

TEP Progress Report

1st March 2017

1 Contents

1. Purpose	1
2. Schedule 1 MAN17560 – TEP Approval Conditions.....	2
3. Receiving Environment Water Quality Results	3
3.1. Trigger and Contaminant Limits	3
3.2. Receiving Water Quality Results.....	7
3.2.1. Magazine Creek West (Section 2)	7
3.2.1.1. pH.....	8
3.2.1.2. Electrical Conductivity	9
3.2.1.3. Sulphates	9
3.2.1.4. Metals.....	10
3.2.2. Gunpowder Creek	12
3.2.2.1. pH.....	15
3.2.2.2. Electrical Conductivity	17
3.2.2.3. Sulphate	19
3.2.2.4. Metals.....	22
4. Seepage Interception	44
5. Notifications submitted to EHP.....	44
6. TEP Action Program	46
7. Conclusion.....	50

1. Purpose

This report addresses the conditions of Schedule 1 of Certificate of Approval (MAN17560).

It aims to report on water quality of receiving environment sample sites included in Schedule C table 4 of EA EPML00911413, during the life of TEP – MAN17560 and TEP action program progress.

Water quality data analysis aims to assess if:

1. Water quality of receiving waters was maintained or improved during the period of TEP (condition 2 of Schedule 1 of Certificate of approval MAN17560):
 - 1.1. Groundwater quality north of Old Mammoth TSF area has improved during the period of TEP (Performance indicator of objective 1 of TEP Action Program);
 - 1.2. Water quality along Magazine Creek West has improved during the period of the TEP (Performance indicator of objective 2 of TEP Action Program);
 - 1.3. Water quality in Gunpowder Creek has improved during the period of TEP (performance indicator of objective 3 of TEP Action Program);
2. Identify receiving environmental water quality exceedences during the period of TEP (condition 4 & 5 of Schedule 1 of Certificate of approval MAN17560).

2. Schedule 1 MAN17560 – TEP Approval Conditions

Table 1 – TEP Approval Conditions

Condition No.	Condition	Capricorn Copper Summary
1	All conditions of the EA apply during the period of the TEP unless a condition of this certificate of approval specifies otherwise.	Capricorn Copper understands this condition.
2	BMG (CCM) must ensure that the water quality of receiving waters is maintained or improved during the period of the TEP.	Capricorn Copper has worked to maintain and improve the receiving water quality by improving site water drainage, discontinuing discharge, and engaging consultants to provide a long term site compliance strategy
3	Contaminant releases may occur from the area defined in Figure 1 as “Old TSF”, subject to condition 2 of this certificate of approval.	Capricorn Copper acknowledges that contaminant releases have occurred historically from the area defined as “Old TSF” and is actively working to maintain and improve the receiving water quality through localised drainage earth works, sump maintenance, and implementing a comprehensive site compliance strategy
4	BMG (CCM) must ensure there is no exceedence of any EA contaminant limit, except for: (a) The sulphate contaminant limit within the Section 1 of Gunpowder Creek, subject to condition 2 of this certificate (b) The sulphate contaminant limit within the section of Gunpowder Creek defined in Figure 1 as Section 3 of Gunpowder Creek, which must not exceed 2,000 mg/L during the period of this TEP.	Refer to Section 4 for a summary of exceedences. Capricorn Copper has engaged consultants to provide a long term site compliance strategy to assist in addressing historical exceedence issues.
5	BMG (CCM) must ensure there is no exceedence of any EA contaminant limit within the section of Magazine Creek defined as	Refer to Section 4 for a summary of exceedences.

	'Section 2: Magazine Ck', except for copper and pH, subject to condition 2 of this certificate of approval.	Capricorn Copper has engaged consultants to provide a long term site compliance strategy to assist in addressing historical exceedence issues.
6	BMG (CCM) must ensure that a review of water quality monitoring data, sufficient to determine compliance and condition 2 of this certificate of approval, is undertaken by an appropriately qualified person at least once per calendar month.	To be adhered to.
7	BMG (CCM) must notify the administering authority within 24 hours of identifying any non-compliance with a condition of this certificate of approval	To be adhered to.
8	The progress of the TEP must be monitored by BMG (CCM) and documented in a report completed at a frequency of once every six months.	To be adhered to.

3. Receiving Environment Water Quality Results

3.1. Trigger and Contaminant Limits

Since August 2016, CCM has started using site specific trigger and contaminant limit based on reference site percentiles where enough data is available. Prior to this date, both trigger and contaminant limits were based on livestock drinking water guidelines detailed in Schedule C Table 4 of the EA.

Due to an inadequate amount of continuous data for MGU1, water quality exceedences are assessed in accordance with guideline limit values as noted in the EA for Magazine Creek. However, site specific contaminant limits have been calculated for Gunpowder Creek and the adopted contaminant limits for used to assess Gunpowder Creek water quality in this report are the site specific trigger and contaminant limits are based on the adopted contaminant limits of GPU1 values on 1 February 2017.

