

**RICHMOND QUARRY
GROUNDWATER MONITORING RESULTS (MP8-MP12)**

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	0.01	0.002	0.002	0.05	2	0.001	0.02	0.01	3	N/A	
Spreadsheet Trigger Values				<6.5 or >8.5	>1.5	>50	>0.2	>0.024	>0.002	>0.05	>2	>0.001	>0.02	>0.01	>3	nil	
Monitoring Point	Date	Column1	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)	
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	<0.001	<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	0.026	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														
	10/09/2019	Quarter 3 2019	No access														
	11/12/2019	Quarter 4 2019	No access														
	2/04/2020	Quarter 1 2020	No access														
	26/06/2020	Quarter 2 2020	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	0.028	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	0.06	<0.001	<0.0001	<0.001	0.0005	<0.0005	0.0009	<0.001	0.026	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	
10/09/2019		Quarter 3 2019	Dry Well														
11/12/2019		Quarter 4 2019	Sample Collected	5.45	0.292	<0.005	0.042	<0.001	<0.0001	<0.001	0.001	<0.0005	0.001	<0.001	0.031	0.47	
2/04/2020		Quarter 1 2020	Sample Collected	5.23	0.235	0.086	0.021	<0.001	<0.0001	<0.001	0.002	<0.0005	0.001	<0.001	0.011	0.71	
26/06/2020		Quarter 2 2020	Sample Collected	5.31	0.208	0.043	0.068	<0.001	<0.0001	<0.001	0.005	<0.0005	<0.001	<0.001	0.01	0.77	
MP10		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	0.039	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	0.098	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		

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
Spreadsheet Trigger Values				<6.5 or >8.5	>1.5	>50	>0.2	>0.024	>0.002	>0.05	>2	>0.001	>0.02	>0.01	>3	nil
Monitoring Point	Date	Column1	Sampling Conditions	pH	Conductivity (d5/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)
MP12	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	0.143	0.036	<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
	10/09/2019	Quarter 3 2019	Sample Collected	4.38	0.124	<0.001	0.204	<0.001	<0.0001	<0.001	0.007	<0.0005	0.002	0.001	0.029	0.91
	11/12/2019	Quarter 4 2019	Sample Collected	4.43	0.127	0.032	0.19	<0.001	<0.0001	<0.001	0.043	<0.0005	0.002	0.001	0.031	0.92
	2/04/2020	Quarter 1 2020	Sample Collected	4.43	0.093	0.142	0.134	<0.001	<0.0001	0.001	0.017	<0.0005	0.001	<0.001	0.014	0.99
	26/06/2020	Quarter 2 2020	Sample Collected	4.37	0.091	0.134	0.105	<0.001	<0.0001	0.001	0.008	<0.0005	0.001	<0.001	0.012	1.61
	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
	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	0.035	0.035	<0.001	<0.001	<0.001	0.001	<0.0005	0.001	<0.001	0.019	0.13
	25/09/2018	Quarter 3 2018	Sample Collected	6.11	0.494	0.074	0.063	<0.001	<0.0001	<0.001	0.00058	<0.0005	0.0013	<0.001	0.016	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	
10/09/2019	Quarter 3 2019	Sample Collected	5.34	0.439	<0.005	0.006	<0.001	<0.0001	0.0001	0.004	<0.0005	0.002	<0.001	0.041	0.87	
11/12/2019	Quarter 4 2019	Sample Collected	6.05	0.362	0.018	0.028	<0.001	<0.0001	<0.001	0.043	<0.0005	0.002	<0.001	0.036	0.24	
2/04/2020	Quarter 1 2020	Sample Collected	5.01	0.421	<0.005	0.012	<0.001	<0.0001	<0.001	0.008	<0.0005	0.002	<0.001	0.015	1.28	
26/06/2020	Quarter 2 2020	Sample Collected	4.79	0.404	<0.005	0.022	<0.001	<0.0001	<0.001	0.018	<0.0005	0.002	<0.001	0.025	1.32	

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.