0.00010	0.00010	0.0003	0.00030	0.00030	0.00030	<0.0001			<0.0001
Chromium - Filtered	mg/L	0.002										<0.001	0.001	0.001	0.001	<0.001			<0.001	0.001	0.001	0.001	0.001	<0.001			<0.001
Copper - Filtered	mg/L	0.0005	0.0014									<0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Iron - Filtered	mg/L	0.05										<0.05	0.05	0.05	0.05	<0.05			<0.05	0.06	0.06	0.06	0.06	5.08	5.08	5.08	5.08
Lead - Filtered	mg/L	0.00005	0.0034									<0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Manganese - Filtered	mg/L	0.001	1.9									0.008	0.008	0.008	0.008	0.105	0.105	0.105	0.105	0.103	0.103	0.103	0.103	0.372	0.372	0.372	0.372
Mercury - Filtered	mg/L	0.0001	0.00006									<0.0001	0.0001	0.0001	0.0001	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001			<0.0001
Nickel - Filtered	mg/L	0.001	0.011									<0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001			<0.001	0.002	0.002	0.002	0.002
Selenium - Filtered	mg/L	0.01	0.005									<0.01	0.01	0.01	0.01	<0.01			<0.01	<0.001			<0.001	<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008									<0.005	0.005	0.005	0.005	<0.005			<0.005	0.015	0.015	0.015	0.015	0.031	0.031	0.031	0.031
Nutrients																											
Ammonia as N	mg/L	0.01	0.9																								
Nitrate as N	mg/L	0.01	0.7																								
Nitrite as N	mg/L	0.01																									
Nitrite + Nitrate as N	mg/L	0.01																									
Total Phosphorus as P	mg/L	0.01																									
Other																											
Silica	mg/L																										
Fluoride	mg/L	0.02																									
Total Cyanide	mg/L	0.004	0.007																								
Calculated Parameters																											
Total Anions	meq/L	0.01										25.10	25.10	25.10	25.10	102.00	102.00	102.00	102.00	17.10	17.10	17.10	17.10	9.88	9.88	9.88	9.88
Total Cations	meq/L	0.01										23.90	23.90	23.90	23.90	99.90	99.90	99.90	99.90	17.80	17.80	17.80	17.80	9.96	9.96	9.96	9.96
Ionic Balance	%	0.01										0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				T3-A				T3-P				T4-A				T4-P				T5				T6			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																											
pH Value (Lab)	pH unit	0.01																									
pH Value (field)	pH unit	0.01		6.69	6.91	6.95	7.02	7.48	9.05	8.50	11.97	6.76	7.06	7.14	7.20	7.38	7.61	7.69	7.84	6.88	7.11	7.04	7.30	6.74	6.97	7.01	7.11
Conductivity (field)	µS/cm	1		2110	2318	2400	2420	1280	1379	1320	1647	2270	3340	3470	4130	1751	1836	1850	1920	1260	1330	1310	1420	1400	1408	1400	1420
Lab Conductivity @ 25°C	µS/cm	1		2150	2150	2150	2150	2050	2050	2050	2050	2270	2270	2270	2270	2000	2000	2000	2000	1330	1330	1330	1330	1280	1280	1280	1280
Total Dissolved Solids (TDS)	mg/L	1		1390	1914	1700	3200	694	776	754	905	1490	2174	2120	2740	954	1032	1050	1100	754	806	792	910	774	836	816	950
Suspended Solids (TSS)	mg/L	1																									
Total Hardness as CaCO3	mg/L	1																									
Turbidity	NTU	0.01																									
Major Ions																											
Calcium	mg/L	1		62	62	62	62	4	4	4	4	80	80	80	80	37	37	37	37	66	66	66	66	57	57	57	57
Magnesium	mg/L	1		59	59	59	59	0	0	0	0	58	58	58	58	35	35	35	35	29	29	29	29	24	24	24	24
Sodium	mg/L	1		354	354	354	354	211	211	211	211	383	383	383	383	378	378	378	378	202	202	202	202	193	193	193	193
Potassium	mg/L	1		0	0	0	0	80	80	80	80	0	0	0	0	4	4	4	4	2	2	2	2	2	2	2	2
Chloride	mg/L	1		669	669	669	669	200	200	200	200	694	694	694	694	367	367	367	367	293	293	293	293	288	288	288	288
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	84	84	84	84	<1			<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	128	128	128	128	<1			<1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		211	211	211	211	0	0	0	0	209	209	209	209	468	468	468	468	145	145	145	145	161	161	161	161
Total Alkalinity	mg/L	1																									
Sulphate	mg/L	1		92	92	92	92	33	33	33	33	189	189	189	189	10	10	10	10	158	158	158	158	122	122	122	122
Metals																											
Aluminum	mg/L	0.01	0.055	0.02	0.02	0.02	0.02	0.06	0.06	0.06	0.06	<0.01			<0.01	0.01	0.01	0.01	0.01								
Arsenic - Filtered	mg/L	0.001	0.013	<0.001			<0.001	<0.001			<0.001	0.002	0.002	0.002	0.002	<0.001			<0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Boron - Filtered	mg/L	0.05	0.37	<0.05	0.05	0.05	0.05	<0.05			<0.05	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cadmium - Filtered	mg/L	0.00005	0.0002	0.00040	0.00040	0.00040	0.00040	<0.0001			<0.0001	0.00010	0.00010	0.00010	0.00010	0.00100	0.00100	0.00100	0.00100	<0.0001			<0.0001	<0.0001			<0.0001
Chromium - Filtered	mg/L	0.002		<0.001			<0.001	0.002	0.002	0.002	0.002	<0.001			<0.001	0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001			<0.001
Copper - Filtered	mg/L	0.0005	0.0014	<0.001			<0.001	0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Iron - Filtered	mg/L	0.05		13.30	13.30	13.30	13.30	<0.05			<0.05	0.58	0.58	0.58	0.58	0.38	0.38	0.38	0.38	<0.05			<0.05	<0.05			<0.05
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.001	0.001	0.001	0.015	0.015	0.015	0.015	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Manganese - Filtered	mg/L	0.001	1.9	3.200	3.200	3.200	3.200	<0.001			<0.001	0.788	0.788	0.788	0.788	0.015	0.015	0.015	0.015	0.040	0.040	0.040	0.040	0.024	0.024	0.024	0.024
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	0.0004	0.0004	0.0004	0.0004	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001			<0.0001
Nickel - Filtered	mg/L	0.001	0.011	<0.001			<0.001	<0.001			<0.001	0.001	0.001	0.001	0.001	<0.001			<0.001	0.001	0.001	0.001	0.001	<0.001			<0.001
Selenium - Filtered	mg/L	0.01	0.005	<0.010	0.01	0.01	0.01	<0.010			<0.01	<0.010			<0.01	<0.010			<0.01	<0.010			<0.01	<0.010			<0.01
Zinc - Filtered	mg/L	0.005	0.008	<0.005			<0.005	0.010	0.010	0.010	0.010	0.008	0.008	0.008	0.008	<0.005			<0.005	<0.005			<0.005	<0.005			<0.005
Nutrients																											
Ammonia as N	mg/L	0.01	0.9																								
Nitrate as N	mg/L	0.01	0.7																								
Nitrite as N	mg/L	0.01																									
Nitrite + Nitrate as N	mg/L	0.01																									
Total Phosphorus as P	mg/L	0.01																									
Other																											
Silica	mg/L																										
Fluoride	mg/L	0.02																									
Total Cyanide	mg/L	0.004	0.007																								
Calculated Parameters																											
Total Anions	meq/L	0.01		25.00	25.00	25.00	25.00	10.60	10.60	10.60	10.60	27.70	27.70	27.70	27.70	19.90	19.90	19.90	19.90	14.40	14.40	14.40	14.40	13.90	13.90	13.90	13.90
Total Cations	meq/L	0.01		23.30	23.30	23.30	23.30	11.40	11.40	11.40	11.40	25.40	25.40	25.40	25.40	21.30	21.30	21.30	21.30	14.50	14.50	14.50	14.50	13.30	13.30	13.30	13.30
Ionic Balance	%	0.01		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				T7				T9	T10				RA8				RA10				RA14			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**13-Nov-07**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																								
pH Value (Lab)	pH unit	0.01						7.36																
pH Value (field)	pH unit	0.01		6.74	7.18	7.12	7.76	7.70	7.04	1482.35	2180.00	2260.00	6.87	7.13	7.22	7.35	6.91	7.15	7.10	7.39	7.02	693.53	533.54	1700.00
Conductivity (field)	µS/cm	1		4960	5574	5380	6410	2460	2160	2160	2160	2160	6800	7426	7660	7700	1576	1881	1940	2010	7	1564	2030	2190
Lab Conductivity @ 25°C	µS/cm	1		6420	6420	6420	6420	2490	1140	1637	1720	2050	8370	8370	8370	8370	1780	1780	1780	1780	2050	2050	2050	2050
Total Dissolved Solids (TDS)	mg/L	1		3170	3428	3240	4180	3800	12400	12400	12400	12400	4280	4846	4860	5380	1130	1200	1170	1360	7	2142	1780	5000
Suspended Solids (TSS)	mg/L	1																						
Total Hardness as CaCO3	mg/L	1																						
Turbidity	NTU	0.01																						
Major Ions																								
Calcium	mg/L	1		150	150	150	150	59	82	82	82	82	102	102	102	102	68	68	68	68	68	68	68	68
Magnesium	mg/L	1		149	149	149	149	42	57	57	57	57	180	180	180	180	40	40	40	40	58	58	58	58
Sodium	mg/L	1		1180	1180	1180	1180	479	313	313	313	313	1460	1460	1460	1460	266	266	266	266	329	329	329	329
Potassium	mg/L	1		1	1	1	1	2	0	0	0	0	8	8	8	8	0	0	0	0	0	0	0	0
Chloride	mg/L	1		2010	2010	2010	2010	711	478	478	478	478	2540	2540	2540	2540	373	373	373	373	632	632	632	632
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1	<1			<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1	<1			<1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		568	568	568	568	341	245	245	245	245	574	574	574	574	191	191	191	191	182	182	182	182
Total Alkalinity	mg/L	1																						
Sulphate	mg/L	1		416	416	416	416	126	183	183	183	183	358	358	358	358	160	160	160	160	163	163	163	163
Metals																								
Aluminum	mg/L	0.01	0.055					<0.01	0.23	0.23	0.23	0.23	<0.01	0.01	0.01	<0.01	<0.01			<0.01	0.18	0.18	0.18	0.18
Arsenic - Filtered	mg/L	0.001	0.013	0.005	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002
Boron - Filtered	mg/L	0.05	0.37	<0.05			<0.05	0.07	0.08	0.08	0.08	0.08	<0.05			<0.05	0.06	0.06	0.06	0.06	<0.05			<0.05
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001			<0.0001	<0.0001	0.00030	0.00030	0.00030	0.00030	0.00040	0.00040	0.00040	0.00040	<0.0001			<0.0001	<0.0001			<0.0001
Chromium - Filtered	mg/L	0.002		<0.001			<0.001	<0.001	<0.001			<0.001	<0.001	0.001	0.001	<0.001	<0.001			<0.001	<0.001			<0.001
Copper - Filtered	mg/L	0.0005	0.0014	0.002	0.002	0.002	0.002	<0.001	0.002	0.002	0.002	0.002	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Iron - Filtered	mg/L	0.05		0.08	0.08	0.08	0.08	<0.05	1.54	1.54	1.54	1.54	0.43	0.43	0.43	0.43	<0.05			<0.05	0.17	0.17	0.17	0.17
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.001	0.001	<0.001	<0.001	0.004	0.004	0.004	0.004	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Manganese - Filtered	mg/L	0.001	1.9	1.870	1.870	1.870	1.870	0.554	0.818	0.818	0.818	0.818	0.040	0.040	0.040	0.040	0.182	0.182	0.182	0.182	0.044	0.044	0.044	0.044
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001			<0.0001
Nickel - Filtered	mg/L	0.001	0.011	0.005	0.005	0.005	0.005	0.002	0.006	0.006	0.006	0.006	<0.001			<0.001	0.002	0.002	0.002	0.002	<0.001			<0.001
Selenium - Filtered	mg/L	0.01	0.005	<0.010			<0.01	<0.010	<0.010			<0.01	<0.01			<0.01	<0.010			<0.01	<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008	<0.005			<0.005	0.006	0.060	0.060	0.060	0.060	<0.005			<0.005	<0.005			<0.005	0.010	0.010	0.010	0.01
Nutrients																								
Ammonia as N	mg/L	0.01	0.9																					
Nitrate as N	mg/L	0.01	0.7																					
Nitrite as N	mg/L	0.01																						
Nitrite + Nitrate as N	mg/L	0.01																						
Total Phosphorus as P	mg/L	0.01																						
Other																								
Silica	mg/L																							
Fluoride	mg/L	0.02																						
Total Cyanide	mg/L	0.004	0.007																					
Calculated Parameters																								
Total Anions	meq/L	0.01		76.60	76.60	76.60	76.60	29.50	22.20	22.20	22.20	22.20	90.60	90.60	90.60	90.60	17.70	17.70	17.70	17.70	24.80	24.80	24.80	24.80