Table 1- Receiving water EA Guideline Trigger and Contaminant Limits (Magazine Creek)

Parameter	EA Trigger Limit	EA Contaminant Limit
pH (pH units)	6 – 8.5	
EC (µs/cm)	435	1000 ¹
Fluoride (mg/L)	0.2	2
Sulphate (mg/L)	250	1000
Aluminium (mg/L)	0.055	5
Arsenic (mg/L)	0.013	0.5
Boron (mg/L)	0.37	5
Cadmium (mg/L)	0.0002	0.01
Chromium (mg/L)	0.001	1
Cobalt (mg/L)	-	1
Copper (mg/L)	0.0014	1
Lead (mg/L)	0.0034	0.01
Manganese (mg/L)	1.9	1.9
Nickel (mg/L)	0.011	1
Uranium (mg/L)	-	0.2
Zinc (mg/L)	0.008	20

Table 23- Receiving water site specific EA Guideline Trigger and Contaminant Limits based on GPU1 values for 24 consecutive months on 1 February 2017 (Gunpowder Creek)

Parameter	Adopted Trigger Limit	Adopted Contaminant Limit*
pH (pH units)	6 – 8.5	
EC (µs/cm)	435	1000 ²
Sulphate (mg/L)	250	1000
Dissolved Aluminium (mg/L)	0.06	0.3335
Total Aluminium (mg/L)	0.458	1.782
Dissolved Arsenic (mg/L)	0.013	0.013
Total Arsenic (mg/L)	0.013	0.013

¹ Electrical conductivity (EC) contaminant limit for receiving waters is TBA at the time this report was written.

² Electrical conductivity (EC) contaminant limit for receiving waters is TBA at the time this report was written.

Parameter	Adopted Trigger Limit	Adopted Contaminant Limit*
Dissolved Boron (mg/L)	0.37	0.37
Total Boron (mg/L)	0.37	0.37
Dissolved Cadmium (mg/L)	0.0002	0.0002
Total Cadmium (mg/L)	0.0002	0.0002
Dissolved Chromium (mg/L)	0.001	0.001
Total Chromium (mg/L)	0.001	0.00185
Dissolved Cobalt (mg/L)	0.001	0.001
Total Cobalt (mg/L)	0.002	0.002
Dissolved Copper (mg/L)	0.004	0.0057
Total Copper (mg/L)	0.0068	0.01285
Fluoride (mg/L)	0.2	2
Dissolved Lead (mg/L)	0.0034	0.0034
Total Lead (mg/L)	0.0034	0.0034
Dissolved Manganese (mg/L)	1.9	1.9
Total Manganese (mg/L)	1.9	1.9
Dissolved Nickel (mg/L)	0.011	0.011
Total Nickel (mg/L)	0.011	0.011
Dissolved Uranium (mg/L)	0.001	0.001
Total Uranium (mg/L)	0.001	0.001
Zinc Dissolved (mg/L)	0.0188	0.02955
Total Zinc (mg/L)	0.008	0.01495

*If the contaminant limit is lower than the trigger limit then the trigger limit is adopted as the contaminant limit

Table 4- Interim TEP contaminant limits.

Parameter	Site	TEP contaminant Limit (mg/L)
Sulphate	GPU1	No Limit ³
	GPA2	
	GPA5	
	GPA7	
	GPD1	2000
pH	MGA1	No Limit ²

³ No contaminant limit is applied for this parameter in these locations for the duration of the TEP, subject to Condition 2 of the TEP Approval Certificate.



