

Licence Information

Environment Protection Licence (EPL) Number	13218
Licence Holder	MACKA'S SAND PTY LTD
Licensee Address	<p>Licensee: Macka's Sand Pty Ltd 2684 Nelson Bay Rd Salt Ash NSW 2318</p> <p>Premises: Macka's Sand Extraction and Processing Facility Off Nelson Bay Road Salt Ash NSW 2318</p>
Link to the full licence on the EPA website	https://apps.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=77948&SYSUID=1&LICID=13218
Anniversary Date:	30-Jun
Information Last Obtained:	4-Oct-23
Date of Publication:	6-Oct-23



1646 - Macka's Sand - EPL 13218

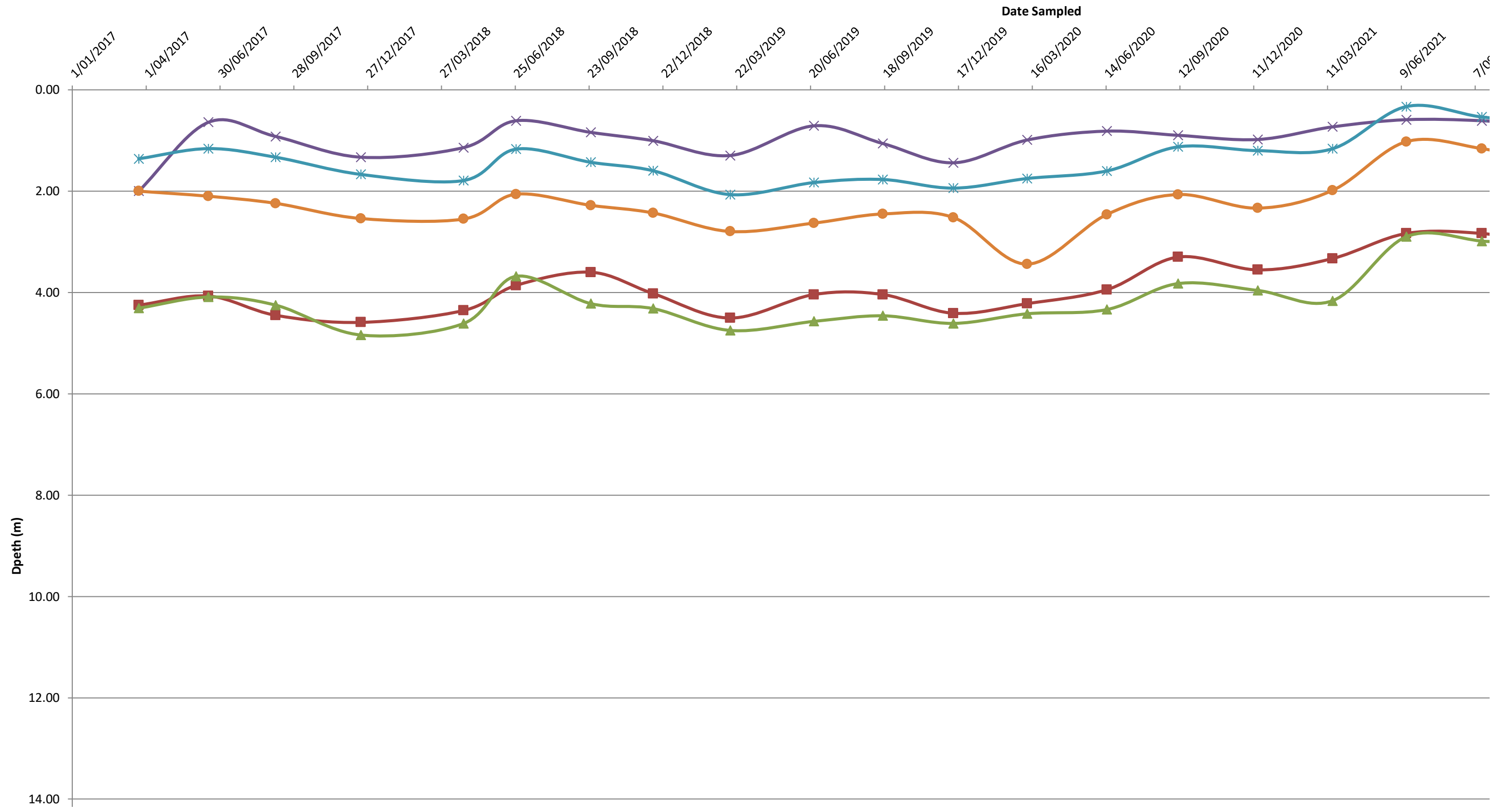
Quarterly Groundwater Monitoring
Licence Holder

Sample Date	Depth - EPL (m)						Water Level (PA 08_0142 - SWMP Only)						Comment
	SP1	SP2	SP3	SP4	SP5	BL158	SP1	SP2	SP3	SP4	SP5	BL158	
	EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	
23-Mar-17	16.20	4.25	4.31	2.00	1.36	2.00	1.30	2.15	1.90	-0.25	2.79	2.16	
16-Jun-17		4.07	4.09	0.64	1.16	2.10		2.33	2.12	1.11	2.99	2.06	Sampling error at SP1
06-Sep-17	16.35	4.45	4.25	0.92	1.33	2.24	1.15	1.95	1.96	0.83	2.82	1.92	
19-Dec-17	16.64	4.59	4.84	1.33	1.67	2.54	0.86	1.81	1.37	0.42	2.48	1.62	
23-Apr-18	16.23	4.36	4.61	1.14	1.79	2.55	1.28	2.05	1.60	0.61	2.36	1.61	
26-Jun-18	15.81	3.86	3.68	0.61	1.17	2.06	1.69	2.54	2.53	1.14	2.98	2.10	
25-Sep-18	15.83	3.60	4.22	0.84	1.43	2.28	1.67	2.80	1.99	0.91	2.72	1.88	Standpipe replaced in August 2018.
10-Dec-18	16.12	4.02	4.32	1.00	1.60	2.43	1.39	2.43	1.89	0.72	2.55	1.73	
14-Mar-19	16.44	4.50	4.75	1.30	2.07	2.80	1.06	1.95	1.46	0.42	2.08	1.36	SP4 Casing broken. Indicative water level based off previously surveyed standpipe height. SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	16.22	4.04	4.57	0.71	1.83	2.63	1.29	2.41	1.64	1.01	2.32	1.53	SP4 Casing broken (repaired and broken again). Indicative water level based off previously surveyed standpipe height.
16-Sep-19	16.07	4.04	4.46	1.06	1.77	2.45	1.44	2.41	1.75	0.66	2.38	1.71	SP5 Monitoring undertaken on 17/9/19
11-Dec-19	16.29	4.41	4.61	1.44	1.94	2.52	1.22	2.04	1.60	0.28	2.21	1.64	
10-Mar-20	16.09	4.22	4.42	0.99	1.75	3.44	1.42	2.23	1.79	0.73	2.40	0.72	
15-Jun-20	16.06	3.95	4.34	0.82	1.60	2.46	1.45	2.51	1.87	0.91	2.54	1.70	SP4 well casing broken. SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	14.65	3.30	3.82	0.90	1.13	2.07	2.86	3.15	2.38	0.82	3.02	2.09	
16-Dec-20	15.82	3.55	3.96	0.98	1.20	2.34	1.69	2.90	2.25	0.74	2.95	1.83	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	16.67	3.33	4.16	0.73	1.16	1.99	0.83	3.12	2.04	0.99	2.98	2.18	
15-Jun-21	15.86	2.84	2.90	0.59	0.33	1.02	1.65	3.62	3.31	1.13	3.82	3.14	
15-Sep-21	14.83	2.84	2.99	0.61	0.54	1.16	2.68	3.62	3.22	1.11	3.61	3.00	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	15.00	3.05	3.16	0.72	0.66	1.45	2.51	3.40	3.05	1.00	3.49	2.71	
16-Mar-22	15.13	2.96	4.23	0.65	0.55	1.49	2.38	3.49	1.98	1.07	3.60	2.67	
20-Jun-22	14.73	2.72	2.88	0.55	0.37	0.48	2.78	3.73	3.32	1.18	3.78	3.68	
14-Sep-22	14.09	2.49	2.36	0.50	0.15	0.58	3.42	3.96	3.84	1.22	4.00	3.58	
13-Dec-22	14.59	2.99	2.90	0.69	0.57	1.10	2.92	3.46	3.31	1.03	3.58	3.06	
14-Mar-23	15.21	3.45	3.50	0.85	2.10	1.74	2.29	3.01	2.71	0.87	2.05	2.42	
14-Jun-23	15.37	3.34	3.56	0.83	2.97	1.79	2.14	3.12	2.64	0.89	2.17	2.37	
14-Sep-23	15.62	3.52	3.82	1.01	2.38	2.20	1.89	2.93	2.39	0.72	2.76	2.63	