Total Cations	meq/L	0.01		71.10	71.10	71.10	71.10	27.30	22.40	22.40	22.40	22.40	83.60	83.60	83.60	83.60	18.30	18.30	18.30	18.30	22.50	22.50	22.50	22.50
Ionic Balance	%	0.01		0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				RA16				RA17	RA18				RA27				RA30				WML20			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**14-Nov-07**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																								
pH Value (Lab)	pH unit	0.01						7.13																
pH Value (field)	pH unit	0.01		6.57	6.88	7.00	7.08	7.38	6.93	7.19	7.27	7.31	6.76	6.97	6.99	7.14	6.63	6.91	7.02	7.13	8.05	8.17	8.18	8.26
Conductivity (field)	µS/cm	1		11100	12412	12300	13860	1364	1650	1810	1765	2060	1960	2155	2060	2540	1450	1565	1600	1633	4940	6615	5850	9820
Lab Conductivity @ 25°C	µS/cm	1		13400	13400	13400	13400	1190	2100	2100	2100	2100	2550	2550	2550	2550	1560	1560	1560	1560	3200	5045	5370	6240
Total Dissolved Solids (TDS)	mg/L	1		7540	9610	9300	12600	702	1130	1415	1455	1620	856	1644	1710	2300	784	1115	1060	1580	8	1092	8	3260
Suspended Solids (TSS)	mg/L	1																			20	35	35	49
Total Hardness as CaCO3	mg/L	1																						
Turbidity	NTU	0.01																						
Major Ions																								
Calcium	mg/L	1		20	20	20	20	47	78	78	78	78	132	132	132	132	68	68	68	68	6	6	6	6
Magnesium	mg/L	1		430	430	430	430	32	54	54	54	54	90	90	90	90	39	39	39	39	2	2	2	2
Sodium	mg/L	1		2450	2450	2450	2450	150	328	328	328	328	368	368	368	368	245	245	245	245	1340	1340	1340	1340
Potassium	mg/L	1		62	62	62	62	4	2	2	2	2	2	2	2	2	1	1	1	1	4	4	4	4
Chloride	mg/L	1		4750	4750	4750	4750	198	618	618	618	618	867	867	867	867	440	440	440	440	1300	1300	1300	1300
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1	<1			<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1	<1			<1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		126	126	126	126	211	220	220	220	220	243	243	243	243	133	133	133	133	1050	1050	1050	1050
Total Alkalinity	mg/L	1																						
Sulphate	mg/L	1		358	358	358	358	58	138	138	138	138	170	170	170	170	140	140	140	140	1	1	1	1
Metals																								
Aluminum	mg/L	0.01	0.055					0.03	<0.01			<0.01	0.02	0.02	0.02	0.02								
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.001	0.001	<0.001	0.005	<0.001			<0.001	0.005	0.005	0.005	0.005	<0.001	0.001	0.001	<0.001	<0.001			<0.001
Boron - Filtered	mg/L	0.05	0.37	<0.05			<0.05	0.05	<0.05			<0.05	<0.05			<0.05	<0.05			<0.05	0.18	0.18	0.18	0.18
Cadmium - Filtered	mg/L	0.00005	0.0002	0.00040	0.00040	0.00040	0.00040	<0.0001	0.00080	0.00080	0.00080	0.00080	0.00030	0.00030	0.00030	0.00030	<0.0001			<0.0001	0.00010	0.00010	0.00010	0.00010
Chromium - Filtered	mg/L	0.002		<0.001			<0.001	<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001	<0.005			<0.005
Copper - Filtered	mg/L	0.0005	0.0014	0.002	0.002	0.002	0.002	<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Iron - Filtered	mg/L	0.05		<0.05			<0.05	1.58	<0.05			<0.05	<0.05			<0.05	<0.05			<0.05	0.08	0.08	0.08	0.08
Lead - Filtered	mg/L	0.00005	0.0034	<0.001			<0.001	<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001	<0.001			<0.001
Manganese - Filtered	mg/L	0.001	1.9	0.146	0.146	0.146	0.146	1.400	0.030	0.030	0.030	0.030	2.880	2.880	2.880	2.880	0.794	0.794	0.794	0.794	0.038	0.038	0.038	0.038
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	<0.0001	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001			<0.0001
Nickel - Filtered	mg/L	0.001	0.011	0.005	0.005	0.005	0.005	0.004	<0.001			<0.001	0.013	0.013	0.013	0.013	0.001	0.001	0.001	0.001	<0.001			<0.001
Selenium - Filtered	mg/L	0.01	0.005	<0.010			<0.01	<0.01	<0.01			<0.01	<0.010			<0.01	<0.010			<0.01	<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008	0.034	0.034	0.034	0.034	0.015	0.011	0.011	0.011	0.011	0.010	0.010	0.010	0.010	0.005	0.005	0.005	0.005	<0.005			<0.005
Nutrients																								
Ammonia as N	mg/L	0.01	0.9																					
Nitrate as N	mg/L	0.01	0.7																					
Nitrite as N	mg/L	0.01																						
Nitrite + Nitrate as N	mg/L	0.01																						
Total Phosphorus as P	mg/L	0.01																						
Other																								
Silica	mg/L																							
Fluoride	mg/L	0.02																						
Total Cyanide	mg/L	0.004	0.007																					
Calculated Parameters																								
Total Anions	meq/L	0.01		144.00	144.00	144.00	144.00	11.00	24.70	24.70	24.70	24.70	32.90	32.90	32.90	32.90	18.00	18.00	18.00	18.00	57.60	57.60	57.60	57.60
Total Cations	meq/L	0.01		145.00	145.00	145.00	145.00	11.60	22.70	22.70	22.70	22.70	30.10	30.10	30.10	30.10	17.30	17.30	17.30	17.30	58.80	58.80	58.80	58.80
Ionic Balance	%	0.01		0.00	0.00	0.00	0.00	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				WML21				WML108B				WML109B				WML110B				WML110C				WML111B			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																											
pH Value (Lab)	pH unit	0.01						6.05	6.51	6.43	7.17	6.90	6.90	6.90	6.90	7.04	7.19	7.19	7.33	7.13	7.13	7.13	7.13	7.28	7.28	7.28	7.28
pH Value (field)	pH unit	0.01		7.52	7.90	7.90	8.46	6.35	6.65	6.60	7.18	6.13	6.62	6.75	6.84	6.13	6.90	7.03	7.41	6.56	6.56	6.56	6.56	7.28	7.50	7.43	7.90
Conductivity (field)	µS/cm	1		6460	7721	7690	8700	12300	14448	14440	16400	11160	11765	11800	12300	9120	9333	9300	9610	8620	8620	8620	8620	735	1761	1920	2640
Lab Conductivity @ 25°C	µS/cm	1		8140	8335	8335	8530	14700	15480	15300	16200	11500	11500	11500	11500	9260	9425	9425	9590	9340	9340	9340	9340	2580	2580	2580	2580
Total Dissolved Solids (TDS)	mg/L	1		3290	4412	4530	4890	8920	11096	11200	13100	6490	7700	7460	9390	5350	5823	5705	6530	5900	5980	5980	6060	540	1062	1060	1660
Suspended Solids (TSS)	mg/L	1		5	47	23	138	577	5781	1850	26700	134	240	240	345	80	176	176	272	2210	2210	2210	2210	16	142	36	478
Total Hardness as CaCO3	mg/L	1		26	38	40	45	4460	4767	4740	5010	1950	2195	2195	2440	1430	1450	1450	1470	1340	1340	1340	1340	123	140	142	152
Turbidity	NTU	0.01						1800.00	4345.00	4345.00	6890.00	240.00	240.00	240.00	240.00	179.00	334.00	334.00	489.00	1140.00	1140.00	1140.00	1140.00	235.00	235.00	235.00	235.00
Major Ions																											
Calcium	mg/L	1		9	10	10	10	627	683	664	758	195	214	214	232	126	145	140	174	124	125	125	126	28	44	42	68
Magnesium	mg/L	1		4	4	4	4	604	727	749	779	330	391	391	452	253	274	273	298	250	251	251	252	8	21	12	61
Sodium	mg/L	1		1710	1823	1790	1970	1680	1857	1885	1930	1700	1960	1960	2220	1360	1518	1515	1680	1570	1610	1610	1650	70	327	378	494
Potassium	mg/L	1		5	5	5	6	30	34	34	37	16	17	17	17	11	13	14	15	10	12	12	13	6	19	10	47
Chloride	mg/L	1		1930	2140	2240	2250	4770	5398	5400	6140	3190	3525	3525	3860	2630	3088	3115	3490	2680	2700	2700	2720	70	473	479	824
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1	26	1	77	<1			<1	<1			<1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		882	950	976	993	492	540	536	589	762	786	786	809	96	349	330	640	763	786	786	809	76	159	115	318
Total Alkalinity	mg/L	1						516	549	541	589	809	809	809	809	96	105	105	114	809	809	809	809	76	127	127	178
Sulphate	mg/L	1		0.58	1	1	1	632	852	864	970	719	980	980	1240	71.9	242	225	446	356	370	370	383	81	114	122	138
Metals																											
Aluminum	mg/L	0.01	0.055	0.26	0.26	0.26	0.26	1.82	4.56	5.74	6.12													<0.01	0.13	0.13	0.25
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.001	0.001	0.001	<0.001	0.038	0.036	0.070	0.002	0.003	0.003	0.003	<0.001	0.003	0.003	0.005	0.002	0.007	0.007	0.011	0.002	0.003	0.003	0.004
Boron - Filtered	mg/L	0.05	0.37	0.14	0.14	0.14	0.14	0.06	0.06	0.06	0.06	0.09	0.09	0.09	0.09	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.08	0.08	0.08	0.08
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001	0.00010	0.00010	0.00010	0.0003	0.00113	0.00115	0.00220	0.0002	0.00075	0.00075	0.00130	0.0002	0.00028	0.00025	0.00040	<0.0001	0.00010	0.00010	0.00010	<0.0001	0.00074	0.00020	0.00270
Chromium - Filtered	mg/L	0.002		<0.001	0.002	0.001	<0.005	0.004	0.010	0.011	0.015	<0.005			<0.005	<0.001	0.003	0.002	0.005	<0.005	0.007	0.007	0.009	<0.001	0.003	0.003	0.008
Copper - Filtered	mg/L	0.0005	0.0014	<0.001	0.001667	0.002	0.002	0.003	0.046	0.0285	0.159	0.002	0.006	0.006	0.01	0.001	0.01	0.007	0.025	0.001	0.009	0.009	0.017	<0.001	0.005	0.002	0.017
Iron - Filtered	mg/L	0.05		0.1	0.31	0.37	0.45	<0.05	283.59	71.75	1420.00	<1.72	7.76	7.76	13.80	2.56	17.73	9.83	48.70	2.34	9.57	9.57	16.80	0.58	1.84	1.07	5.50
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.002	0.002	0.003	<0.001	0.077	0.044	0.265	<0.001	0.017	0.017	0.033	0.003	0.009	0.009	0.016	<0.001	0.017	0.017	0.032	<0.001	0.004	0.002	0.014
Manganese - Filtered	mg/L	0.001	1.9	0.006	0.011	0.009	0.018	0.071	2.615	2.865	4.100	1.58	1.740	1.740	1.900	0.009	1.272	1.479	2.120	0.364	0.482	0.482	0.599	0.024	0.064	0.054	0.105
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	<0.0001	0.0002	0.0001	0.0005	<0.0001	0.0001	0.0001	0.0001	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001	0.0001	0.0001	0.0001
Nickel - Filtered	mg/L	0.001	0.011	<0.001	0.001	0.001	0.002	0.012	0.713	0.038	4.110	0.008	0.010	0.010	0.011	0.001	0.437	0.014	1.720	0.001	0.009	0.009	0.016	<0.001	0.032	0.003	0.150
Selenium - Filtered	mg/L	0.01	0.005	<0.01			<0.01	<0.01	0.02	0.02	0.05	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01	0.01	0.01	0.01
Zinc - Filtered	mg/L	0.005	0.008	<0.005	0.014	0.017	0.020	0.058	0.204	0.118	0.637	0.026	0.099	0.099	0.172	0.022	0.063	0.060	0.109	0.008	0.075	0.075	0.142	0.008	0.040	0.030	0.103
Nutrients				<																							
Ammonia as N	mg/L	0.01	0.9	0.65	1.03	1.03	1.40	0.02	0.37	0.10	1.25	0.92	0.92	0.92	0.92	2.2	2.32	2.32	2.44	0.29	0.29	0.29	0.29	0.04	0.12	0.10	0.23
Nitrate as N	mg/L	0.01	0.7	<0.01			<0.01	<0.01	2.99	2.60	6.76	0.22	0.22	0.22	0.22	<0.01			<0.01	<0.01			<0.01	<0.01	0.29	0.30	0.54
Nitrite as N	mg/L	0.01		<0.01			<0.01	<0.01	3.15	3.00	6.59	0.96	0.96	0.96	0.96	0.18	0.29	0.29	0.39	0.04	0.04	0.04	0.04	<0.01	0.98	0.57	2.78
Nitrite + Nitrate as N	mg/L	0.01						4.85	5.596667	5.18	6.76	1.17	1.17	1.17	1.17	0.18	0.285	0.285	0.39	0.04	0.04	0.04	0.04	0.51	1.69	1.69	2.87
Total Phosphorus as P	mg/L	0.01						0.07	1.746667	0.64	4.53	0.37	0.37	0.37	0.37	0.18	0.22	0.22	0.26	0.91	0.91	0.91	0.91	0.04	0.21	0.21	0.38
Other																											
Silica	mg/L																										
Fluoride	mg/L	0.02		0.74	0.82	0.82	0.90	0.19	0.37	0.40	0.60	0.2	0.20	0.20	0.20					0.3	0.30	0.30	0.30	0.14	0.83	0.23	2.70
Total Cyanide	mg/L	0.004	0.007					<0.004	0.004	0.004	0.004	<0.004			<0.004	<0.004	0.004	0.004	0.004	<0.004	0.004	0.004	0.004	<0.004	0.005	0.005	0.006
Calculated Parameters																											
Total Anions	meq/L	0.01		75.40	81.00	80.90	86.70	166.00	178.50	182.50	189.00	120.00	133.00	133.00	146.00	92.80	99.10	98.80	106.00	98.30	98.60	98.60	98.90	7.37	18.89	18.30	32.50
Total Cations	meq/L	0.01		75.20	79.17	78.90	83.40	155.00	174.00	175.50	201.00	112.00	131.50	131.50	151.00	87.50	96.00	97.25	102.00	95.50	98.25	98.25	101.00	7.08	18.60	19.80	30.00
Ionic Balance	%	0.01		0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.04	0.02	0.03	0.03	0.04	0.02	0.03	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.04