	GS2	No Limit ²
Copper	MGA1	No Limit ²
	GS2	No Limit ²

3.2. Receiving Water Quality Results

3.2.1. Magazine Creek West (Section 2)

Table 5 – Water quality statistics of Magazine Creek 2015-2017

Sampling location	Parameter	pH		EC (µs/cm)		Sulphate (mg/L)		Dissolved Metals (mg/L)										Total Metals (mg/L)					
								Aluminium		Copper		Cobalt		Nickel		Zinc		Aluminium		Copper		Cobalt	
Adopted Contaminant Limit*		6 – 8.5		1000		1000		5		1		1		1		20		5		1		1	
Year		2015/16 ¹	2016/17 ²	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/18	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
MGU1 (Magazine Creek east branch immediately upstream of Raw Water Dams)	Average	7.65167	7.56222	268.083	47.67778	26.8333	7.77778	0.00867	1.05111	0.0112	0.01067	0.0012	0.002	0.0015	0.0018	0.0105	0.0054	0.6883	1.2422	0.0165	0.0156	0.00267	0.004
	Standard Dev	0.99714	1.18065	251.927	40.59393	52.0593	11.8825	0.00554	1.90846	0.0027	0.00693	0.0004	0.0013	0.0005	0.0011	0.00927	0.001	0.6569	0.9191	0.0065	0.0083	0.00082	0.003
	Minimum	6.72	6.02	40.8	0	4	1	0.005	0.12	0.007	0.004	0.001	0.001	0.001	0.001	0.005	0.005	0.14	0.22	0.01	0.006	0.002	0.001
	Maximum	9.31	9.32	634	129.6	133	39	0.019	6.08	0.014	0.024	0.002	0.005	0.002	0.004	0.028	0.008	1.91	2.96	0.026	0.033	0.004	0.01
	95th Percentile	9.0625	9.14	595.5	112.52	102.25	26.2	0.017	4.092	0.014	0.0224	0.0018	0.0042	0.002	0.0036	0.0245	0.0072	1.6325	2.664	0.0253	0.029	0.00375	0.0092
	n	6	9	6	9	6	9	6	9	6	9	6	9	6	9	6	9	6	9	6	9	6	9
MGA1 (Magazine Creek approximately 450m downstream Raw Water Dam 1)	Average	5.61	6.12	511	557.17	227	246.50	0.0822	0.08	5.418	3.48	0.1752	0.16	0.0738	0.08	0.1242	0.08	0.12	0.25	5.498	3.68	0.1788	0.16
	Standard Dev	0.1589	0.72315	87.3728	184.6016	50.547	102.342	0.01599	0.07396	1.6864	2.28762	0.0491	0.0809	0.0154	0.034	0.01542	0.036	0.0316	0.2133	1.6338	2.4548	0.05984	0.0873
	Minimum	5.44	5.05	452	284.00	190	101.00	0.071	0.01	3.09	0.46	0.123	0.05	0.063	0.02	0.063	0.02	0.08	0.02	3.25	0.61	0.126	0.05
	Maximum	5.86	6.97	662	773.00	316	365.00	0.11	0.20	7.58	7.22	0.256	0.25	0.101	0.13	0.101	0.12	0.16	0.54	7.52	7.71	0.278	0.27
	95th Percentile	5.818	6.945	631.6	767	295.6	364.25	0.1042	0.175	7.332	6.5075	0.2394	0.2375	0.0948	0.1168	0.0948	0.1173	0.156	0.5175	7.328	7.0175	0.2592	0.2575
	n	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6
GS2 (Greenstone Creek approximately 200m upstream confluence with Gunpowder Creek)	Average	8.284	7.90	499.592	218.28	153.727	42.43	0.001	0.03	0.0074	0.01	0.0025	0.00	0.0025	0.002	0.00983	0.01	0.2878	0.29	0.0134	0.01	0.00304	0.00
	Standard Dev	0.54099	0.64949	245.407	123.8883	126.864	69.4057	6.7E-19	0.04842	0.0027	0.00269	0.0061	0.0033	0.0034	0.0022	0.0114	0.0024	0.317	0.2015	0.0068	0.005	0.00717	0.0037
	Minimum	7.15	6.60	132.6	88.00	5	1.00	0.001	0.01	0.004	0.002	0.001	0.00	0.001	0.001	0.005	0.01	0.01	0.11	0.001	0.01	0.001	0.001
	Maximum	9.35	9.07	1198	623.00	575	260.00	0.001	0.18	0.018	0.01	0.03	0.02	0.016	0.01	0.05	0.02	1.06	0.85	0.031	0.03	0.035	0.02
	95th Percentile	9.09	8.6975	910.6	411.8	287.2	230	0.001	0.15	0.01	0.01	0.0064	0.002	0.0077	0.006	0.0344	0.005	1.017	0.62	0.0291	0.017	0.0084	0.002
	n	25	22	25	22	23	21	23	21	23	21	23	21	23	21	23	21	23	21	23	21	23	21

* Due to an inadequate amount of continuous data for MGU1, water quality exceedences are assessed in accordance with guideline limit values as noted in the EA for Magazine Creek.

¹ 2015/16 refers to the period 1 March 2015 - 1 March 2016

² 2016/17 refers to the period 1 March 2016 - 1 March 2017

Magazine Creek only flows during severe rainfall events and for a short period, hence available data is very limited. GS2 water quality will be used to assess Magazine Creek water quality and impact in receiving waters.