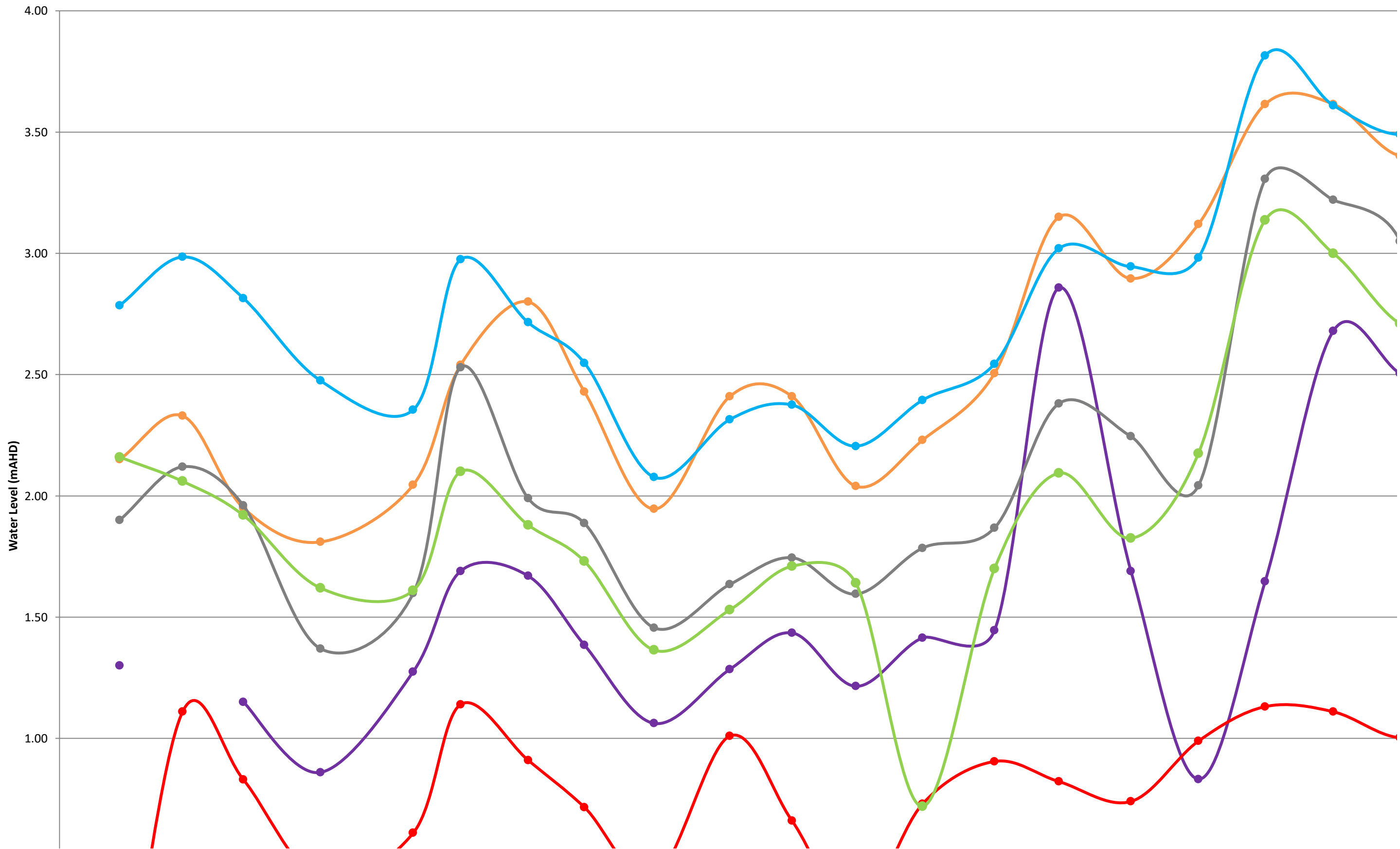
Above nominated SWMP trigger level

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158	SP1	SP2	SP3	SP4	SP5	BL158	Comment
Count	4	4	4	4	4	4	4	4	4	4	4	4	
Min	14.09	2.49	2.36	0.50	0.15	0.58	2.14	3.01	2.64	0.87	2.05	2.37	
Average	14.81	3.07	3.08	0.72	1.45	1.30	2.69	3.38	3.12	1.00	2.95	2.86	
Max	15.37	3.45	3.56	0.85	2.97	1.79	3.42	3.96	3.84	1.22	4.00	3.58	

Groundwater Depths (m)



Groundwater Levels (mAHD)



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Quarterly Groundwater Monitoring