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				WML112B				WML112C				WML113B				WML113C				WML114B	WML115B				WML115C
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**20-Dec-07**	**Min**	**Mean**	**Median**	**Max**	**07-Nov-07**
Physical Parameters																									
pH Value (Lab)	pH unit	0.01		7.88	8.27	8.27	8.66	8.26	8.26	8.26	8.26	7.36	7.36	7.36	7.36	7.06	7.06	7.06	7.06	7.06	7.57	7.68	7.68	7.78	7.28
pH Value (field)	pH unit	0.01		6.97	7.75	7.53	8.89	6.96	7.66	7.60	8.61	7.09	7.51	7.54	7.72	6.58	7.06	7.08	7.43	7.34	10.04	10.04	10.04	10.04	7.39
Conductivity (field)	µS/cm	1		1420	1885	1950	2050	1350	1623	1670	1850	731	907	905	1100	906	1149	1155	1368	6410	3003	3003	3003	3003	3860
Lab Conductivity @ 25°C	µS/cm	1		1720	6010	6010	10300	1360	1360	1360	1360	875	875	875	875	1450	1450	1450	1450	6730	3790	3880	3880	3970	4100
Total Dissolved Solids (TDS)	mg/L	1		548	1025	1100	1230	720	845	822	1060	490	566	563	660	702	999	977	1320	3580	2090	2195	2195	2300	2610
Suspended Solids (TSS)	mg/L	1		74	255	223	492	49	68	69	99	46	134	74	404	3050	9190	7730	18200						
Total Hardness as CaCO3	mg/L	1		233	275	277	309	229	278	285	318	153	169	168	184	231	254	252	288						
Turbidity	NTU	0.01		32.20	54.50	54.50	76.80	133.00	154.50	154.50	176.00	16.20	24.50	24.50	32.80	3420.00	5440.00	5440.00	7460.00						
Major Ions																									
Calcium	mg/L	1		36	49	51	61	17	32	30	48	31	35	35	43	54	66	61	93	95	9	26	26	43	86
Magnesium	mg/L	1		8	27	31	39	22	43	46	51	18	21	21	26	23	27	25	37	166	7	21	21	34	47
Sodium	mg/L	1		126	308	338	355	215	229	232	242	89	129	135	142	138	147	149	154	1220	735	755	755	775	783
Potassium	mg/L	1		10	16	14	26	6	11	13	13	2	3	4	4	2	2	2	2	8	4	6	6	7	1
Chloride	mg/L	1		167	357	383	446	157	186	184	230	120	131	132	142	188	233	224	319	2060	1000	1075	1075	1150	1210
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1			<1	<1	<1			<1	<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1			<1	<1	<1			<1	<1
Bicarbonate as CaCO3	mg/L	1		83	389	511	572	264	615	669	803	213	263	275	282	07	168	186	196	646	285	332	332	378	237
Total Alkalinity	mg/L	1		426	505	518	572	537	666	658	803	257	269	274	276	141	176	191	196						
Sulphate	mg/L	1		<1	44	17	143	0.53	8	1	42	1.02	8	5	24	88	106	100	146	259	74	80	80	86	325
Metals																									
Aluminum	mg/L	0.01	0.055	0.13	0.45	0.45	0.76	<0.01	0.02	0.02	0.03	0.01	0.32	0.32	0.63	<0.01	18.26	18.26	36.50	<0.01	<0.01	0.01	0.01	0.01	
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.004	0.003	0.010	<0.001	0.001	0.001	0.001	<0.001	0.002	0.001	0.004	0.002	0.026	0.022	0.066	0.000	<0.001	0.001	0.001	0.001	0.002
Boron - Filtered	mg/L	0.05	0.37	<0.05			<0.05	0.06	0.06	0.06	0.06	<0.05	0.05	0.05	0.05					0.12	0.07	0.10	0.10	0.13	<0.05
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001	0.00511	0.00030	0.03140	<0.0001	0.00030	0.00015	0.00110	<0.0001	0.00042	0.00025	0.00140	0.0002	0.00175	0.00045	0.00810	0.00230	<0.0001			<0.0001	<0.0001
Chromium - Filtered	mg/L	0.002		<0.001	0.003	0.003	0.005	<0.001	0.001	0.001	0.001	<0.001	0.003	0.002	0.009	<0.001	0.064	0.048	0.197	0.002	<0.001			<0.001	<0.001
Copper - Filtered	mg/L	0.0005	0.0014	<0.001	0.024143	0.01	0.088	<0.001	0.0015	0.0015	0.002	<0.001	0.0035	0.003	0.008	<0.001	0.0715	0.0565	0.215	<0.001	<0.001			<0.001	0.001
Iron - Filtered	mg/L	0.05		<0.05	2.12	1.36	6.61	1.75	14.41	14.85	26.40	1.29	3.56	2.19	11.60	<0.05	119.26	94.55	350.00	0.99	<0.05	0.31	0.31	0.57	<0.05
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.005	0.001	0.022	<0.001			<0.001	<0.001	0.004	0.002	0.010	<0.001	0.099	0.067	0.308	<0.001	<0.001			<0.001	<0.001
Manganese - Filtered	mg/L	0.001	1.9	<0.001	0.119	0.178	0.212	<0.001	0.049	0.037	0.125	<0.001	0.330	0.358	0.522	0.015	2.622	1.885	8.570	0.194	0.003	0.074	0.074	0.144	0.004
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001			<0.0001	<0.0001	0.0003	0.0002	0.0010	<0.0001	<0.0001			<0.0001	<0.0001
Nickel - Filtered	mg/L	0.001	0.011	<0.001	0.020	0.004	0.122	<0.001	0.008	0.002	0.042	<0.001	0.064	0.002	0.375	<0.001	0.491	0.092	2.440	0.001	<0.001			<0.001	<0.001
Selenium - Filtered	mg/L	0.01	0.005	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01	<0.01			<0.01	<0.01
Zinc - Filtered	mg/L	0.005	0.008	<0.005	0.223	0.059	1.090	<0.005	0.007	0.006	0.010	<0.005	0.035	0.038	0.064	<0.005	0.308	0.230	0.966	0.009	<0.005	0.006	0.006	0.006	<0.005
Nutrients																									
Ammonia as N	mg/L	0.01	0.9	5.56	13.44	15.00	18.90	32.3	40.06	39.70	50.30	0.76	1.39	1.55	1.79	0.02	0.06	0.05	0.14						
Nitrate as N	mg/L	0.01	0.7	<0.01	0.02	0.01	0.06	<0.01			<0.01	<0.01	0.02	0.01	0.03	<0.01	0.27	0.01	1.30						
Nitrite as N	mg/L	0.01		<0.01	0.08	0.01	0.21	<0.01	0.02	0.01	0.05	0.01	0.08	0.04	0.23	<0.01	0.51	0.53	0.96						
Nitrite + Nitrate as N	mg/L	0.01		0.01	0.093333	0.06	0.21	<0.01	0.01	0.01	0.01	<0.01	0.033333	0.04	0.05	0.62	0.96	0.96	1.3						
Total Phosphorus as P	mg/L	0.01		0.68	2.47	3.26	3.47	0.04	0.29	0.4	0.43	0.46	0.536667	0.57	0.58	0.29	2.956667	3.26	5.32						
Other																									
Silica	mg/L																								
Fluoride	mg/L	0.02		0.17	0.37	0.20	1.10	0.04	0.45	0.10	1.90	0.27	0.59	0.30	1.80	0.2	0.30	0.25	0.60						
Total Cyanide	mg/L	0.004	0.007	<0.004	0.008	0.009	0.011	<0.004	0.004	0.004	0.004	<0.004	0.006	0.004	0.009	<0.004	0.005	0.004	0.007						
Calculated Parameters																									
Total Anions	meq/L	0.01		8.50	18.67	20.70	23.20	15.40	17.64	17.50	20.50	8.15	9.16	9.34	9.53	10.90	12.08	11.75	14.20	76.40	35.40	38.60	38.60	41.80	45.60
Total Cations	meq/L	0.01		8.59	18.76	20.60	22.50	16.00	17.32	16.30	20.10	8.19	9.11	9.20	9.61	10.90	11.92	11.35	14.30	72.00	33.20	36.00	36.00	38.80	42.30
Ionic Balance	%	0.01		0.01	0.03	0.02	0.05	0.01	0.03	0.03	0.05	0.00	0.01	0.00	0.03	0.00	0.02	0.01	0.05	0.03	0.03	0.03	0.03	0.04	0.04

