

RICHMOND QUARRY
GROUNDWATER MONITORING RESULTS (MP8-MP12)

Monitoring Point	Date		Sampling Conditions	pH	Conductivity (dS/m)	Nitrate (NO ₃) (mg/L)	Aluminium (Al) (mg/L)	Total Arsenic (As) (mg/L)	Cadmium (Cd) (mg/L)	Total Chromium (Cr) (mg/L)	Copper (Cu) (mg/L)	Mercury (Hg) (mg/L)	Nickel (Ni) (mg/L)	Lead (Pb) (mg/L)	Zinc (Zn) (mg/L)	Recharge Rate (L/Hour)	
ANZECC 2000 Trigger Values ¹				6.5 - 8.5 ³	0.35	0.7	0.055	0.024	0.0002	n/s	0.0014	0.0006	0.011	0.0034	0.008	N/A	
NHMRC Drinking Water Guidelines ²				6.5 - 8.5 ³	n/s	50	0.2	0.01	0.002	0.05	2	0.001	0.02	0.01	3	N/A	
MP8	17/06/2014	Quarter 3 2014	Unable to Collect Sample					-	-	-		-				-	
	2/10/2014	Quarter 4 2014	Unable to Collect Sample					-	-	-		-				-	
	5/11/2014	Quarter 4 2014	Sample Collected	3.66	0.448	0.11	0.131	<0.001	<0.001	<0.001	0.002	<0.0005	0.007	0.002	0.044	0.86	
	22/01/2015	Quarter 1 2015	Sample Collected	3.81	0.736	0.083	0.118	0.001	<0.001	0.001	0.002	<0.0005	0.01	0.001	<0.054	0.58	
	9/04/2015	Quarter 2 2015	Sample Collected	4.47	0.509	0.897	0.089	<0.001	<0.001	<0.0001	0.002	<0.0005	0.007	0.001	0.039	0.71	
	13/08/2015	Quarter 3 2015	Sample Collected	3.49	0.762	<0.005	0.083	0.001	<0.0001	<0.001	0.001	<0.0005	0.009	0.001	0.036	0.86	
	18/12/2015	Quarter 4 2015	Sample Collected	3.32	0.563	<0.005	0.165	<0.001	<0.0001	<0.001	0.004	<0.0005	0.007	0.001	0.036	0.54	
		Quarter 1 2016															
	26/05/2016	Quarter 2 2016	Sample Collected	3.82	0.613	<0.005	0.137	0.001	<0.0001	<0.001	0.002	<0.0005	0.008	0.001	0.031	0.33	
	11/08/2016	Quarter 3 2016	Sample Collected	4.00	0.48	<0.005	0.088	<0.001	<0.0001	<0.001	0.001	<0.0005	0.006	<0.001	0.026	0.79	
	16/11/2016	Quarter 4 2016	Sample Collected	3.55	0.66	0.014	0.14	<0.001	<0.001	0.001	0.005	<0.0005	0.007	0.001	0.036	0.75	
	21/02/2017	Quarter 1 2017	Insufficient Water Levels			-	-	-	-	-	-	-	-	-	-	-	-
	8/06/2017	Quarter 2 2017	Sample Collected	3.28	0.599	0.01	0.189	<0.001	<0.0001	0.001	0.006	<0.0005	0.007	0.001	0.043	0.76	
	6/09/2017	Quarter 3 2017	Sample Collected	3.61	0.702	0.009	0.141	<0.001	<0.0001	0.001	0.002	<0.0005	0.008	0.001	0.035	1.04	
	7/12/2017	Quarter 4 2017	Sample Collected	4.12	0.524	0.021	0.146	<0.001	<0.001	0.001	0.004	<0.0005	0.007	0.001	0.043	0.83	
	22/03/2018	Quarter 1 2018	Sample Collected	4.47	0.57	0.005	0.071	<0.001	<0.0001	<0.001	0.005	<0.0005	0.007	<0.001	0.03	0.54	
	21/06/2018	Quarter 2 2018	Insufficient Water Levels														
	25/09/2018	Quarter 3 2018	No access														
	6/12/2018	Quarter 4 2018	No access														
	19/03/2019	Quarter 1 2019	No access														
16/07/2019	Quarter 2 2019	No access															
MP9	17/06/2014	Quarter 3 2014	Unable to Collect Sample														
	2/10/2014	Quarter 4 2014	Unable to Collect Sample														
	5/11/2014	Quarter 4 2014	Sample Collected	5.38	0.257	0.025	0.023	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	<0.001	0.019	1.25	