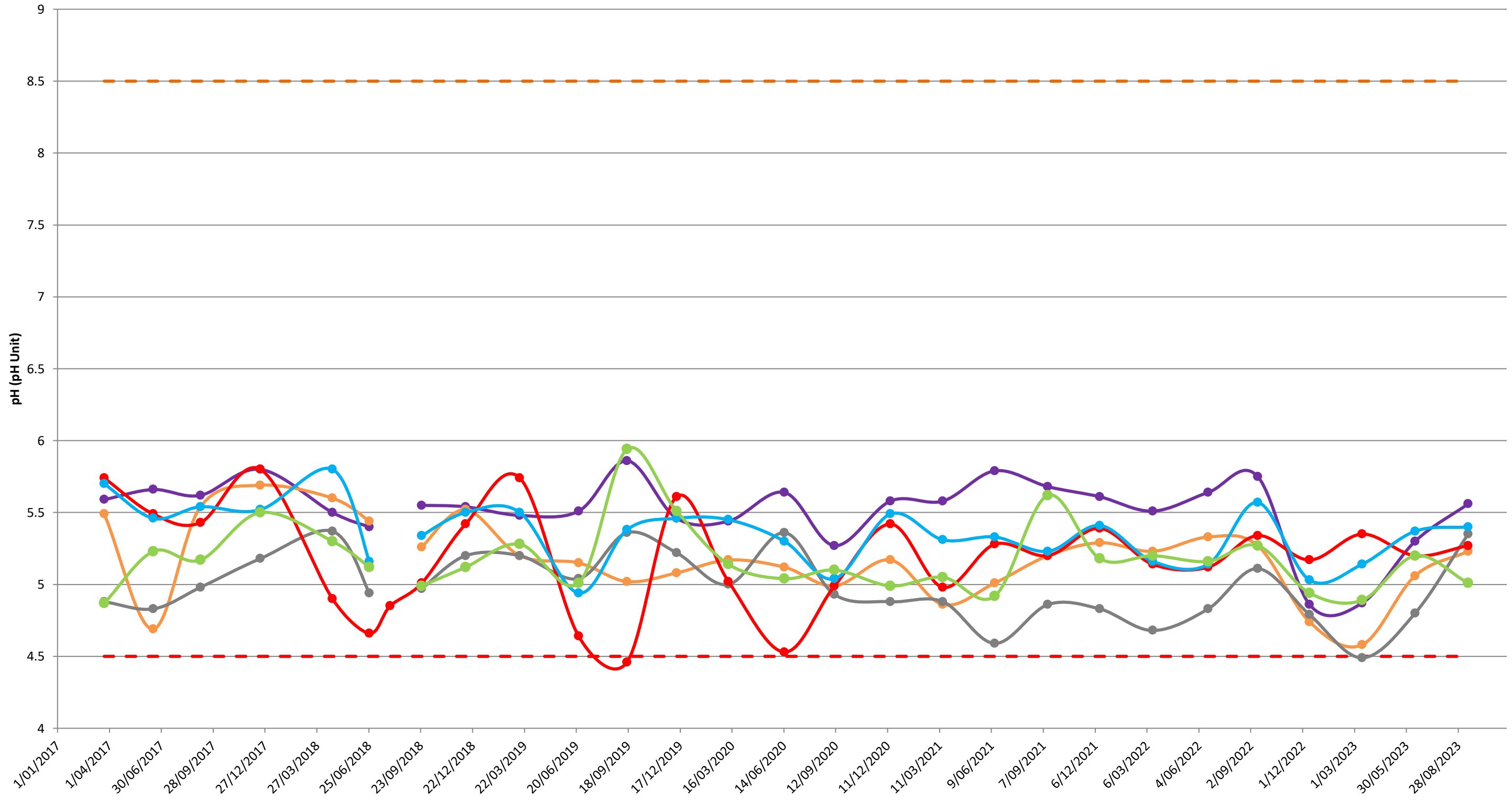
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Sample Date	pH									Comment
	Lower SWMP Trigger	Upper SWMP Trigger	EPL Limit	SP1	SP2	SP3	SP4	SP5	BL158	
				EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	
23-Mar-17	4.5	8.5	non-specified	5.59	5.49	4.88	5.74	5.70	4.87	
16-Jun-17	4.5	8.5	non-specified	5.66	4.69	4.83	5.49	5.46	5.23	
06-Sep-17	4.5	8.5	non-specified	5.62	5.54	4.98	5.43	5.54	5.17	
19-Dec-17	4.5	8.5	non-specified	5.80	5.69	5.18	5.80	5.52	5.50	
23-Apr-18	4.5	8.5	non-specified	5.50	5.60	5.37	4.90	5.80	5.30	
26-Jun-18	4.5	8.5	non-specified	5.40	5.44	4.94	4.66	5.16	5.12	
01-Aug-18	4.5	8.5	non-specified				4.85			Additional SP4 monitoring event due to standpipe replacement
25-Sep-18	4.5	8.5	non-specified	5.55	5.26	4.97	5.01	5.34	4.99	
10-Dec-18	4.5	8.5	non-specified	5.54	5.52	5.20	5.42	5.50	5.12	
14-Mar-19	4.5	8.5	non-specified	5.48	5.20	5.20	5.74	5.50	5.28	SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	4.5	8.5	non-specified	5.51	5.15	5.04	4.64	4.94	5.01	
16-Sep-19	4.5	8.5	non-specified	5.86	5.02	5.36	4.46	5.38	5.94	SP5 Monitoring undertaken on 16/9/19
11-Dec-19	4.5	8.5	non-specified	5.46	5.08	5.22	5.61	5.46	5.51	
10-Mar-20	4.5	8.5	non-specified	5.44	5.17	5.00	5.02	5.45	5.14	
15-Jun-20	4.5	8.5	non-specified	5.64	5.12	5.36	4.53	5.30	5.04	SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	4.5	8.5	non-specified	5.27	4.99	4.93	4.99	5.04	5.10	
16-Dec-20	4.5	8.5	non-specified	5.58	5.17	4.88	5.42	5.49	4.99	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	4.5	8.5	non-specified	5.58	4.86	4.88	4.98	5.31	5.05	
15-Jun-21	4.5	8.5	non-specified	5.79	5.01	4.59	5.28	5.33	4.92	
15-Sep-21	4.5	8.5	non-specified	5.68	5.20	4.86	5.20	5.23	5.62	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	4.5	8.5	non-specified	5.61	5.29	4.83	5.39	5.41	5.18	
16-Mar-22	4.5	8.5	non-specified	5.51	5.23	4.68	5.14	5.16	5.20	
20-Jun-22	4.5	8.5	non-specified	5.64	5.33	4.83	5.12	5.14	5.16	
14-Sep-22	4.5	8.5	non-specified	5.75	5.27	5.11	5.34	5.57	5.27	
13-Dec-22	4.5	8.5	non-specified	4.86	4.74	4.79	5.17	5.03	4.94	
14-Mar-23	4.5	8.5	non-specified	4.87	4.58	4.49	5.35	5.14	4.89	
14-Jun-23	4.5	8.5	non-specified	5.30	5.06	4.80	5.20	5.37	5.20	
14-Sep-23	4.5	8.5	non-specified	5.56	5.23	5.35	5.27	5.40	5.01	