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				WML119				WML120A				WML120B				WML129				WML148	WML155	WML157	WML158	WML181
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**29-Nov-07**	**29-Nov-07**	**29-Nov-07**	**29-Nov-07**	**24-Jun-07**
Physical Parameters																								
pH Value (Lab)	pH unit	0.01		7.26	7.66	7.60	8.19	6.77	6.98	6.99	7.16	6.87	7.06	7.07	7.24	7.06	7.21	7.25	7.27	6.94	6.74	7.23	7.14	7.61
pH Value (field)	pH unit	0.01		5.29	6.65	6.73	7.78	6.89	7.20	7.20	7.69	6.74	7.01	7.07	7.20	6.88	7.16	7.13	7.54	7.24	6.92	7.77	7.63	6.16
Conductivity (field)	µS/cm	1		86	615	126	1890	476	808	880	1040	438	795	779	1220	399	541	471	789	2170	978	842	745	3570
Lab Conductivity @ 25°C	µS/cm	1		2320	4205	4015	6470	742	2330	1114	6350	1020	1363	1250	1930	396	517	547	577	2610	915	803	705	4920
Total Dissolved Solids (TDS)	mg/L	1		62	1705	837	5160	306	1104	458	5620	348	638	534	1480	192	786	304	4080	2180	5600	2250	2300	2700
Suspended Solids (TSS)	mg/L	1		48	163	90	498	5	23	25	37	186	1135	456	3260	956	1651	1340	3470					
Total Hardness as CaCO3	mg/L	1		12	75	23	332	107	205	211	343	94	162	154	258	108	119	111	156					
Turbidity	NTU	0.01		39.00	145.00	145.00	251.00	1.20	3.30	3.30	5.40	81.70	123.35	123.35	165.00	612.00	806.00	806.00	1000.00					
Major Ions																								
Calcium	mg/L	1		3	17	11	39	18	50	33	203	18	41	33	123	18	25	23	33	103	61	53	37	15
Magnesium	mg/L	1		1	32	4	122	14	63	28	354	12	30	25	83	9	13	13	18	54	23	22	16	38
Sodium	mg/L	1		5	419	12	1570	60	236	123	1260	74	127	127	221	28	45	45	54	363	65	59	75	1010
Potassium	mg/L	1		4	6	6	9	<1	3	2	13	0	1	1	2	2	3	3	3	0	1	0	0	6
Chloride	mg/L	1		5	492	17	1830	82	393	144	2300	75	202	160	610	44	65	60	102	696	165	114	91	1110
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1			<1	<1	<1	<1	<1	<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1			<1	<1	<1	<1	<1	<1
Bicarbonate as CaCO3	mg/L	1		29	369	54	1080	109	253	200	936	137	175	177	232	78	119	114	161	125	140	190	183	863
Total Alkalinity	mg/L	1		29	33	30	41	208	224	224	240	200	203	203	206	110	118	118	126					
Sulphate	mg/L	1		0.74	40	10	167	19	78	28	462	16	44	39	111	3.94	17	21	26	91	20	10	5	76
Metals																								
Aluminum	mg/L	0.01	0.055	0.51	0.51	0.51	0.51	<0.01	0.16	0.16	0.30	<0.01	10.41	10.41	20.80	25.6	25.60	25.60	25.60	<0.01	<0.01	<0.01	<0.01	
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.001	0.001	0.002	<0.001	0.003	0.002	0.005	<0.001	0.002	0.002	0.005	0.001	0.003	0.004	0.005	<0.001	<0.001	<0.001	<0.001	<0.001
Boron - Filtered	mg/L	0.05	0.37	0.11	0.11	0.11	0.11	<0.05			<0.05	<0.05			<0.05	<0.05	0.05	0.05	0.05	<0.05	<0.05	0.06	<0.05	0.13
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001	0.00011	0.00010	0.00020	<0.0001	3.38382	0.00025	20.30000	<0.0001	0.00023	0.00020	0.00050	<0.0001	0.00031	0.00020	0.00080	0.00050	0.04550	0.00020	0.00050	0.00010
Chromium - Filtered	mg/L	0.002		<0.001	0.002	0.002	0.005	<0.001	0.002	0.002	0.005	0.002	0.011	0.007	0.025	<0.001	0.010	0.010	0.022	<0.005	<0.005	<0.005	<0.005	<0.005
Copper - Filtered	mg/L	0.0005	0.0014	<0.001	0.004857	0.004	0.01	<0.001	0.002167	0.0015	0.005	<0.001	0.012333	0.007	0.034	<0.001	0.016	0.013	0.034	0.002	<0.001	0.001	<0.001	0.002
Iron - Filtered	mg/L	0.05		<0.05	1.34	1.60	2.63	0.47	1.16	0.76	3.46	<0.05	13.13	7.68	34.40	0.58	10.36	8.95	25.30	<0.05	<0.05	<0.05	<0.05	<0.05
Lead - Filtered	mg/L	0.00005	0.0034	<0.001	0.009	0.004	0.039	<0.001	0.002	0.001	0.008	<0.001	0.013	0.008	0.033	<0.001	0.013	0.008	0.026	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese - Filtered	mg/L	0.001	1.9	0.009	0.061	0.060	0.144	<0.001	0.048	0.044	0.081	0.004	0.403	0.159	1.410	0.012	0.701	0.799	1.260	0.001	0.008	<0.001	0.986	0.010
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0003	0.0001	0.0010	<0.0001	0.0003	0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel - Filtered	mg/L	0.001	0.011	<0.001	0.014	0.002	0.086	<0.001	0.010	0.002	0.049	<0.001	0.043	0.016	0.175	0.001	0.108	0.020	0.683	0.001	0.001	<0.001	0.001	<0.001
Selenium - Filtered	mg/L	0.01	0.005	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc - Filtered	mg/L	0.005	0.008	0.005	0.078	0.043	0.312	0.006	0.029	0.016	0.077	<0.005	0.047	0.033	0.109	<0.005	0.047	0.032	0.102	0.013	0.006	0.009	<0.005	0.007
Nutrients																								
Ammonia as N	mg/L	0.01	0.9	0.09	0.37	0.25	0.92	0.02	0.09	0.09	0.17	0.05	0.14	0.13	0.27	0.06	0.15	0.16	0.24					
Nitrate as N	mg/L	0.01	0.7	<0.01			<0.01	<0.01	0.16	0.01	0.53	<0.01	0.05	0.01	0.18	<0.01			<0.01					
Nitrite as N	mg/L	0.01		<0.01	0.04	0.04	0.07	<0.01	0.04	0.02	0.14	<0.01	0.12	0.14	0.27	<0.01	0.03	0.01	0.08					
Nitrite + Nitrate as N	mg/L	0.01		<0.01	0.023333	0.02	0.04	0.02	0.085	0.085	0.15	0.12	0.14	0.14	0.16	<0.01	0.035	0.035	0.06					
Total Phosphorus as P	mg/L	0.01		0.22	0.246667	0.22	0.3	0.03	0.045	0.045	0.06	0.14	0.2	0.2	0.26	0.41	0.63	0.63	0.85					
Other																								
Silica	mg/L																							
Fluoride	mg/L	0.02		<0.1	0.25	0.15	0.80	0.21	0.48	0.30	1.40	0.21	0.40	0.30	0.80	0.14	0.23	0.20	0.50					
Total Cyanide	mg/L	0.004	0.007	<0.004			<0.004	<0.004	0.004	0.004	0.004	<0.004	0.004	0.004	0.004	<0.004	0.004	0.004	0.004					
Calculated Parameters																								
Total Anions	meq/L	0.01		0.76	21.99	1.55	76.50	5.15	17.81	9.77	93.30	5.15	10.05	9.08	22.20	3.05	4.52	4.55	5.74	24.00	7.85	7.22	6.34	50.00
Total Cations	meq/L	0.01		0.72	21.87	1.56	80.70	4.96	17.99	9.40	94.40	5.20	10.11	9.32	22.60	2.96	4.41	4.35	5.55	25.30	7.80	6.99	6.44	48.00
Ionic Balance	%	0.01		0.02	0.03	0.03	0.03	0.01	0.02	0.02	0.05	0.01	0.01	0.01	0.02	0.00	0.02	0.01	0.04	0.03	0.00	0.02	0.01	0.02