3.2.1.1. pH

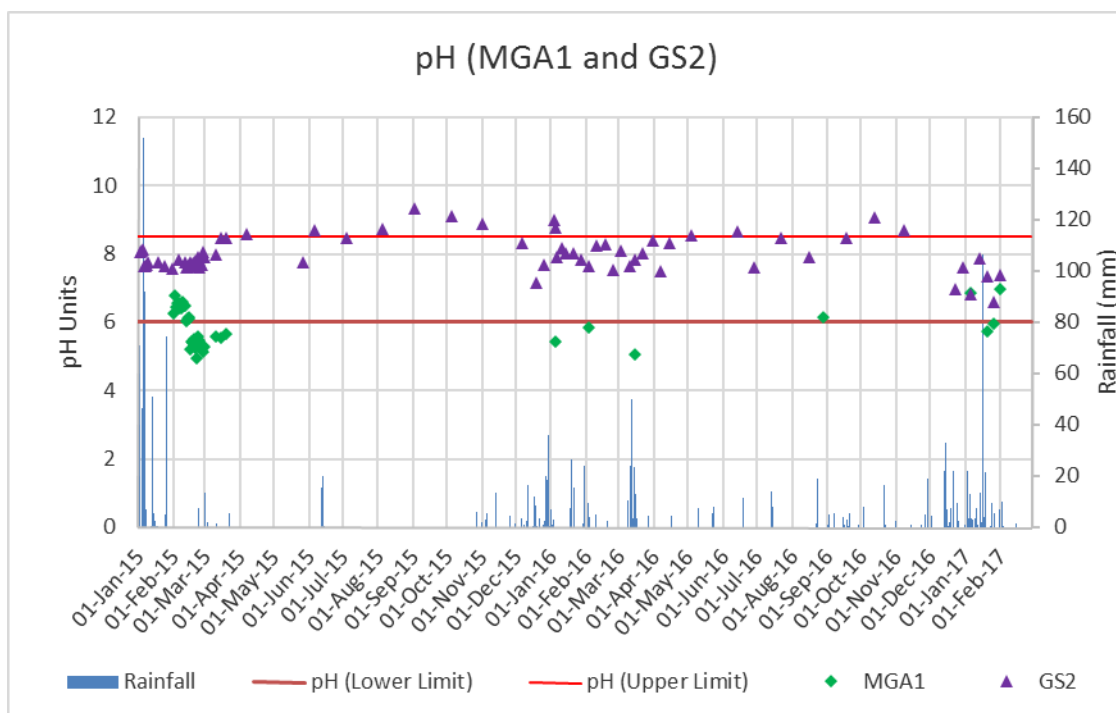


Figure 1. pH results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

The average pH at monitoring location MGA1 has increased from 5.61 in 2015/2016 to 6.12 in 2016/2017, showing better alignment with EA contaminant limits and improved compliance.

Monitoring location GS2 located downstream of MGA1 and average pH values have decreased from 8.28 in 2015/2016 to 7.90 in 2016/2017. Maximum and 95th percentile pH values in 2016/2017 decreased to 9.07 (from 9.35) and 8.70 (from 9.09) respectively, showing better alignment with EA contaminant limits and improved compliance.