	22/01/2015	Quarter 1 2015	Sample Collected	5.34	0.317	0.033	0.036	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	0.001	0.019	1.88	
	9/04/2015	Quarter 2 2015	Sample Collected	5.37	0.247	0.174	0.042	<0.001	<0.001	<0.0001	0.003	<0.0005	0.002	<0.001	0.016	2.83	
	13/08/2015	Quarter 3 2015	Sample Collected	5.61	0.252	0.091	0.034	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.02	1.88	
	18/12/2015	Quarter 4 2015	Sample Collected	4.89	0.26	0.068	0.015	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.026	1.08	
		Quarter 1 2016															
	26/05/2016	Quarter 2 2016	Sample Collected	5.27	0.284	0.029	0.009	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.01	1.92	
	11/08/2016	Quarter 3 2016	Sample Collected	5.27	0.265	0.09	0.02	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.011	2.25	
	16/11/2016	Quarter 4 2016	Sample Collected	5.22	0.286	0.13	0.024	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	<0.001	0.013	1.42	
	21/02/2017	Quarter 1 2017	Sample Collected	5.20	0.275	0.079	0.024	<0.001	<0.001	<0.001	<0.001	<0.0005	0.001	<0.001	0.014	0.96	
	8/06/2017	Quarter 2 2017	Sample Collected	5.02	0.135	0.149	0.091	<0.001	<0.0001	<0.001	0.001	<0.0005	<0.001	<0.001	0.038	0.96	
	6/09/2017	Quarter 3 2017	Sample Collected	5.22	0.193	0.234	0.146	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.028	1.08	
	7/12/2017	Quarter 4 2017	Sample Collected	5.72	0.077	0.17	0.181	<0.001	<0.001	<0.001	0.002	<0.0005	0.001	<0.001	0.042	0.75	
	22/03/2018	Quarter 1 2018	Sample Collected	5.45	0.125	0.226	0.149	<0.001	<0.0001	<0.001	0.002	<0.0005	0.001	<0.001	0.054	1.16	
	21/06/2018	Quarter 2 2018	Sample Collected	5.40	0.246	0.114	0.174	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	<0.001	0.019	0.43	
	25/09/2018	Quarter 3 2018	Sample Collected	5.26	0.28	0.029	0.060901906	<0.001	<0.0001	<0.001	0.000503	<0.0005	0.0009	<0.001	0.02695	0.69	
	6/12/2018	Quarter 4 2018	Sample Collected	5.28	0.459	0.01	0.007	<0.001	<0.0001	<0.001	0.002	<0.0005	0.002	<0.001	0.023	0.64	
	19/03/2019	Quarter 1 2019	Sample Collected	5.28	0.279	0.067	0.056	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.031	0.45	
16/07/2019	Quarter 2 2019	Sample Collected	5.28	0.263	0.119	0.052	<0.001	<0.0001	<0.001	<0.001	<0.0005	<0.001	<0.001	0.025	0.59		
17/06/2014	Quarter 3 2014	Unable to Collect Sample						-	-	-		-				-	
2/10/2014	Quarter 4 2014	Unable to Collect Sample						-	-	-		-				-	
5/11/2014	Quarter 4 2014	Sample Collected	6.10	0.212	0.029	0.074	<0.001	<0.001	0.001	0.002	<0.0005	0.001	<0.001	0.01	0.92		
22/01/2015	Quarter 1 2015	Sample Collected	4.91	0.143	0.008	0.108	<0.001	<0.001	0.001	<0.001	<0.0005	0.002	0.001	0.015	1.29		
9/04/2015	Quarter 2 2015	Sample Collected	4.48	0.096	0.115	0.064	<0.001	<0.001	<0.0001	0.001	<0.0005	0.001	0.002	0.019	1.63		