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				WML182				WML183				WML184	WML185	WML186	WML239				WML240				WML241			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**28-Nov-07**	**28-Nov-07**	**28-Nov-07**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																										
pH Value (Lab)	pH unit	0.01		6.85	6.97	6.97	7.08	6.97	7.00	7.00	7.02	6.97	6.74	6.44												
pH Value (field)	pH unit	0.01		6.80	6.86	6.86	6.91	6.81	6.93	6.93	7.04	6.96	6.68	6.76	7.01	7.21	7.14	7.53	6.53	6.72	6.61	6.96	6.96	7.14	7.12	7.34
Conductivity (field)	µS/cm	1		3840	6330	6330	8820	8140	8245	8245	8350	3180	1852	463	707	876	903	984	1150	1532	1610	1700	431	560	549	687
Lab Conductivity @ 25°C	µS/cm	1		4220	6450	6450	8680	8180	8375	8375	8570	4560	4430	387												
Total Dissolved Solids (TDS)	mg/L	1		2280	4110	4110	5940	5000	5155	5155	5310	2960	2870	290	468	572	558	640	938	1081	1120	1240	304	508	348	1190
Suspended Solids (TSS)	mg/L	1													18	97	48	327	4	21	26	37	22	240	24	1090
Total Hardness as CaCO3	mg/L	1													216	232	230	245	383	445	450	476	50	64	68	80
Turbidity	NTU	0.01													16.60	72.30	72.30	128.00	13.40	340.20	340.20	667.00				
Major Ions																										
Calcium	mg/L	1		50	84	84	118	83	102	102	120	44	82	23	48	52	52	55	84	97	98	104	10	13	14	16
Magnesium	mg/L	1		96	209	209	321	263	305	305	347	70	120	8	23	25	24	26	42	49	50	53	6	7	8	9
Sodium	mg/L	1		727	1114	1114	1500	1240	1320	1320	1400	532	622	29	83	90	89	96	129	139	138	149	90	101	97	124
Potassium	mg/L	1		7	11	11	14	13	14	14	14	5	5	2	1	2	2	2	1	1	1	2	<1	1	1	1
Chloride	mg/L	1		929	1600	1600	2270	2150	2220	2220	2290	602	944	41	162	186	180	209	406	439	440	475	81	91	83	115
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1			<1	<1	<1	<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1			<1	<1	<1	<1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		757	899	899	1040	916	1013	1013	1110	758	595	75	139	144.2	144	150	82	103	110	117	130	146	140	178
Total Alkalinity	mg/L	1													139	142	142	144	130	149	140	178				
Sulphate	mg/L	1		102	366	366	629	244	441	441	637	104	183	27	21	25	25	31	33	40	37	48	9.3	12	13	14
Metals																										
Aluminum	mg/L	0.01	0.055									<0.01	<0.01	0.04	0.86	0.86	0.86	0.86	0.23	0.23	0.23	0.23	0.06	0.06	0.06	0.06
Arsenic - Filtered	mg/L	0.001	0.013	<0.001	0.001	0.001	0.001	<0.001			<0.001	<0.001	0.002	0.001	<0.001			<0.001	<0.001			<0.001	<0.001	0.001	0.001	0.002
Boron - Filtered	mg/L	0.05	0.37	<0.1	0.13	0.13	0.16	0.13	0.15	0.15	0.16	0.10	0.07	<0.05												
Cadmium - Filtered	mg/L	0.00005	0.0002	<0.0001			<0.0001	<0.0001			<0.0001	0.00010	<0.0001	0.00020	<0.0001	0.00024	0.00020	0.00040	0.0001	0.00038	0.00020	0.00090	<0.0001	0.00030	0.00040	0.00050
Chromium - Filtered	mg/L	0.002		<0.005			<0.005	<0.005			<0.005	<0.01	<0.005	<0.005	<0.001	0.002	0.002	0.002	<0.001	0.001	0.001	0.002	<0.001	0.002	0.001	0.005
Copper - Filtered	mg/L	0.0005	0.0014	<0.001	0.002	0.002	0.003	0.002	0.002	0.002	0.002	<0.001	<0.001	<0.001	<0.001	0.0026	0.002	0.007	0.002	0.003	0.003	0.005	<0.001	0.0022	0.001	0.006
Iron - Filtered	mg/L	0.05		<0.05	0.27	0.27	0.49	0.08	0.25	0.25	0.42	0.94	3.96	0.80	0.19	0.85	1.11	1.36	0.12	0.40	0.32	0.69	0.66	4.19	5.44	7.03
Lead - Filtered	mg/L	0.00005	0.0034	<0.001			<0.001	<0.001			<0.001	<0.001	<0.001	0.002	<0.001	0.002	0.001	0.005	<0.001	0.002	0.001	0.003	<0.001	0.002	0.002	0.002
Manganese - Filtered	mg/L	0.001	1.9	0.061	0.073	0.073	0.084	0.027	0.042	0.042	0.057	0.076	0.272	0.030	0.001	0.032	0.030	0.065	0.001	0.277	0.309	0.484	0.004	0.074	0.056	0.175
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001			<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001
Nickel - Filtered	mg/L	0.001	0.011	<0.001			<0.001	<0.001	0.002	0.002	0.002	<0.001	0.001	0.002	<0.001	0.004	0.001	0.014	0.001	0.031	0.002	0.144	<0.001	0.023	0.001	0.112
Selenium - Filtered	mg/L	0.01	0.005	<0.01			<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008	<0.005			<0.005	<0.005	0.006	0.006	0.007	0.006	<0.005	0.119	0.014	0.021	0.020	0.036	0.014	0.028	0.020	0.049	0.013	0.018	0.017	0.024
Nutrients																										
Ammonia as N	mg/L	0.01	0.9												<0.01	0.03	0.02	0.07	<0.01	0.06	0.03	0.16	0.04	0.07	0.09	0.10
Nitrate as N	mg/L	0.01	0.7												<0.01	0.05	0.01	0.21	<0.01	0.03	0.01	0.13	<0.01	0.02	0.01	0.04
Nitrite as N	mg/L	0.01													<0.01	0.28	0.22	0.83	<0.01	1.00	0.92	1.86	<0.01	0.07	0.05	0.20
Nitrite + Nitrate as N	mg/L	0.01													0.21	0.443333	0.29	0.83	0.02	0.036667	0.04	0.05				
Total Phosphorus as P	mg/L	0.01													<0.01	0.02	0.01	0.04	0.02	0.133333	0.19	0.19				
Other																										
Silica	mg/L																									
Fluoride	mg/L	0.02													0.16	0.31	0.20	0.80	0.08	0.19	0.15	0.40	0.3	0.90	0.30	3.30
Total Cyanide	mg/L	0.004	0.007												<0.004	0.005	0.004	0.008	<0.004	0.006	0.004	0.009				
Calculated Parameters																										
Total Anions	meq/L	0.01		43.50	70.70	70.70	97.90	91.80	92.00	92.00	92.20	34.30	42.30	3.22	8.01	8.71	8.51	9.43	7.03	13.53	14.70	16.30	5.24	12.55	5.34	41.30
Total Cations	meq/L	0.01		42.20	70.10	70.10	98.00	87.20	87.95	87.95	88.70	31.20	41.10	3.14	7.97	8.56	8.34	9.13	7.07	13.51	15.20	15.40	5.10	12.24	5.21	39.90
Ionic Balance	%	0.01		0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.05	0.02	0.01	0.00	0.01	0.01	0.02	0.00	0.02	0.03	0.03	0.00	0.01	0.01	0.02