3.2.1.2. Electrical Conductivity

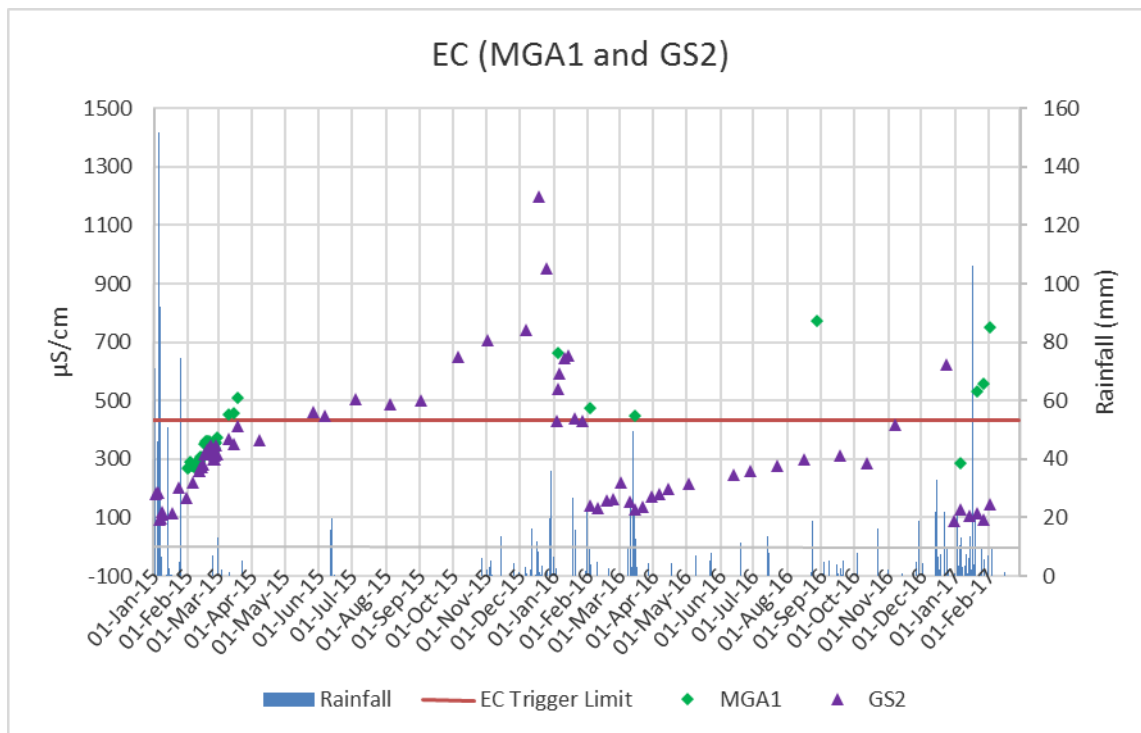


Figure 2. EC results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

3.2.1.3. Sulphates

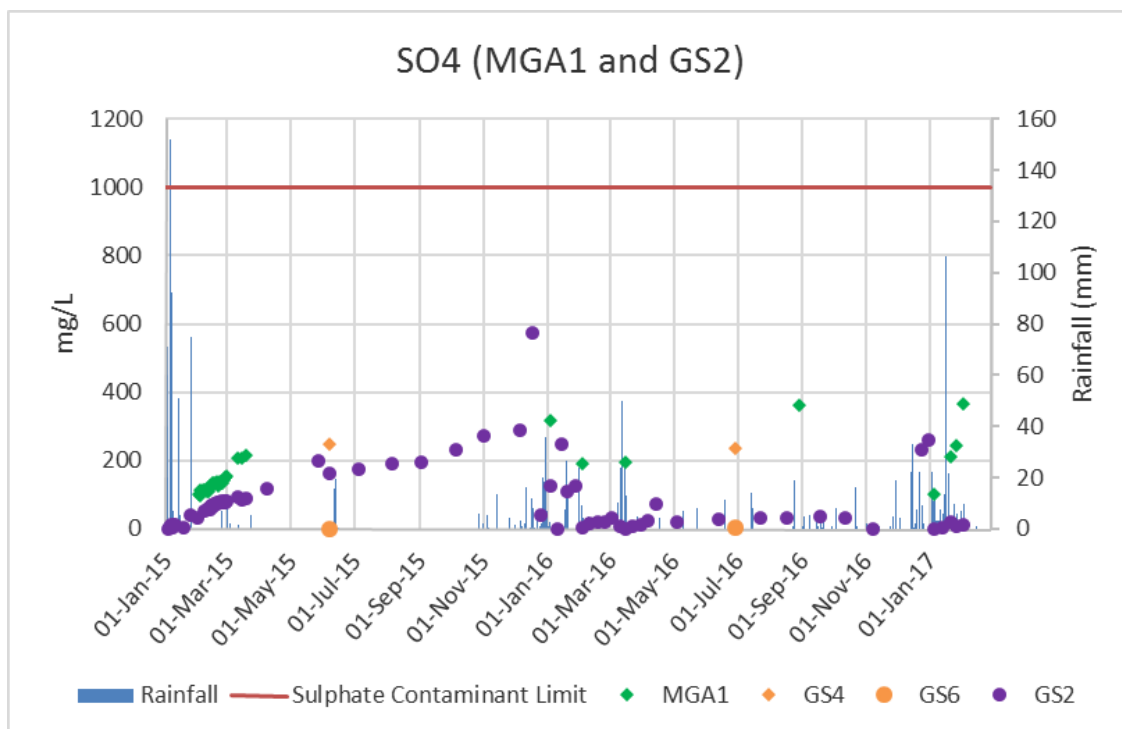


Figure 3. Sulphate results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

3.2.1.4. Metals

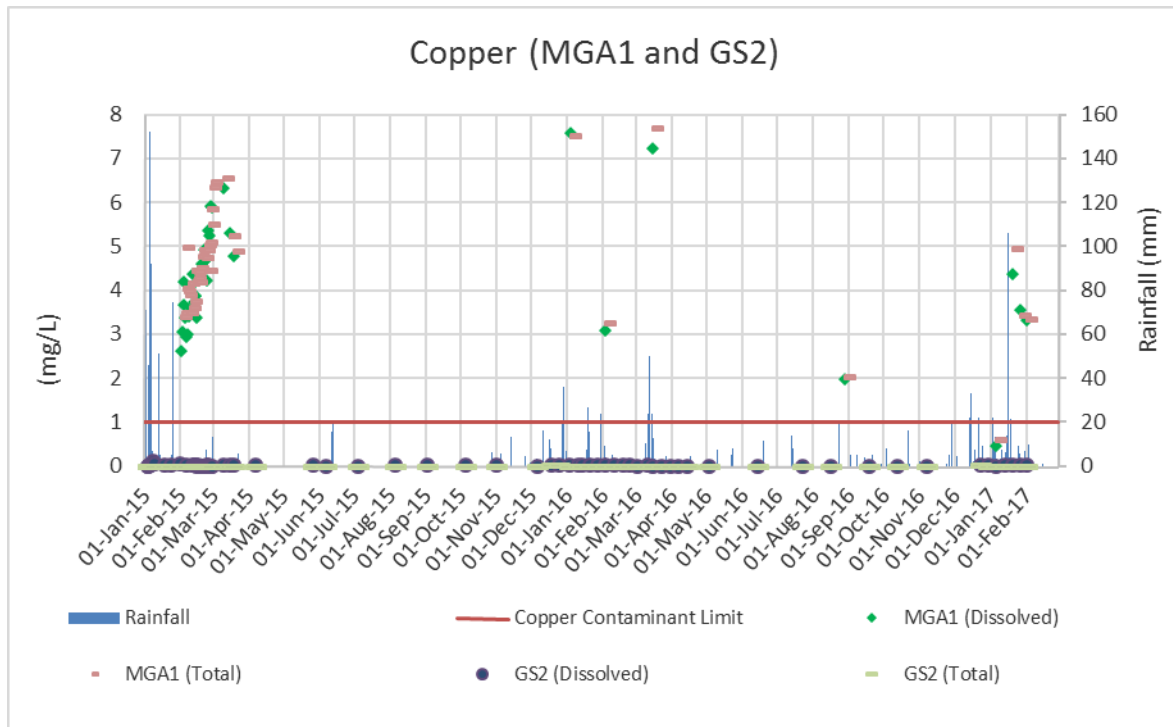


Figure 4- Copper results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams

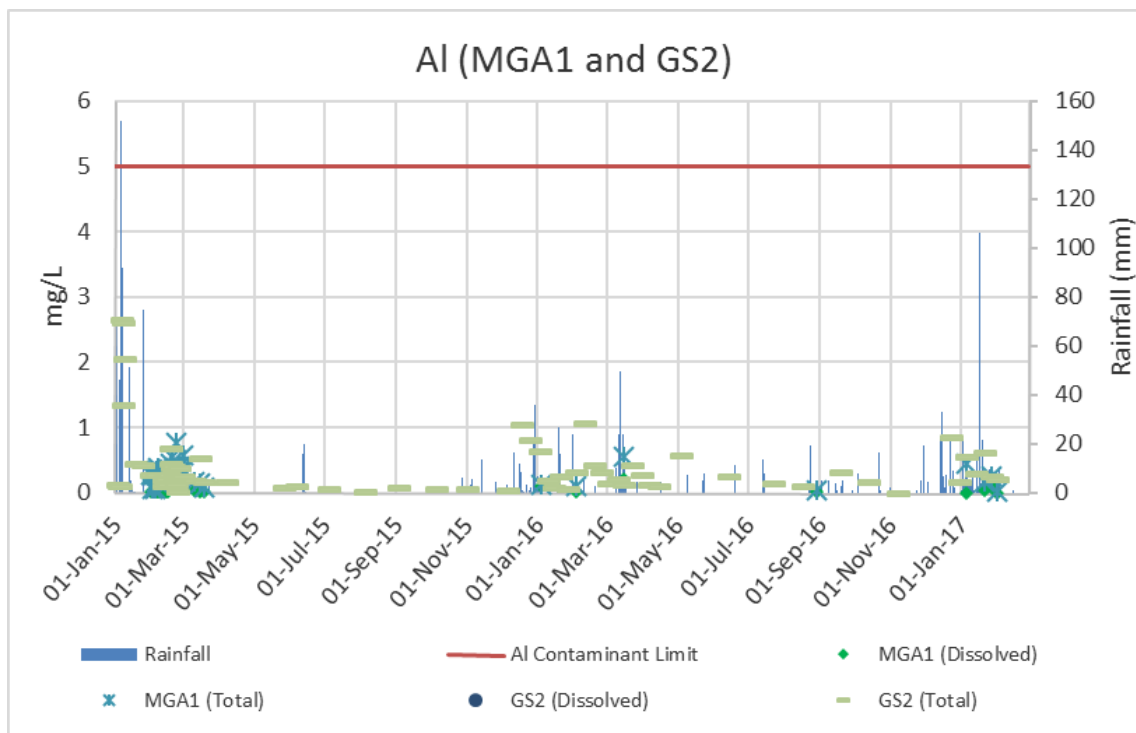


Figure 5. Aluminium results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

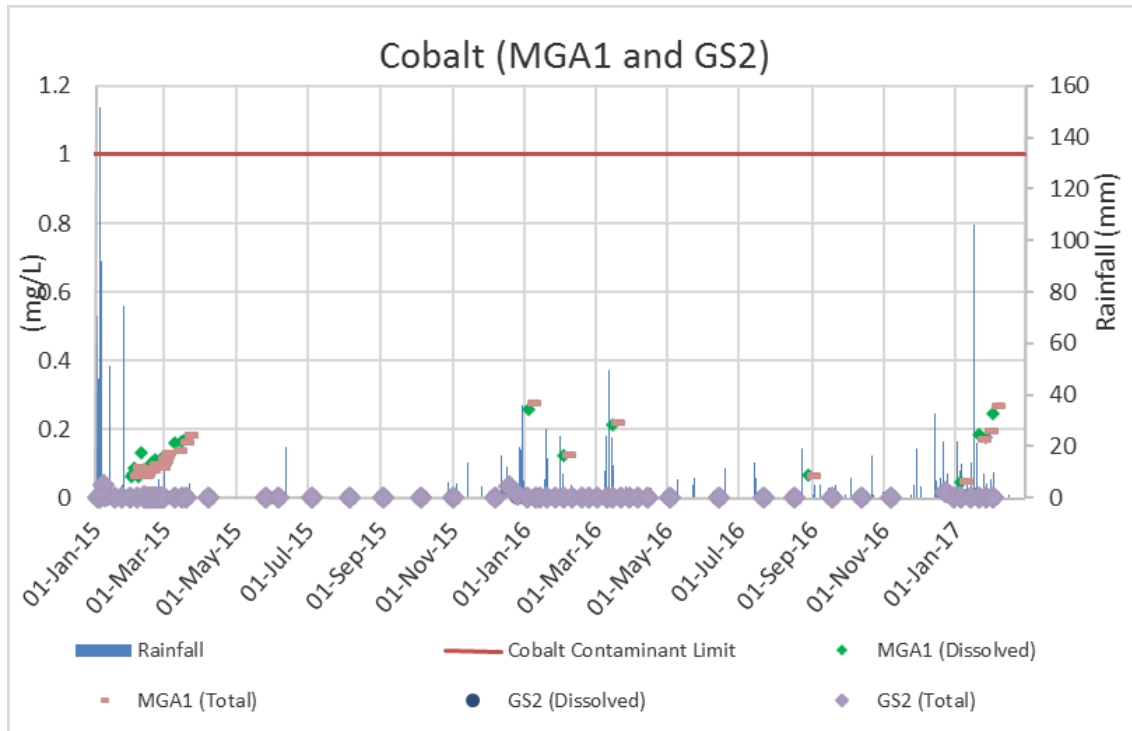


Figure 6. Cobalt results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

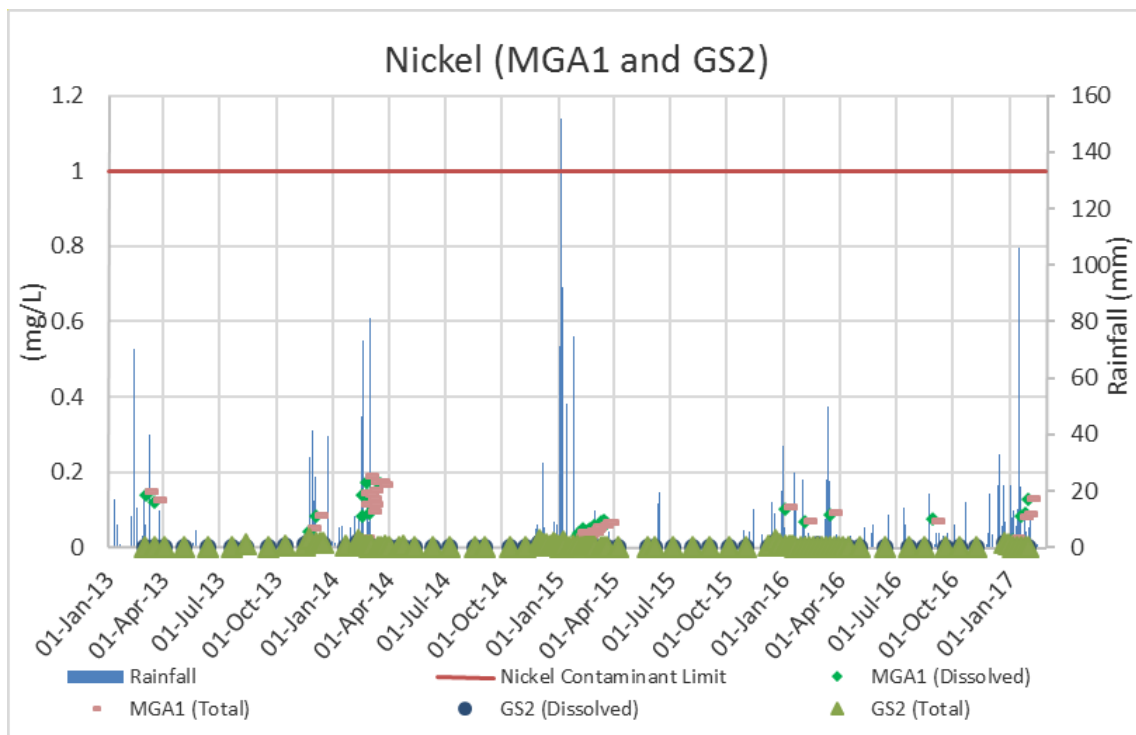


Figure 7. Nickel results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

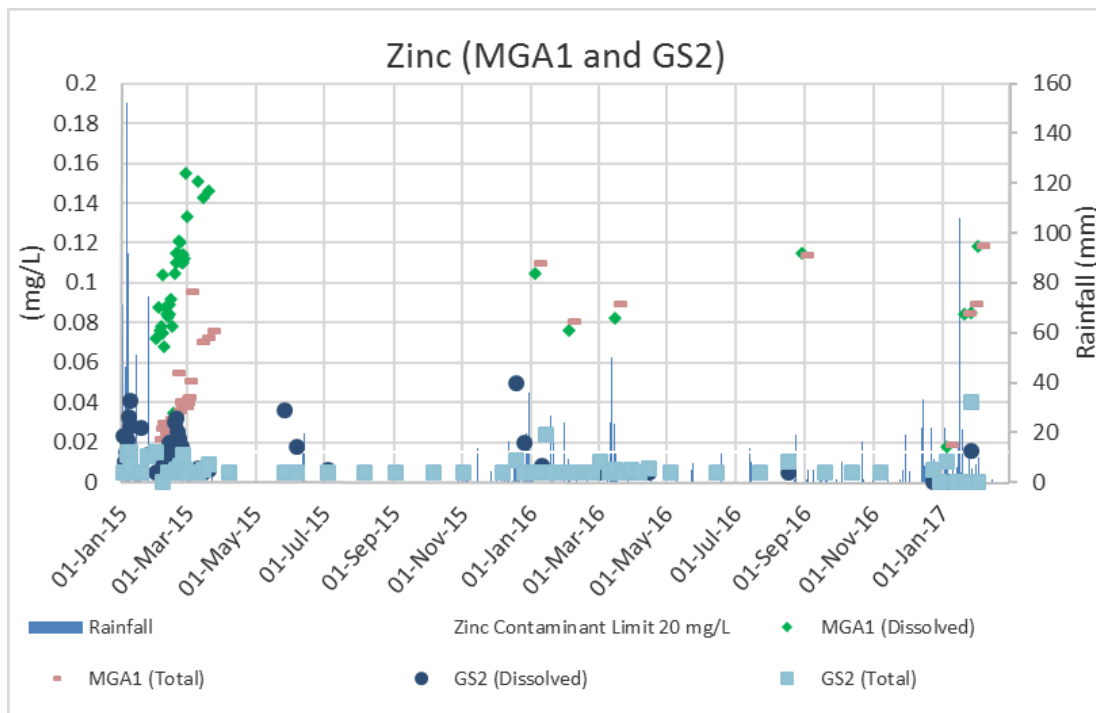