Above nominated SWMP trigger level

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158
Count	4	4	4	4	4	4
Min	4.86	4.58	4.49	5.17	5.03	4.89
Average	5.20	4.91	4.80	5.27	5.28	5.08
Max	5.75	5.27	5.11	5.35	5.57	5.27

Groundwater - pH



Note: No EPL Limit Specified

Lower SWMP Trigger Upper SWMP Trigger SP1 SP2 SP3 SP4 SP5 BL158

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Quarterly Groundwater Monitoring

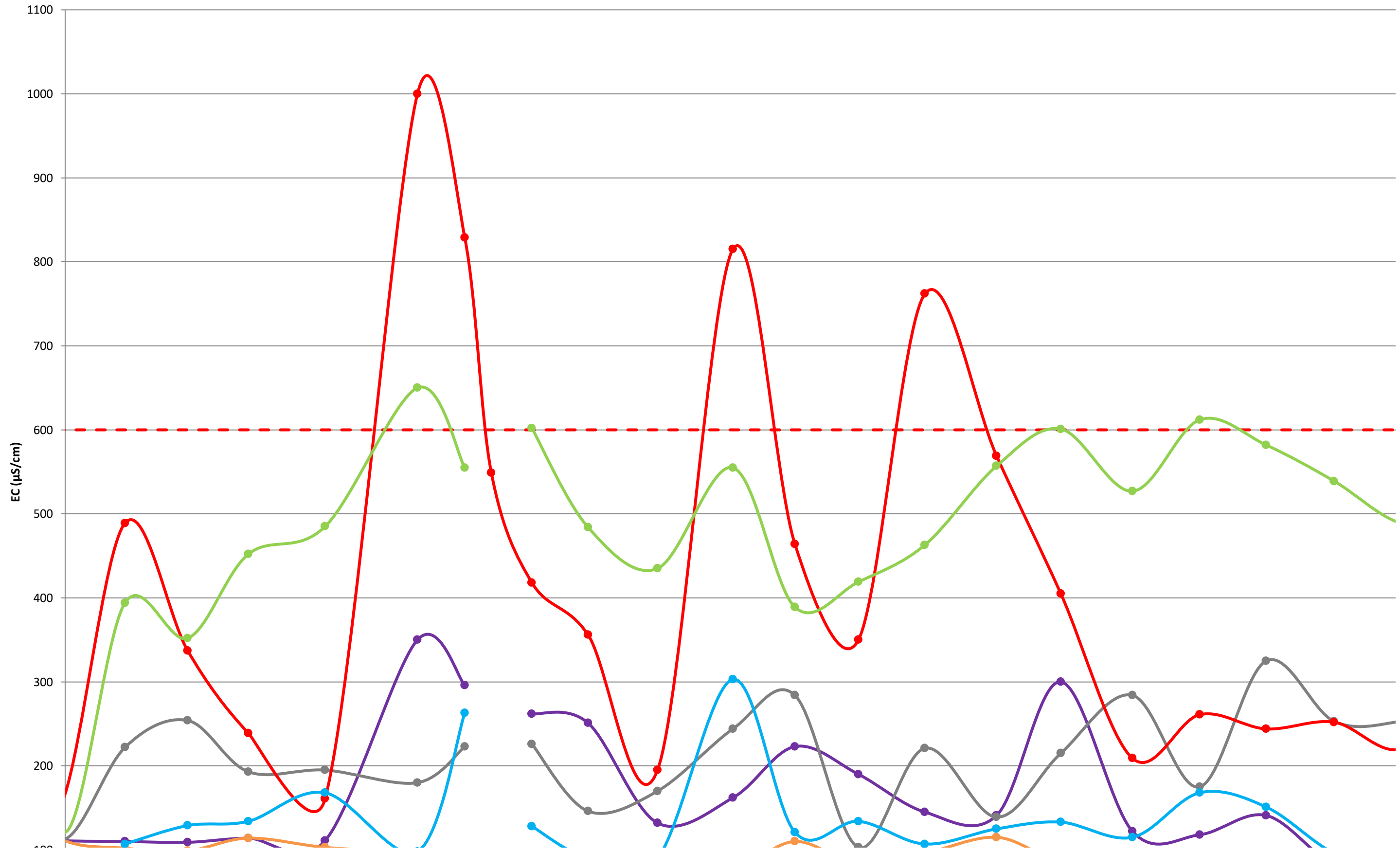
Licence Holder

Sample Date	Electrical Conductivity (µs/cm)								Comment
	SWMP Trigger	EPL Limit	SP1	SP2	SP3	SP4	SP5	BL158	
			EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	
04-Oct-09	N/A			218	162	178	133		Baseline Monitoring
12-Aug-22	N/A		145	567	104	174	134	570	
19-Nov-10	600		154	334	158	224	131	334	
05-Jan-11	600		409	160	173	210	118	255	
18-Mar-11	600		226	98	84	118	139		
23-May-11	600		177	181	172	378		363	
23-Aug-11	600		127	170	123	254	122	390	
22-Nov-11	600		184	158	169	160	161	362	
01-Mar-12	600		175	176	156	188	272	309	
25-Sep-12	600		129	162	138	183	145	282	
04-Jan-13	600		134	155	134	174	137	266	
05-Mar-13	600		148						Montioring undertaken at SP1 only
02-Apr-13	600		148	283	132	171	100	265	
28-May-13	600		161						Montioring undertaken at SP1 only
03-Sep-13	600		147	146	178	184	250	259	
06-Jan-14	600	non-specified	127	125	145	162	124	225	
15-Apr-14	600	non-specified	130	128	238	230	112	234	
31-May-14	600	non-specified	151	132	228	289	242	235	
	600	non-specified	126	124	244	215	110	243	
12-Jan-15	600	non-specified	122	107	257	174	258	255	
25-Feb-15	600	non-specified	118	120	248	169	99	100	
13-May-15	600	non-specified	214	110	221	112	87	90	
31-Aug-15	600	non-specified	105	471	299	106	184	344	
18-Nov-15	600	non-specified	107	106	318	106	190	376	
14-Apr-16	600	non-specified	108	85	95	159	142	362	
30-Jun-16	600	non-specified	115	219	110	179	94	217	
13-Oct-16	600	non-specified	116	165	196	115	101	455	
29-Dec-16	600	non-specified	111	112	112	159		121	Sampling Error at SP5
23-Mar-17	600	non-specified	110	102	222	489	107	394	
16-Jun-17	600	non-specified	109	99	254	337	129	352	
06-Sep-17	600	non-specified	114	114	193	239	134	452	
19-Dec-17	600	non-specified	111	103	195	161	168	485	
23-Apr-18	600	non-specified	350	96	180	1000	98	650	
26-Jun-18	600	non-specified	296	86	223	829	263	555	
01-Aug-18	600	non-specified				549			Additional SP4 monitoring event due to standpipe replacement
25-Sep-18	600	non-specified	262	75	226	418	128	602	
10-Dec-18	600	non-specified	251	92	146	356	90	484	
14-Mar-19	600	non-specified	132	75	170	195	90	435	SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	600	non-specified	162	76	244	815	303	555	
16-Sep-19	600	non-specified	223	110	284	464	121	389	SP5 monitoring undertaken on 17/9/19
11-Dec-19	600	non-specified	190	83	103	350	134	419	
10-Mar-20	600	non-specified	145	96	221	762	107	463	
15-Jun-20	600	non-specified	141	115	139	569	125	557	SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	600	non-specified	300	87	215	405	133	601	
16-Dec-20	600	non-specified	122	92	284	209	115	527	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	600	non-specified	118	82	175	261	168	612	
15-Jun-21	600	non-specified	141	86	325	244	151	582	
15-Sep-21	600	non-specified	82	97	253	252	96	539	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	600	non-specified	69	79	253	220	74	489	
16-Mar-22	600	non-specified	91	95	275	293	116	490	
20-Jun-22	600	non-specified	84	96	282	332	101	529	
14-Sep-22	600	non-specified	225	106	221	270	113	467	
13-Dec-22	600	non-specified	200	126	215	185	107	728	
14-Mar-23	600	non-specified	175	101	218	187	107	297	
14-Jun-23	600	non-specified	144	100	231	285	66	409	
14-Sep-23	600	non-specified	85	114	222	298	66	688	