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

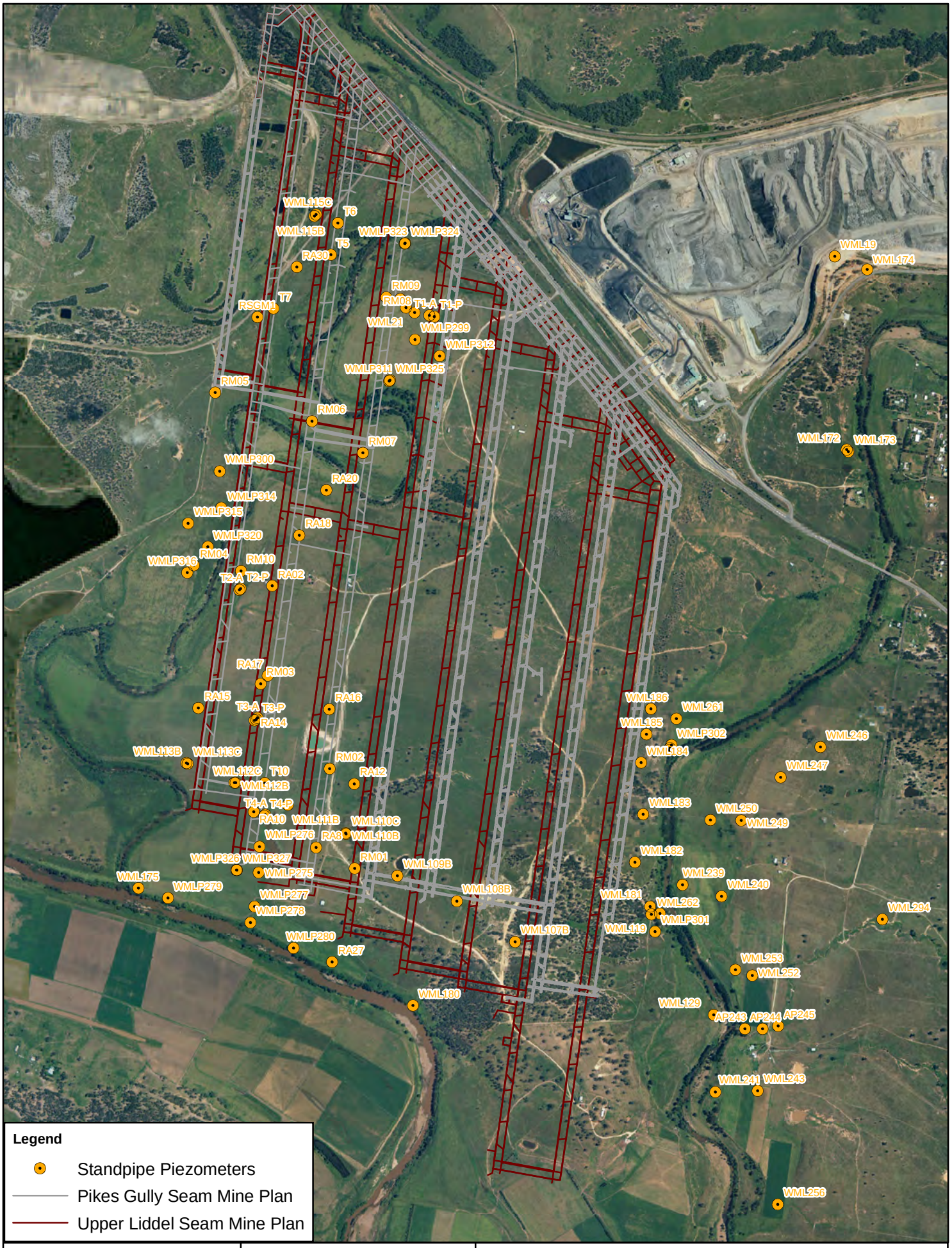
Bore / Well / Spring / Soak				WML243				WML247				WML249				WML252				WML253				WML256			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																											
pH Value (Lab)	pH unit	0.01																									
pH Value (field)	pH unit	0.01		6.64	6.88	6.85	7.04	7.24	7.38	7.38	7.52	7.49	7.67	7.71	7.79	7.03	7.30	7.23	7.63	6.58	7.07	7.18	7.37	6.55	6.70	6.73	6.90
Conductivity (field)	µS/cm	1		3740	5090	5280	6200	14800	14900	14900	15000	13500	15000	15100	16300	3730	4885	4880	5830	300	396	411	453	2240	3650	3270	5930
Lab Conductivity @ 25°C	µS/cm	1																									
Total Dissolved Solids (TDS)	mg/L	1		2820	3478	3610	4100	9260	9335	9335	9410	9650	10043	10010	10500	2630	3208	3235	3700	236	294	256	472	1340	2008	1860	2580
Suspended Solids (TSS)	mg/L	1		340	1048	532	3020	748	1234	1234	1720	307	821	554	1870	524	2045	2040	3740	10	31	14	86	480	852	952	1130
Total Hardness as CaCO3	mg/L	1		634	860	951	1040	468	471	471	474	813	835	829	870	459	725	776	890	101	112	112	124	372	568	582	747
Turbidity	NTU	0.01		617.00	1073.50	1073.50	1530.00	624.00	713.00	713.00		182.00	464.00	464.00	746.00	545.00	1492.50	1492.50	2440.00	5.10	27.15	27.15	49.20				
Major Ions																											
Calcium	mg/L	1		86	134	155	164	35	36	36	36	60	64	65	68	63	98	105	118	20	25	25	28	85	132	139	174
Magnesium	mg/L	1		92	128	137	154	92	93	93	93	161	164	162	170	73	117	125	144	12	12	12	13	39	58	57	76
Sodium	mg/L	1		648	890	971	1050	2970	3175	3175	3380	3100	3470	3305	4170	722	856	887	950	22	30	30	41	371	481	515	566
Potassium	mg/L	1		2	2	2	2	16	17	17	17	10	11	11	11	2	2	2	2	<1			<1	1	1	1	2
Chloride	mg/L	1		951	1338	1430	1690	4220	4405	4405	4590	4580	4788	4755	5060	995	1343	1395	1540	45	51	49	63	517	793	829	987
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1			1	<1			<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1			1	<1			<1	<1			<1	<1			<1	<1			<1
Bicarbonate as CaCO3	mg/L	1		501	610	593	696	1430	1435	1435	1440	1080	1145	1140	1220	277	318	320	345	96	103	98	120	223	277	292	306
Total Alkalinity	mg/L	1		501	597	593	696	1430	1435	1435	1440	1080	1140	1120	1220	277	316	322	345	96	97	98	98	223	262	261	302
Sulphate	mg/L	1		149	234	245	282	50	52	52	54.3	335	764	841	1040	214	293	284	371	6	9	9	11	126	167	171	208
Metals																											
Aluminum	mg/L	0.01	0.055	10.6	10.60	10.60	10.60					4.48	4.48	4.48	4.48	18.5	24.30	24.30	30.10	0.18	0.18	0.18	0.18	4.2	4.20	4.20	4.20
Arsenic - Filtered	mg/L	0.001	0.013	0.003	0.012	0.010	0.023	0.004	0.007	0.007	0.009	0.006	0.009	0.008	0.014	0.006	0.014	0.011	0.024	<0.001	0.001	0.001	0.001	<0.001	0.002	0.002	0.004
Boron - Filtered	mg/L	0.05	0.37																								
Cadmium - Filtered	mg/L	0.00005	0.0002	0.0002	0.00062	0.00060	0.00130	0.0007	0.00450	0.00450	0.00830	<0.0001	0.00045	0.00035	0.00100	<0.0001	0.00075	0.00035	0.00300	<0.0001	0.00118	0.00020	0.00440	0.0003	0.00286	0.00060	0.00880
Chromium - Filtered	mg/L	0.002		0.005	0.014	0.008	0.029	0.01	0.010	0.010	0.010	<0.005	0.011	0.009	0.021	0.006	0.023	0.018	0.048	<0.001	0.001	0.001	0.002	0.002	0.005	0.003	0.010
Copper - Filtered	mg/L	0.0005	0.0014	0.006	0.013	0.008	0.029	0.026	0.033	0.033	0.04	0.009	0.01325	0.0115	0.021	0.006	0.021667	0.015	0.042	<0.001	0.0016	0.001	0.003	0.002	0.0074	0.005	0.013
Iron - Filtered	mg/L	0.05		7.72	24.14	14.40	52.30	15	26.80	26.80	38.60	5.58	11.68	8.21	24.70	11.1	47.12	37.50	91.50	0.11	0.60	0.23	2.07	0.47	5.20	5.46	9.40
Lead - Filtered	mg/L	0.00005	0.0034	0.003	0.011	0.008	0.025	0.017	0.019	0.019	0.020	0.004	0.009	0.007	0.019	0.003	0.022	0.016	0.044	<0.001	0.002	0.001	0.004	<0.001	0.010	0.008	0.023
Manganese - Filtered	mg/L	0.001	1.9	0.006	0.702	0.736	1.450	0.031	0.187	0.187	0.342	0.008	0.153	0.096	0.413	0.017	0.706	0.618	1.910	0.002	0.170	0.217	0.282	0.003	0.367	0.424	0.640
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001	0.0001	0.0001	0.0001	<0.0001			0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001
Nickel - Filtered	mg/L	0.001	0.011	0.008	0.341	0.018	1.640	0.021	0.571	0.571	1.120	0.005	0.054	0.015	0.182	0.005	0.159	0.031	0.828	<0.001	0.021	0.001	0.100	0.004	0.027	0.012	0.101
Selenium - Filtered	mg/L	0.01	0.005	<0.01			<0.01	<0.01			0.01	0.01	0.02	0.02	0.02	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008	0.034	0.071	0.055	0.131	0.101	0.127	0.127	0.153	0.024	0.048	0.042	0.084	0.024	0.108	0.084	0.219	<0.005	0.013	0.015	0.019	0.017	0.036	0.033	0.056
Nutrients																											
Ammonia as N	mg/L	0.01	0.9	0.02	0.03	0.03	0.04	<0.01	0.06	0.06	0.10	<0.01	0.07	0.08	0.10	<0.01	0.05	0.06	0.10	<0.01	0.01	0.01	0.03	0.04	0.60	0.13	2.21
Nitrate as N	mg/L	0.01	0.7	0.1	3.13	0.22	14.70	<0.01			0.01	<0.01	0.23	0.01	0.87	<0.01	1.73	0.04	5.42	<0.01			<0.01	<0.01	0.01	0.01	0.02
Nitrite as N	mg/L	0.01		0.08	13.64	11.20	32.30	<0.01	0.02	0.02	0.02	<0.01	1.27	1.58	1.92	<0.01	3.23	3.96	6.10	<0.01	0.04	0.03	0.09	<0.01	0.04	0.01	0.10
Nitrite + Nitrate as N	mg/L	0.01		7.64	11.34667	11.6	14.8	0.02	0.02	0.02	0.02	0.87	1.53	1.8	1.92	<3.42	4.555	4.69	5.42	<0.01	0.023333	0.03	0.03	0.01	0.043333	0.02	0.1
Total Phosphorus as P	mg/L	0.01		0.04	0.366667	0.34	0.72	0.34	0.835	0.835	1.33	0.76	1.136667	1.22	1.43	0.48	1.2025	0.96	2.41	<0.01	0.043333	0.05	0.07	0.15	0.253333	0.27	0.34
Other																											
Silica	mg/L																										
Fluoride	mg/L	0.02		0.38	0.64	0.42	1.50	<0.02	0.41	0.41	0.8	1.77	2.36	2.19	3.30	0.13	0.36	0.35	0.80	0.1	0.20	0.18	0.40	0.07	0.22	0.10	0.70
Total Cyanide	mg/L	0.004	0.007	<0.004	0.005	0.004	0.006	<0.004	0.004	0.004		<0.004	0.004	0.004	0.004	<0.004	0.004	0.004	0.004	<0.004	0.004	0.004	0.004	<0.004	0.005	0.004	0.007
Calculated Parameters																											
Total Anions	meq/L	0.01		47.70	79.10	62.50	157.00	153.00	160.00	160.00	167.00	40.60	144.40	169.50	198.00	3.79	45.03	53.85	58.20	3.38	9.75	3.77	34.20	23.40	33.60	33.60	42.60
Total Cations	meq/L	0.01		47.40	76.40	62.60	148.00	139.00	153.00	153.00	167.00	39.10	134.03	157.00	183.00	3.92	45.12	52.90	59.10	3.40	9.48	3.67	33.10	23.60	34.14	35.20	44.80
Ionic Balance	%	0.01		0.00	0.01	0.00	0.04	0.00	0.02	0.02	0.05	0.02	0.03	0.03	0.05	0.00	0.01	0.01	0.03	0.01	0.01	0.01	0.02	0.00	0.02	0.02	0.03