Figure 8. Zinc results from 2015-2017 downstream from the Magazine Creek Evaporation Ponds/raw water Dams.

The only metal of concern at MGA1 is copper, both in total and dissolved forms. There was a reduction in average dissolved copper concentrations from 5.418 mg/L in 2015/2016 to 3.48 mg/L in 2016/2017. Similarly, average total copper concentrations reduced from 5.48 mg/L in 2015/2016 to 3.68 mg/L in 2016/2017.

GS2 located downstream of MGA1 did not record elevated levels of either dissolved or total copper.

3.2.2. Gunpowder Creek

Statistics (average, standard deviation, maximum, minimum and 95th percentile values) are provided in Table 6 and data for each parameter and for each site is provided in figures 9 to 63. Arsenic, Boron Cadmium and Uranium are not showed in more detailed due to their consistent low values over the period of study.

Table 6 - Water quality statistics for Gunpowder Creek 2015-2017 – pH, EC Sulphates and Dissolved Metals

Sampling location	Parameter	pH		EC (µs/cm)		Sulphate (mg/L)		Dissolved Metals (mg/L)											
								Aluminium		Copper		Cobalt		Nickel		Lead		Chromium	
Adopted Contaminant Limit*		6 – 8.5		1000		1000		0.3335		0.0057		0.001		0.011		0.0034		0.001	
Year		2015/16 ¹	2016/17 ²	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
GPU1 (Gunpowder Creek approximately 3.8km upstream causeway)	Average	7.57565	7.5875	167.283	156.9417	2.77273	2.43478	0.1087	0.08696	0.0032	0.00296	0.0011	0.001	0.001	0.0011	0.001	0.001	0.001	0.001
	Standard Dev	0.7332	0.64689	94.541	79.71867	1.92556	1.12112	0.14448	0.1321	0.0013	0.00201	0.0004	0.0002	0.0002	0.0003	6.7E-19	0.0002	7E-19	4E-19