Above nominated SWMP trigger level

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158
Count	4	4	4	4	4	4
Min	144	100	215	185	66	297
Average	186	108	221	232	98	475
Max	225	126	231	285	113	728

Groundwater - Electrical Conductivity (EC)



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Quarterly Groundwater Monitoring

Licence Holder

Sample Date	Turbidity (NTU)								Comment
	SWMP Trigger	EPL Limit	SP1	SP2	SP3	SP4	SP5	BL158	
			EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	
23-Mar-17	50	non-specified	9.6	7.4	2.2	3.2	9.8	2.3	
16-Jun-17	50	non-specified	2.9	1.3	0.6	1.3	6.2	1.1	
06-Sep-17	50	non-specified	2.5	3.2	0.5	1.0	9.4	1.8	
19-Dec-17	50	non-specified	3.5	3.4	0.7	0.4	4.1	0.2	
23-Apr-18	50	non-specified	6.9	2.9	7.6	15.0	7.7	1.0	
26-Jun-18	50	non-specified	27.0	4.6	4.6	4.6	4.2	0.8	
01-Aug-18	50	non-specified				22.0			Additional SP4 monitoring event due to standpipe replacement
25-Sep-18	50	non-specified	140.0	5.8	4.8	0.1	6.2	0.4	
10-Dec-18	50	non-specified	330.0	4.2	2.6	6.1	15.0	0.3	
14-Mar-19	50	non-specified	36.0	4.1	1.7	1.2	15.0	1.0	SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	50	non-specified	110.0	2.9	20.0	12.0	20.0	3.3	
16-Sep-19	50	non-specified	85.0	2.6	2.7	20.0	70.0	8.8	SP5 monitoring undertaken on 17/9/19
11-Dec-19	50	non-specified	89.0	2.6	36.0	3.9	24.0	2.1	
10-Mar-20	50	non-specified	34.0	55.0	60.0	26.0	46.0	1.4	
15-Jun-20	50	non-specified	83.7	6.1	38.0	9.2	95.0	1.8	SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	50	non-specified	16.0	11.0	31.0	6.0	36.0	12.0	
16-Dec-20	50	non-specified	45.0	11.0	4.0	35.0	17.0	2.7	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	50	non-specified	62.1	12.4	5.7	16.9	21.1	2.8	
15-Jun-21	50	non-specified	5.2	5.2	1.9	32.0	5.8	2.5	
15-Sep-21	50	non-specified	14.0	8.1	2.9	3.9	5.2	2.0	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	50	non-specified	15.5	2.7	1.4	2.4	14.7	1.0	
16-Mar-22	50	non-specified	6.1	3.3	9.2	4.7	9.8	3.5	
20-Jun-22	50	non-specified	17.1	9.5	4.6	24.3	5.9	4.2	
14-Sep-22	50	non-specified	5.1	13.0	1.8	15.0	15.0	2.8	
13-Dec-22	50	non-specified	6.8	4.0	2.5	10.9	11.2	10.5	
14-Mar-23	50	non-specified	7.5	13.0	1.1	4.4	12.0	4.3	
14-Jun-23	50	non-specified	6.8	9.7	1.3	10.1	14.3	5.0	
14-Sep-23	50	non-specified	18.0	8.1	0.6	12.0	13.0	1.0	