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%

Table F1: Monitoring Bore Groundwater Samples - Laboratory Analysis Results

Bore / Well / Spring / Soak				WML294				WML299				WMLP300				WMLP301				WMLP302			
Parameter	**Units**	**LOR**	**ANZECC***	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**	**Min**	**Mean**	**Median**	**Max**
Physical Parameters																							
pH Value (Lab)	pH unit	0.01																					
pH Value (field)	pH unit	0.01		7.00	7.22	7.21	7.45	7.14	7.23	7.23	7.32	7.29	7.29	7.29	7.29	7.85	7.94	7.94	8.03	6.35	6.51	6.51	6.67
Conductivity (field)	µS/cm	1		4130	8338	9360	10500	947	1289	1289	1630	1400	1530	1530	1660	5920	6135	6135	6350	648	730	730	812
Lab Conductivity @ 25°C	µS/cm	1																					
Total Dissolved Solids (TDS)	mg/L	1		2490	5315	5855	7060	822	961	961	1100	898	999	999	1100	3590	4300	4300	5010	398	461	461	524
Suspended Solids (TSS)	mg/L	1		5	46	52	76	96	130	130	164	116	1353	1353	2590	12	16	16	20	30	37	37	44
Total Hardness as CaCO3	mg/L	1		599	1202	1290	1630	217	230	230	243	307	315	315	322	108	113	113	118	135	135	135	135
Turbidity	NTU	0.01		17.20	17.20	17.20	17.20																
Major Ions																							
Calcium	mg/L	1		72	104	100	145	44	50	50	55	58	58	58	58	14	18	18	21	16	17	17	17
Magnesium	mg/L	1		96	228	255	307	26	26	26	26	40	42	42	43	16	17	17	18	23	23	23	23
Sodium	mg/L	1		755	1551	1740	1970	181	236	236	290	286	288	288	290	1540	1565	1565	1590	126	128	128	129
Potassium	mg/L	1		2	6	7	8	3	4	4	4	5	6	6	6	7	8	8	9	2	3	3	3
Chloride	mg/L	1		1100	2443	2720	3230	201	236	236	271	306	322	322	338	1610	1665	1665	1720	138	142	142	146
Hydroxide Alkalinity as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1			<1	<1			<1
Carbonate as CaCO3	mg/L	1		<1			<1	<1			<1	<1			<1	<1	21	21	41	<1			<1
Bicarbonate as CaCO3	mg/L	1		317	743	870	915	224	225	225	226	322	380	380	437	968	999	999	1030	164	174	174	184
Total Alkalinity	mg/L	1		317	616	615.5	914																
Sulphate	mg/L	1		260	604	674	809	86	150	150	214	19	64	64	108	68	102	102	135	27	29	29	31
Metals																							
Aluminum	mg/L	0.01	0.055	0.04	0.04	0.04	0.04	1.11	1.11	1.11	1.11	3.51	3.51	3.51	3.51	0.07	0.07	0.07	0.07	0.15	0.15	0.15	0.15
Arsenic - Filtered	mg/L	0.001	0.013	0.001	0.002	0.002	0.002	0.005	0.006	0.006	0.006	0.007	0.008	0.008	0.008	0.004	0.009	0.009	0.014	0.002	0.003	0.003	0.004
Boron - Filtered	mg/L	0.05	0.37																				
Cadmium - Filtered	mg/L	0.00005	0.0002	0.0001	0.00125	0.00050	0.00390	0.0001	0.00015	0.00015	0.00020	0.0002	0.00020	0.00020	0.00020	<0.0001	0.00035	0.00035	0.00060	<0.0001	0.00040	0.00040	0.00070
Chromium - Filtered	mg/L	0.002		<0.001	0.002	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.005	0.005	0.007	<0.001	0.002	0.002	0.003	0.002	0.003	0.003	0.004
Copper - Filtered	mg/L	0.0005	0.0014	0.002	0.004	0.0035	0.007	0.002	0.0035	0.0035	0.005	0.007	0.009	0.009	0.011	<0.001	0.0025	0.0025	0.004	0.003	0.0045	0.0045	0.006
Iron - Filtered	mg/L	0.05		0.14	0.57	0.33	1.48	1.06	2.10	2.10	3.14	2.24	5.17	5.17	8.09	0.1	0.21	0.21	0.32	2.32	3.71	3.71	5.10
Lead - Filtered	mg/L	0.00005	0.0034	0.001	0.004	0.004	0.006	0.002	0.003	0.003	0.003	0.003	0.005	0.005	0.006	0.001	0.003	0.003	0.004	0.002	0.007	0.007	0.011
Manganese - Filtered	mg/L	0.001	1.9	0.006	0.064	0.069	0.114	2.01	2.080	2.080	2.150	0.746	0.838	0.838	0.930	0.071	0.083	0.083	0.095	0.025	0.038	0.038	0.051
Mercury - Filtered	mg/L	0.0001	0.00006	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001			<0.0001
Nickel - Filtered	mg/L	0.001	0.011	0.001	0.011	0.003	0.038	0.002	0.003	0.003	0.003	0.006	0.008	0.008	0.010	0.002	0.003	0.003	0.003	0.001	0.002	0.002	0.002
Selenium - Filtered	mg/L	0.01	0.005	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01	<0.01			<0.01
Zinc - Filtered	mg/L	0.005	0.008	0.015	0.058	0.067	0.084	0.034	0.048	0.048	0.062	0.022	0.053	0.053	0.083	<0.011	0.017	0.017	0.023	0.042	0.050	0.050	0.058
Nutrients								<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0001	0.0001	0.0001				
Ammonia as N	mg/L	0.01	0.9	0.18	0.61	0.32	1.64	0.29	0.29	0.29	0.29	0.96	0.96	0.96	0.96	0.54	0.54	0.54	0.54	0.38	0.38	0.38	0.38
Nitrate as N	mg/L	0.01	0.7	<0.01	0.11	0.05	0.32	0.02	0.83	0.83	1.64	0.07	0.86	0.86	1.64	<0.01	0.83	0.83	1.64	0.1	0.10	0.10	0.10
Nitrite as N	mg/L	0.01		0.09	1.39	0.90	3.67	<0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	<0.01	0.01	0.01	0.01	0.12	0.12	0.12	0.12
Nitrite + Nitrate as N	mg/L	0.01		0.41	2.04	2.04	3.67																
Total Phosphorus as P	mg/L	0.01		0.3	0.305	0.305	0.31																
Other																							
Silica	mg/L																						
Fluoride	mg/L	0.02		0.22	0.77	0.59	1.70	0.3	0.55	0.55	0.80	0.3	0.95	0.95	1.60	0.9	1.60	1.60	2.30	0.2	0.20	0.20	0.20
Total Cyanide	mg/L	0.004	0.007	<0.004	0.004	0.004	0.004																
Calculated Parameters																							
Total Anions	meq/L	0.01		102.00	109.00	108.00	118.00	12.30	57.15	57.15	102.00	19.20	60.60	60.60	102.00	71.70	71.70	71.70	71.70	8.20	8.20	8.20	8.20
Total Cations	meq/L	0.01		98.50	107.00	101.75	126.00	12.00	55.25	55.25	98.50	18.70	58.60	58.60	98.50	70.80	70.80	70.80	70.80	7.97	7.97	7.97	7.97
Ionic Balance	%	0.01		0.02	0.03	0.03	0.04	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01

* ANZECC (2000) Trigger Value for Freshwater Ecosystem Protection (95%



Legend

- Standpipe Piezometers
- Pikes Gully Seam Mine Plan
- Upper Liddel Seam Mine Plan

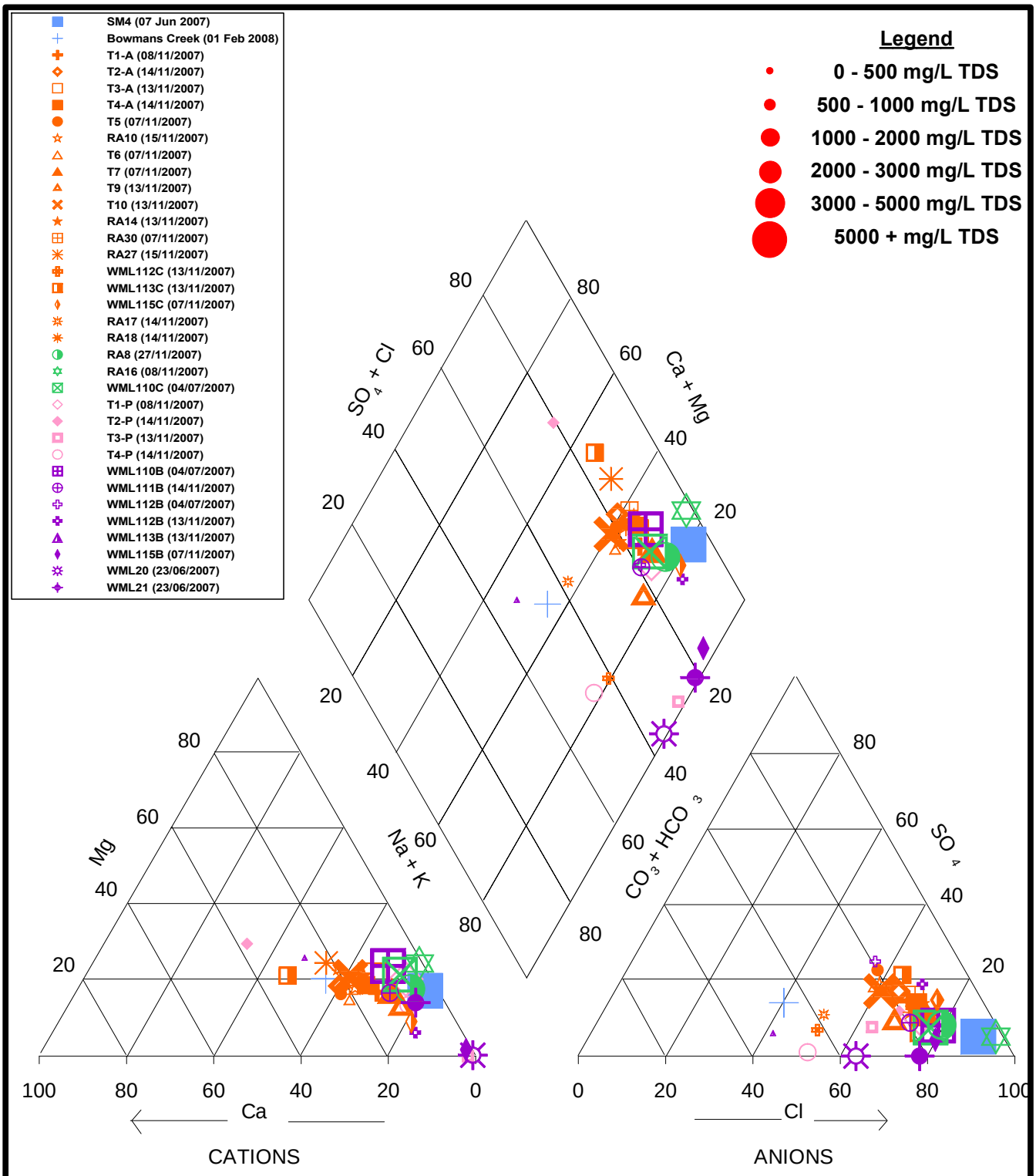
Date:	11 July 2011	Scale:	As Shown
Initials:	HZ	Job No.:	S55J
Drawing No.:	S55J-401b	Rev:	A

RPS Aquaterra

Ashton Coal Operations Pty Ltd

Groundwater Quality Monitoring Bore Location Plan

Figure F1



RPS Aquaterra

CLIENT Ashton Coal Operations Ltd		PROJECT	ASHTON COAL PROJECT
DRAWN PJD	DATE August 2008	TITLE	PIPER TRILINEAR DIAGRAM BOWMANS CREEK BORES
CHECKED	DATE		
SCALE As Shown	Dwg S03-301 A4	PROJECT No S03	Appendix F2