Monitoring Point	Date		Sampling Conditions	pH	Conductivity (dS/m)	Nitrate (NO ₃) (mg/L)	Aluminium (Al) (mg/L)	Total Arsenic (As) (mg/L)	Cadmium (Cd) (mg/L)	Total Chromium (Cr) (mg/L)	Copper (Cu) (mg/L)	Mercury (Hg) (mg/L)	Nickel (Ni) (mg/L)	Lead (Pb) (mg/L)	Zinc (Zn) (mg/L)	Recharge Rate (L/Hour)
ANZECC 2000 Trigger Values ¹				6.5 - 8.5 ³	0.35	0.7	0.055	0.024	0.0002	n/s	0.0014	0.0006	0.011	0.0034	0.008	N/A
NHMRC Drinking Water Guidelines ²				6.5 - 8.5 ³	n/s	50	0.2	0.01	0.002	0.05	2	0.001	0.02	0.01	3	N/A
MP10	13/08/2015	Quarter 3 2015	Sample Collected	4.44	0.105	0.126	0.094	<0.001	<0.0001	<0.001	0.002	<0.0005	0.001	0.001	0.012	1.54
	18/12/2015	Quarter 4 2015	Sample Collected	3.80	0.123	0.026	0.165	<0.001	<0.0001	<0.001	0.008	<0.0005	0.002	0.001	0.016	1.42
		Quarter 1 2016														
	26/05/2016	Quarter 2 2016	Sample Collected	4.28	0.128	0.021	0.159	0.001	<0.0001	<0.001	0.003	<0.0005	0.002	0.002	0.014	1.5
	11/08/2016	Quarter 3 2016	Sample Collected	4.38	0.101	0.717	0.149	<0.001	<0.0001	0.001	0.002	<0.0005	0.002	0.002	0.011	1.83
	16/11/2016	Quarter 4 2016	Sample Collected	4.21	0.135	0.419	0.117	<0.001	<0.001	<0.001	0.002	<0.0005	0.002	<0.001	0.013	1.5
	21/02/2017	Quarter 1 2017	Sample Collected	4.23	0.129	0.085	0.164	<0.001	<0.001	<0.001	0.004	<0.0005	0.002	<0.001	0.019	1.04
	8/06/2017	Quarter 2 2017	Sample Collected	3.94	0.095	0.036	0.143	<0.001	<0.0001	0.001	0.006	<0.0005	0.001	<0.001	0.018	1.2
	6/09/2017	Quarter 3 2017	Sample Collected	4.55	0.094	0.098	0.146	<0.001	<0.0001	0.001	0.002	<0.0005	0.001	<0.001	0.014	1.42
	7/12/2017	Quarter 4 2017	Sample Collected	4.59	0.1	0.078	0.125	<0.001	<0.001	0.001	0.006	<0.0005	0.001	<0.001	0.022	1
	22/03/2018	Quarter 1 2018	Sample Collected	4.46	0.101	0.106	0.127	<0.001	<0.0001	0.001	0.002	<0.0005	0.001	<0.001	0.018	1.16
	21/06/2018	Quarter 2 2018	Sample Collected	4.39	0.118	0.036	0.174	<0.001	<0.001	0.001	0.002	<0.0005	0.001	<0.001	0.012	0.48
	25/09/2018	Quarter 3 2018	No Access													
	6/12/2018	Quarter 4 2018	No Access													
19/03/2019	Quarter 1 2019	Sample Collected	4.36	0.125	0.038	0.244	<0.001	<0.0001	0.001	0.003	<0.0005	0.002	<0.001	0.016	0.88	
16/07/2019	Quarter 2 2019	Sample Collected	4.45	0.112	0.065	0.198	<0.001	<0.0001	<0.001	0.003	<0.0005	0.002	0.001	0.026	1.03	
MP11		Quarter 3 2014														
		Quarter 4 2014														
	5/11/2014	Quarter 4 2014														
	22/01/2015	Quarter 1 2015	Level Measured - 0.65m													
	7/04/2015	Quarter 2 2015	Level Measured - 0.60m													
	13/08/2015	Quarter 3 2015	Level Measured - 0.61m													
	18/12/2015	Quarter 4 2015	Level Measured - 0.51m													
		Quarter 1 2016														
	26/05/2016	Quarter 2 2016	Level Measured - 0.56m													
	11/08/2016	Quarter 3 2016	Level Measured - 0.50m													
	16/11/2016	Quarter 4 2016	Level Measured - 0.54m													
	21/02/2017	Quarter 1 2017	Level Measured - 0.51m													
	8/06/2017	Quarter 2 2017	Level Measured - 0.54m													
	6/09/2017	Quarter 3 2017	Level Measured - 0.52m													
	7/12/2017	Quarter 4 2017	Level Measured - 0.51m													
	22/03/2018	Quarter 1 2018	Level Measured - 0.54m													
	21/06/2018	Quarter 2 2018	Site not accessible													
25/09/2018	Quarter 3 2018	Windmill not accessible														
6/12/2018	Quarter 4 2018	Windmill not accessible														
19/03/2019	Quarter 1 2019	Windmill not accessible														
16/07/2019	Quarter 2 2019	Windmill not accessible														
MP12	17/06/2014	Quarter 3 2014														
	2/10/2014	Quarter 4 2014														
	5/11/2014	Quarter 4 2014														
	22/01/2015	Quarter 1 2015														
	7/04/2015	Quarter 2 2015														
	13/08/2015	Quarter 3 2015	Sample Collected	10.10	0.396	0.165	0.059	0.001	<0.0001	0.005	0.005	<0.0005	0.001	<0.001	0.001	0.29
	18/12/2015	Quarter 4 2015	Sample Collected	7.27	0.615	0.113	0.058	0.002	<0.0001	<0.001	0.001	<0.0005	0.001	0.001	0.002	0.25
		Quarter 1 2016														
	26/05/2016	Quarter 2 2016	Sample Collected	6.90	0.6	0.116	0.049	0.001	<0.0001	<0.001	0.001	<0.0005	0.001	0.001	0.005	0.38
	11/08/2016	Quarter 3 2016	Sample Collected	6.78	0.585	0.083	0.061	0.001	<0.0001	<0.001	0.001	<0.0005	0.001	0.001	0.005	0.21
	16/11/2016	Quarter 4 2016	Sample Collected	6.48	0.607	0.104	0.041	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	0.001	0.008	0.25
	21/02/2017	Quarter 1 2017	Sample Collected	6.29	0.56	0.075	0.024	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	<0.001	0.008	0.31
8/06/2017	Quarter 2 2017	Sample Collected	5.89	0.552	0.035	0.025	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.01	0.28	
6/09/2017	Quarter 3 2017	Sample Collected	6.22	0.559	0.037	0.031	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.01	0.23	