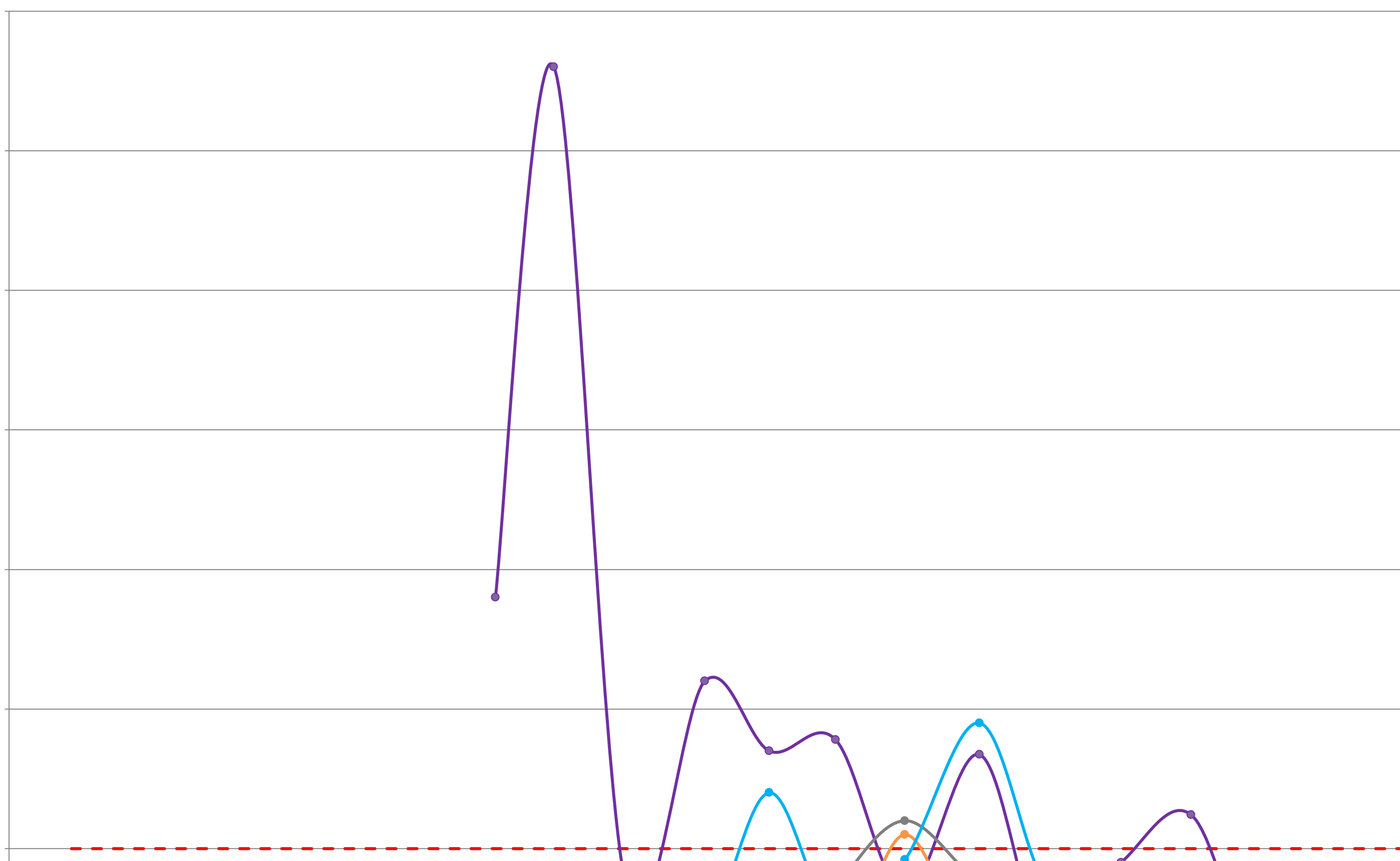
Above nominated SWMP trigger level

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158
Count	4	4	4	4	4	4
Min	5.1	4.0	1.1	4.4	11.2	2.8
Average	6.6	9.9	1.7	10.1	13.1	5.7
Max	7.5	13.0	2.5	15.0	15.0	10.5

Groundwater - Turbidity (NTU)

Turbidity (NTU)

350
300
250
200
150
100
50



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Quarterly Groundwater Monitoring

Licence Holder

Sample Date	Arsenic (mg/L)								Comment
	SWMP Trigger	EPL Limit	SP1	SP2	SP3	SP4	SP5	BL158	
			EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	
23-Mar-17	0.01	non-specified	0.001	0.001	0.001	0.001	0.002	0.001	
16-Jun-17	0.01	non-specified	0.001	0.001	0.002	0.002	0.002	0.001	
06-Sep-17	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
19-Dec-17	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
23-Apr-18	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
26-Jun-18	0.01	non-specified	0.001	0.001	0.001	0.001	0.003	0.001	
01-Aug-18	0.01	non-specified				0.001			Additional SP4 monitoring event due to standpipe replacement
25-Sep-18	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
10-Dec-18	0.01	non-specified	0.001	0.001	0.001	0.001	0.002	0.001	
14-Mar-19	0.01	non-specified	0.001	0.001	0.001	0.001	0.002	0.001	SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	0.01	non-specified	0.001	0.001	0.001	0.002	0.003	0.001	
16-Sep-19	0.01	non-specified	0.001	0.001	0.001	0.009	0.001	0.001	SP5 Monitoring undertaken on 16/9/19
11-Dec-19	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
10-Mar-20	0.01	non-specified	0.001	0.001	0.001	0.009	0.001	0.001	
15-Jun-20	0.01	non-specified	0.001	0.001	0.001	0.003	0.001	0.001	SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	0.01	non-specified	0.001	0.001	0.002	0.001	0.001	0.001	
16-Dec-20	0.01	non-specified	0.001	0.001	0.001	0.015	0.001	0.001	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	0.01	non-specified	0.001	0.001	0.001	0.003	0.001	0.001	
15-Jun-21	0.01	non-specified	0.001	0.001	0.001	0.002	0.001	0.001	
15-Sep-21	0.01	non-specified	0.001	0.001	0.001	0.002	0.007	0.001	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	0.01	non-specified	0.001	0.001	0.001	0.001	0.002	0.001	
16-Mar-22	0.01	non-specified	0.001	0.001	0.001	0.001	0.006	0.001	
20-Jun-22	0.01	non-specified	0.001	0.001	0.001	0.002	0.014	0.001	
14-Sep-22	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
13-Dec-22	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
14-Mar-23	0.01	non-specified	0.001	0.001	0.001	0.001	0.001	0.001	
14-Jun-23	0.01	non-specified	0.001	0.001	0.001	0.002	0.005	0.001	
14-Sep-23	0.01	non-specified	0.001	0.001	0.001	0.002	0.004	0.001	

Above nominated SWMP trigger level

Note: Bold values indicate values greater than laboratory Limit of Reporting (0.001 mg/L) (i.e. limit of detection).

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158
Count	4	4	4	4	4	4
Min	0.001	0.001	0.001	0.001	0.001	0.001
Average	0.001	0.001	0.001	0.001	0.002	0.001
Max	0.001	0.001	0.001	0.002	0.005	0.001

Groundwater - Arsenic (mg/L)

0.016
0.014
0.012
0.01
0.008
0.006

Arsenic (mg/L)