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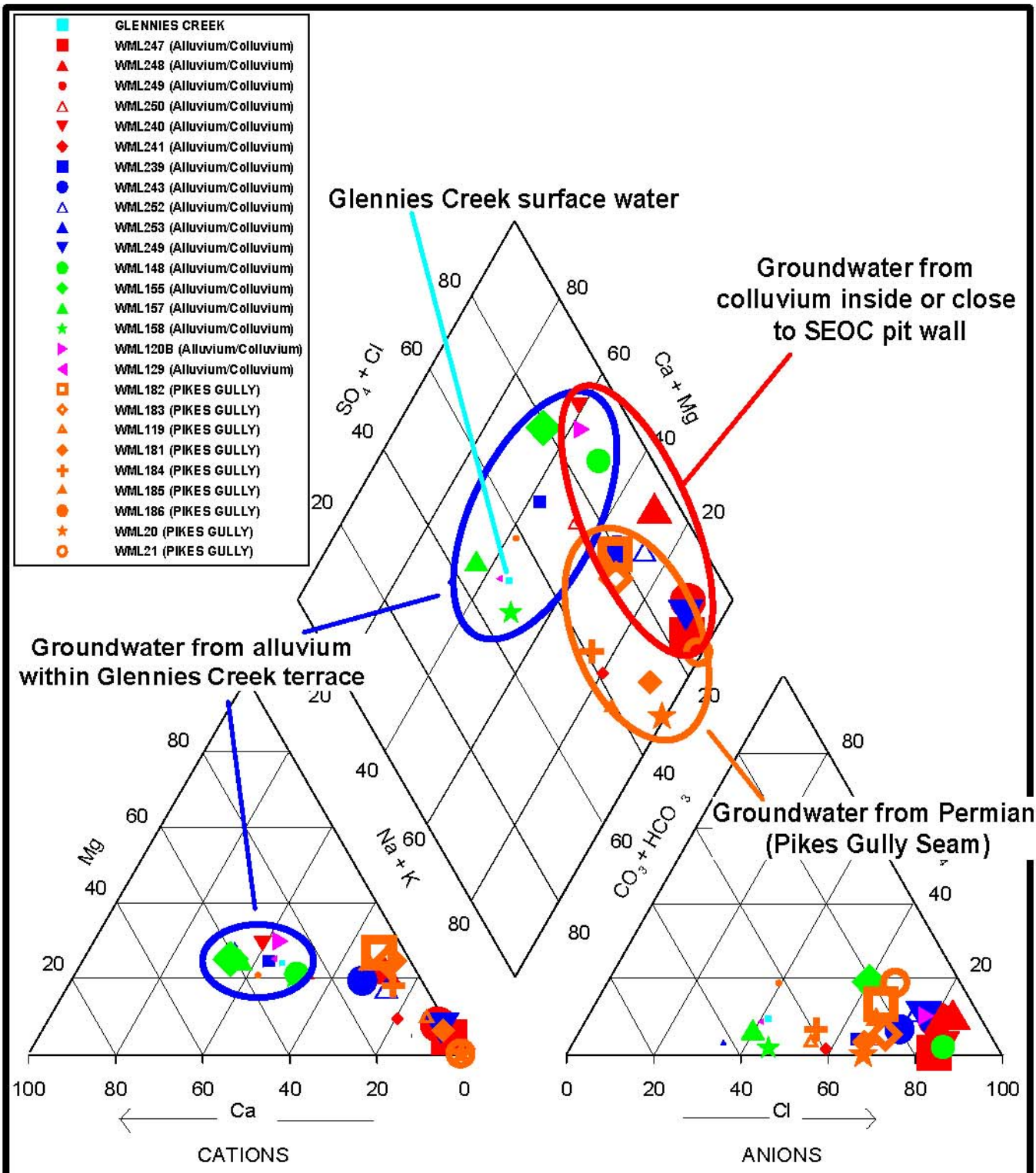

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	CHECKED	DATE			
	SCALE: As Shown	S36-010a	A4	PROJECT No: S36	Appendix F3

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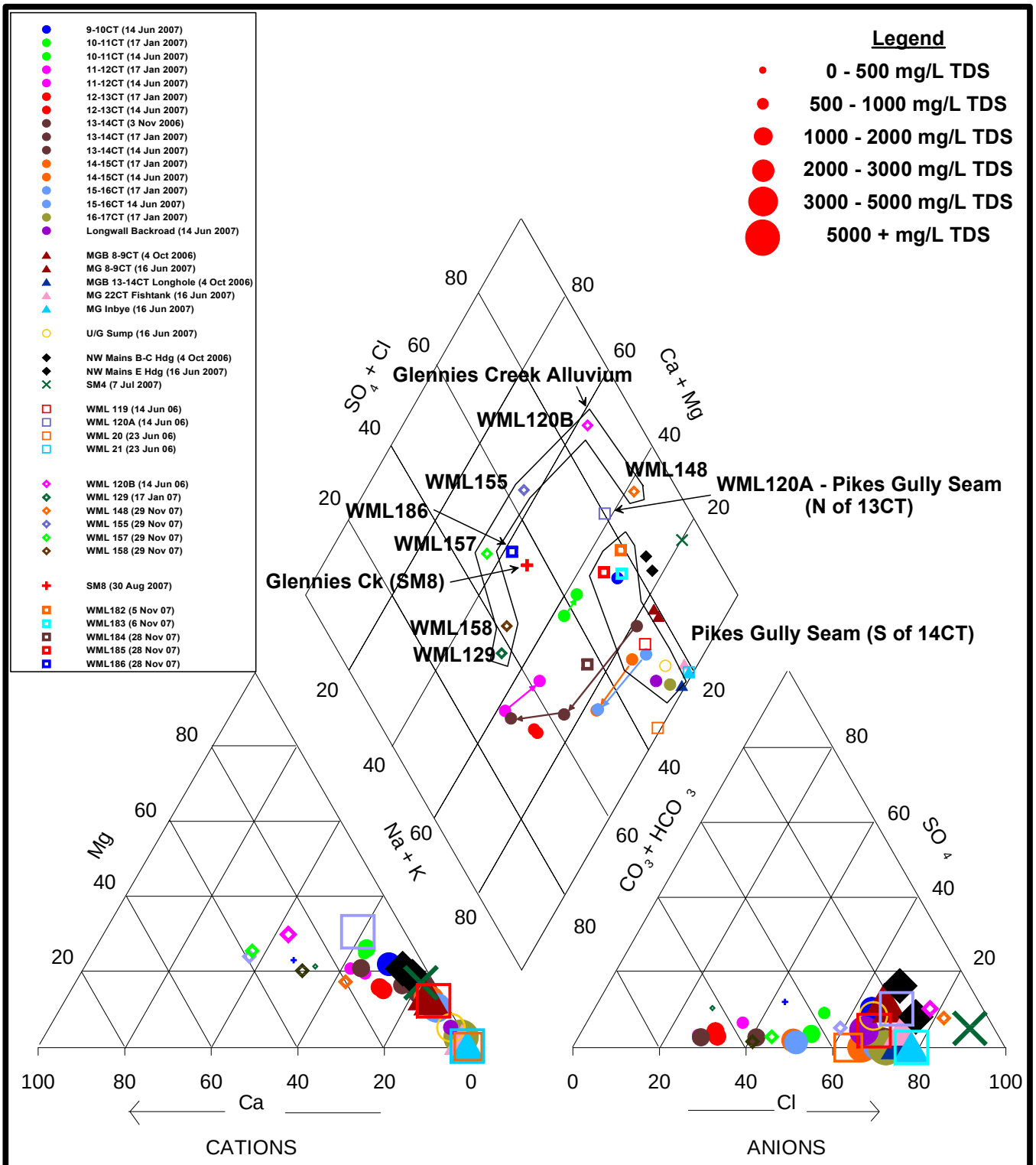

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	CHECKED / DATE		
	SCALE: As Shown / Dwg 05-0166-141 / A4	PROJECT No: S55	Appendix F4

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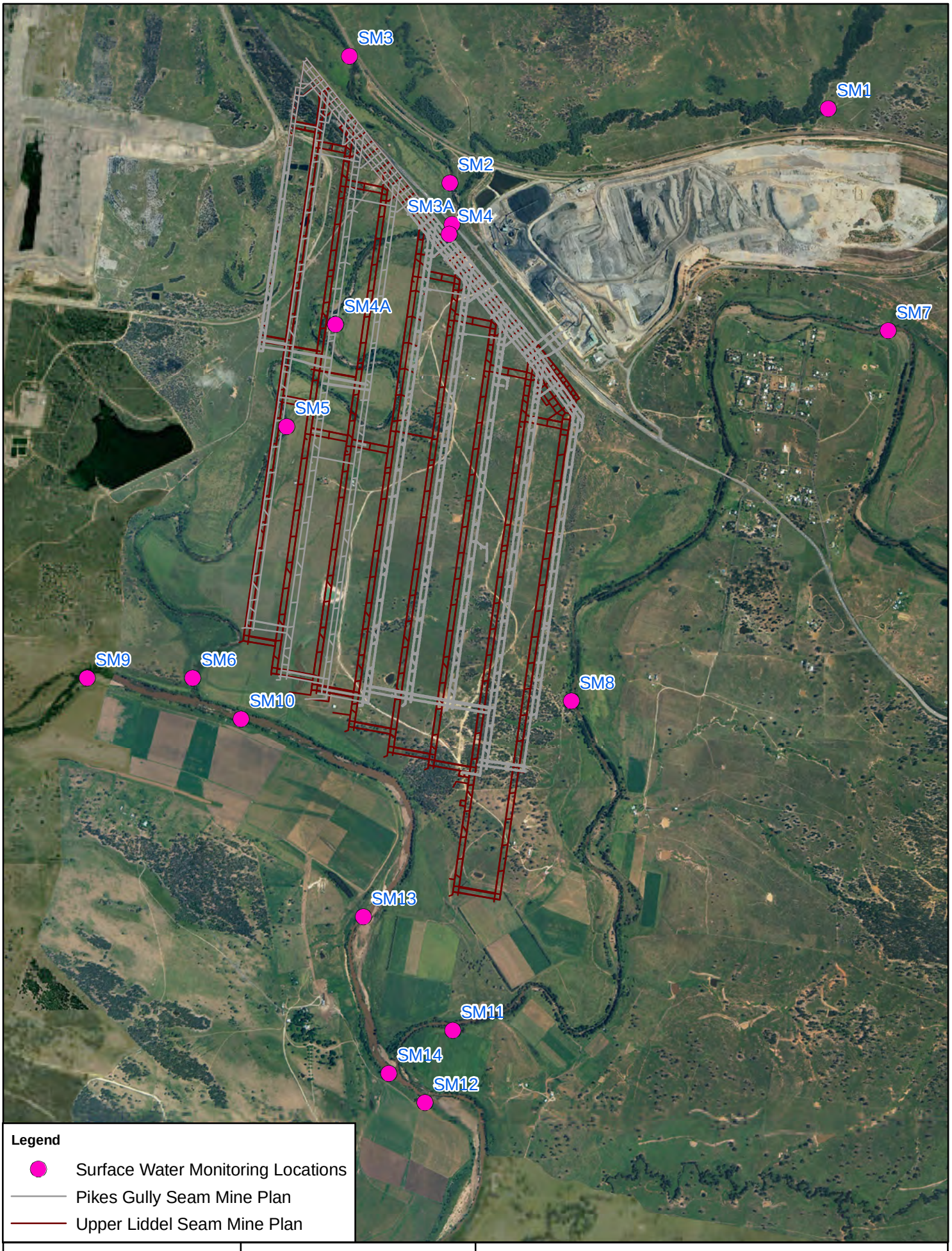

Date:	11 July 2011	Scale:	As Shown
Initials:	HZ	Job No.:	S55J
Drawing No.:	S55J-407	Rev:	A

Ashton Coal Operations Pty Ltd

Surface Water Monitoring Location

Figure F5