Monitoring Point	Date		Sampling Conditions	pH	Conductivity (dS/m)	Nitrate (NO ₃) (mg/L)	Aluminium (Al) (mg/L)	Total Arsenic (As) (mg/L)	Cadmium (Cd) (mg/L)	Total Chromium (Cr) (mg/L)	Copper (Cu) (mg/L)	Mercury (Hg) (mg/L)	Nickel (Ni) (mg/L)	Lead (Pb) (mg/L)	Zinc (Zn) (mg/L)	Recharge Rate (L/Hour)
ANZECC 2000 Trigger Values ¹				6.5 - 8.5 ³	0.35	0.7	0.055	0.024	0.0002	n/s	0.0014	0.0006	0.011	0.0034	0.008	N/A
NHMRC Drinking Water Guidelines ²				6.5 - 8.5 ³	n/s	50	0.2	0.01	0.002	0.05	2	0.001	0.02	0.01	3	N/A
	7/12/2017	Quarter 4 2017	Sample Collected	6.27	0.514	0.027	0.041	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	<0.001	0.011	0.25
	22/03/2018	Quarter 1 2018	Sample Collected	6.19	0.488	0.048	0.037	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.01	0.29
	21/06/2018	Quarter 2 2018	Sample Collected	6.14	0.486	0.073	0.035	<0.001	<0.001	<0.001	0.001	<0.0005	0.003	<0.001	0.019	0.13
	25/09/2018	Quarter 3 2018	Sample Collected	6.11	0.494	0.034	0.063898101	<0.001	<0.0001	<0.001	0.00058	<0.0005	0.001361	<0.001	0.01601	0.26
	6/12/2018	Quarter 4 2018	Sample Collected	5.28	0.256	0.156	0.105	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.014	1.44
	19/03/2019	Quarter 1 2019	Sample Collected	5.42	0.438	0.006	0.018	<0.001	<0.0001	<0.001	0.003	<0.0005	0.002	<0.001	0.027	0.65
	16/07/2019	Quarter 2 2019	Sample Collected	5.52	0.408	0.007	0.022	<0.001	<0.0001	<0.001	0.002	<0.0005	0.002	<0.001	0.027	0.51

1. Initially data will be compared against ANZECC Trigger Values for with the aim to develop site specific trigger levels after 3 years of operations once a larger data set is available.

2. Initially data will be compared against NHMRC Drinking Water Guidelines with the aim to develop site specific trigger levels after 3 years of operations once a larger data set is available.

3. pH level required will be reviewed following collection of baseline monitoring data in accordance with the Project Approval. Specifically it is noted that the pH of nearby soil and receiving waters are mildly acidic pH4.5-pH5.3. The natural acidic soil conditions encountered at the Project Site and subsequent influence on runoff may require that maintenance of ambient condition is the preferred water quality goal.

4. Data in **bold** indicates the data is outside the trigger levels.

5. Monitoring Point 12 was officially added to the monitoring regime in late 2015 but earlier results have been included.