1646 - Macka's Sand - EPL 13218

Quarterly Groundwater Monitoring

Licence Holder

Sample Date	Manganese (mg/L)								Comment
	SWMP Trigger	EPL Limit	SP1	SP2	SP3	SP4	SP5	BL158	
			EPA Point 1	EPA Point 2	EPA Point 3	EPA Point 4	EPA Point 5	EPA Point 6	
23-Mar-17	0.1	non-specified	0.018	0.018	0.001	0.083	0.028	0.006	
16-Jun-17	0.1	non-specified	0.018	0.007	0.001	0.043	0.046	0.012	
06-Sep-17	0.1	non-specified	0.019	0.020	0.001	0.026	0.026	0.008	
19-Dec-17	0.1	non-specified	0.018	0.019	0.001	0.005	0.038	0.012	
23-Apr-18	0.1	non-specified	0.005	0.011	0.005	0.37	0.013	0.015	
26-Jun-18	0.1	non-specified	0.006	0.011	0.002	0.179	0.103	0.011	
01-Aug-18	0.1	non-specified				0.103			Additional SP4 monitoring event due to standpipe replacement
25-Sep-18	0.1	non-specified	0.004	0.014	0.001	0.061	0.037	0.010	
10-Dec-18	0.1	non-specified	0.008	0.012	0.002	0.033	0.013	0.007	
14-Mar-19	0.1	non-specified	0.004	0.007	0.002	0.014	0.016	0.014	SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	0.1	non-specified	0.004	0.006	0.001	0.233	0.135	0.006	
16-Sep-19	0.1	non-specified	0.003	0.006	0.001	0.089	0.008	0.008	
11-Dec-19	0.1	non-specified	0.004	0.009	0.002	0.053	0.018	0.015	
10-Mar-20	0.1	non-specified	0.002	0.005	0.001	0.207	0.016	0.010	
15-Jun-20	0.1	non-specified	0.004	0.007	0.001	0.093	0.028	0.008	SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	0.1	non-specified	0.005	0.005	0.001	0.071	0.024	0.011	
16-Dec-20	0.1	non-specified	0.003	0.004	0.002	0.026	0.019	0.007	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	0.1	non-specified	0.006	0.005	0.004	0.03	0.031	0.011	
15-Jun-21	0.1	non-specified	0.005	0.008	0.001	0.031	0.019	0.010	
15-Sep-21	0.1	non-specified	0.001	0.01	0.001	0.031	0.022	0.010	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	0.1	non-specified	0.001	0.007	0.006	0.021	0.018	0.006	
16-Mar-22	0.1	non-specified	0.005	0.009	0.001	0.031	0.023	0.012	
20-Jun-22	0.1	non-specified	0.004	0.005	0.002	0.037	0.010	0.010	
14-Sep-22	0.1	non-specified	0.018	0.012	0.001	0.048	0.010	0.011	
13-Dec-22	0.1	non-specified	0.016	0.011	0.001	0.015	0.005	0.018	
14-Mar-23	0.1	non-specified	0.021	0.008	0.001	0.011	0.010	0.008	
14-Jun-23	0.1	non-specified	0.034	0.011	0.001	0.032	0.009	0.010	
14-Sep-23	0.1	non-specified	0.016	0.015	0.001	0.034	0.008	0.013	

Above nominated SWMP trigger level

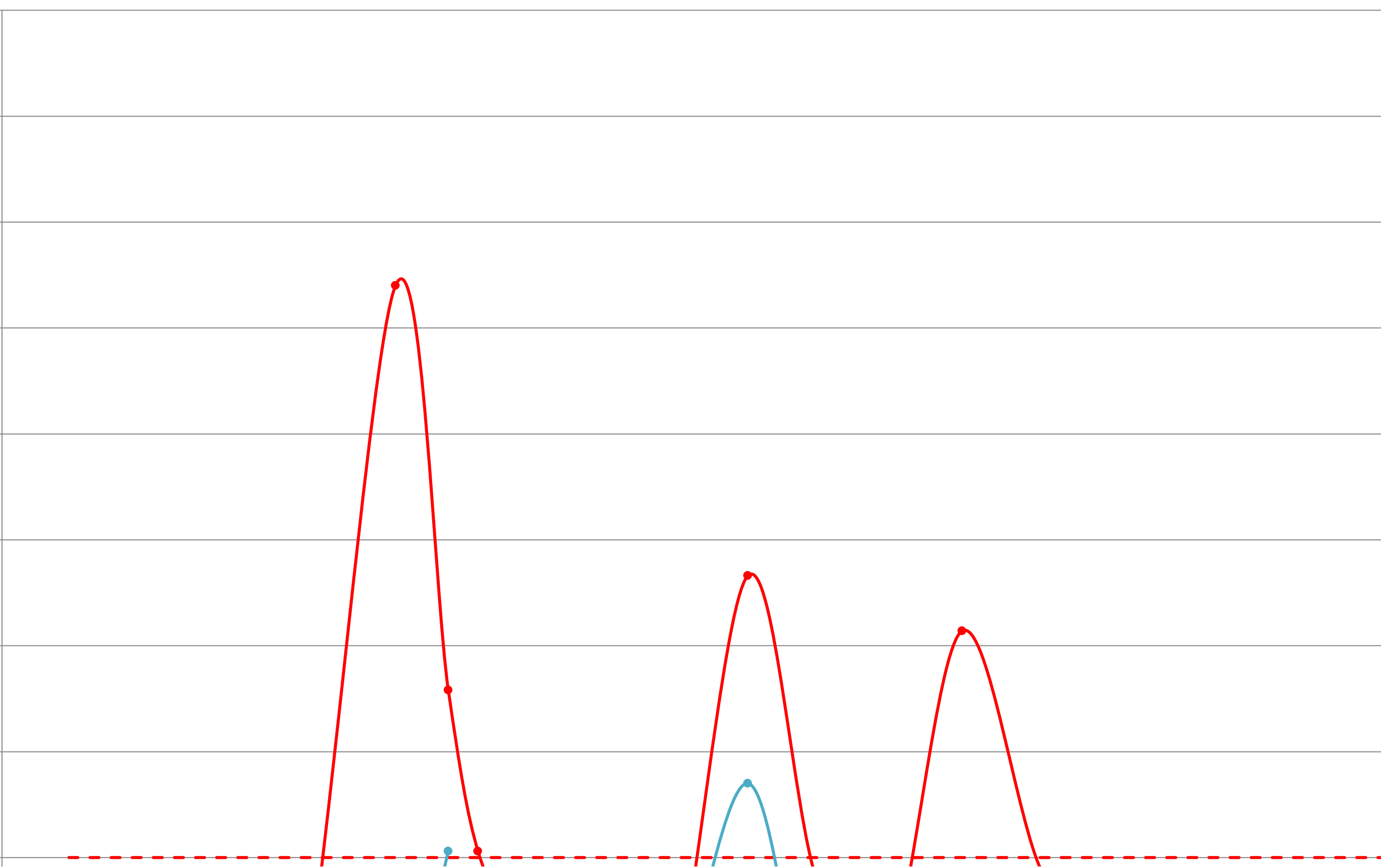
Note: Bold values indicate values greater than laboratory Limit of Reporting (0.001 mg/L) (i.e. limit of detection).

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158
Count	4	4	4	4	4	4
Min	0.016	0.008	0.001	0.011	0.005	0.008
Average	0.022	0.011	0.001	0.027	0.009	0.012
Max	0.034	0.012	0.001	0.048	0.010	0.018

Groundwater - Manganese (mg/L)

Manganese (mg/L)

0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1



1646 - Macka's Sand - EPL 13218

Quarterly Groundwater Monitoring

Licence Holder

Sample Date	SWMP Trigger	EPL Limit	Iron (mg/L)						Comment
			SP1 EPA Point 1	SP2 EPA Point 2	SP3 EPA Point 3	SP4 EPA Point 4	SP5 EPA Point 5	BL158 EPA Point 6	
4/10/2009				8.7	0.24	2.5	0.77		Baseline Monitoring
12/08/2022			0.47	3.7	0.22	3.9	0.91	2.8	Baseline Monitoring
19-Nov-10	5.7	non-specified	4.91	1.74	5.50	3.26	1.46	1.14	
05-Jan-11	5.7	non-specified	9.55	9.38	2.39	13.10	1.28	1.30	
18-Mar-11	5.7	non-specified	0.20	2.12	0.18	0.51	1.12		
23-May-11	5.7	non-specified	2.38	2.38	0.29	5.70	1.02	0.89	
23-Aug-11	5.7	non-specified	2.13	2.10	0.11	2.02	0.64	1.01	
22-Nov-11	5.7	non-specified	0.10	1.70	0.11	1.65	0.50	1.17	
01-Mar-12	5.7	non-specified	0.06	2.17	0.06	2.28	1.23	0.91	
28-May-12	5.7	non-specified	2.22	2.30	0.11	1.06	1.57	1.35	
25-Sep-12	5.7	non-specified	0.10	1.85	0.11	1.07	0.65	0.75	
04-Jan-13	5.7	non-specified	0.22	2.10	0.01	0.44	0.56	0.56	
05-Mar-13	5.7	non-specified	1.81						Montioring undertaken at SP1 only
02-Apr-13	5.7	non-specified	1.98	1.14	0.26	1.98	0.64	0.65	
28-May-13	5.7	non-specified	1.87						Montioring undertaken at SP1 only
03-Sep-13	5.7	non-specified	1.80	1.76	0.17	0.74	1.04	0.40	
06-Jan-14	5.7	non-specified	1.57	1.50	0.31	0.38	0.56	0.57	
15-Apr-14	5.7	non-specified	1.69	1.74	0.19	2.54	0.68	0.39	
	5.7	non-specified	1.33	1.72	0.19	3.71	0.66	0.40	
03-Oct-14	5.7	non-specified	1.68	1.78	0.26	2.27	0.71	0.24	
12-Jan-15	5.7	non-specified	1.83	1.28	0.16	0.46	0.17	0.16	
25-Feb-15	5.7	non-specified	1.54	1.44	0.13	0.91	0.50	0.50	
13-May-15	5.7	non-specified	0.07	1.45	0.05	1.34	1.13	1.33	
31-Aug-15	5.7	non-specified	1.25	1.12	0.11	1.18	1.01	0.75	
18-Nov-15	5.7	non-specified	1.27	1.31	0.12	1.54	0.90	0.88	
14-Apr-16	5.7	non-specified	1.43	0.98	1.71	0.29	1.03	1.23	
30-Jun-16	5.7	non-specified	1.36	0.10	1.32	0.79	3.89	0.11	
13-Oct-16	5.7	non-specified	1.80	0.85	0.09	0.36	0.97	0.93	
29-Dec-16	5.7	non-specified	2.86	1.49	1.86	0.28	0.86	0.71	
23-Mar-17	5.7	non-specified	1.55	1.25	0.22	5.86	0.89	0.90	
16-Jun-17	5.7	non-specified	1.36	0.84	0.35	4.42	1.53	0.60	
06-Sep-17	5.7	non-specified	1.62	1.47	0.20	2.95	0.29	1.11	
19-Dec-17	5.7	non-specified	1.35	1.36	0.28	0.29	1.32	1.62	
23-Apr-18	5.7	non-specified	0.05	0.70	0.16	34.00	0.46	1.80	
26-Jun-18	5.7	non-specified	0.05	0.64	0.13	31.70	3.40	1.51	
01-Aug-18	5.7	non-specified				18.20			Additional SP4 monitoring event due to standpipe replacement
25-Sep-18	5.7	non-specified	0.09	0.71	0.16	10.40	1.59	1.15	
10-Dec-18	5.7	non-specified	0.55	0.82	0.10	3.88	0.38	0.86	
14-Mar-19	5.7	non-specified	0.08	0.46	0.09	0.27	0.46	1.08	SP1 & SP5 monitoring undertaken on 15/3/19 due to access restrictions on 14/3/2019.
24-Jun-19	5.7	non-specified	0.32	0.58	0.14	22.50	2.50	0.82	
16-Sep-19	5.7	non-specified	0.05	0.79	0.10	12.60	0.05	1.47	
11-Dec-19	5.7	non-specified	0.05	0.68	0.05	1.26	0.47	1.14	
10-Mar-20	5.7	non-specified	0.07	0.46	0.09	22.40	0.39	0.89	
15-Jun-20	5.7	non-specified	0.06	0.64	0.05	23.80	0.88	1.12	SP3, SP5 and BL158 sampling conducted on 16/06/20.
10-Sep-20	5.7	non-specified	0.05	0.62	0.05	7.95	0.74	1.28	
16-Dec-20	5.7	non-specified	0.14	0.52	0.09	3.58	0.43	0.87	SP2, SP3 and SP5 sampling conducted on 17/12/2020
17-Mar-21	5.7	non-specified	0.18	0.32	0.05	6.94	0.75	0.97	
15-Jun-21	5.7	non-specified	0.05	0.69	0.12	5.07	0.54	1.27	
15-Sep-21	5.7	non-specified	0.05	0.76	0.11	6.96	1.17	1.04	SP2, SP3, SP4 and SP5 sampling conducted on 20/09/2021
14-Dec-21	5.7	non-specified	0.05	0.63	0.28	2.83	1.16	0.63	
16-Mar-22	5.7	non-specified	0.05	0.77	0.28	6.78	1.18	0.64	
20-Jun-22	5.7	non-specified	0.05	0.42	0.12	8.46	0.62	0.92	
14-Sep-22	5.7	non-specified	0.05	0.91	0.25	4.78	0.32	0.77	
13-Dec-22	5.7	non-specified	0.05	0.85	0.30	0.71	0.50	0.70	
14-Mar-23	5.7	non-specified	0.05	0.86	0.16	0.48	0.59	0.71	
14-Jun-23	5.7	non-specified	0.05	0.97	0.13	8.11	0.44	0.66	
14-Sep-23	5.7	non-specified	0.12	1.07	0.05	7.41	0.42	1.52	

Above nominated SWMP trigger level

Note: Bold values indicate values greater than laboratory Limit of Reporting (0.001 mg/L) (i.e. limit of detection).

FY 22/23 Statistics	SP1	SP2	SP3	SP4	SP5	BL158
Count	4	4	4	4	4	4
Min	0.05	0.85	0.13	0.48	0.32	0.66
Average	0.05	0.90	0.21	3.52	0.46	0.71
Max	0.05	0.97	0.30	8.11	0.59	0.77

Groundwater - Iron (mg/L)

Iron (mg/L)

40
35
30
25
20
15
10