	Minimum	6.28	5.99	65	17	1	1	0.01	0.01	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Maximum	8.88	8.47	436	348	10	5	0.44	0.52	0.007	0.008	0.003	0.002	0.002	0.002	0.001	0.002	0.001	0.001
	95th Percentile	6.6609	6.797	0.00064	56.5735	1.995	1	0.01	0.01	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	n	23	24	23	24	22	23	23	23	23	23	23	23	23	23	23	23	23	19
GPA2 (Gunpowder Creek adjacent to causeway)	Average	7.33217	7.36294	932.313	876.4735	531.318	470.758	0.11	0.06061	0.0069	0.00627	0.0245	0.0223	0.0168	0.0167	0.00148	0.0023	0.001	0.0008
	Standard Dev	0.31969	0.32713	1108.26	809.6367	743.183	540.832	0.15745	0.09956	0.0034	0.0038	0.0322	0.0301	0.0185	0.0186	0.00124	0.0075	7E-19	0.0004
	Minimum	6.73	6.48	57.5	15	4	1	0.01	0.01	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0001
	Maximum	7.86	8.29	3310	2727	2290	1850	0.57	0.4	0.012	0.017	0.105	0.144	0.054	0.082	0.006	0.044	0.001	0.001
	95th Percentile	7.809	7.73	3053.3	2220.8	1902	1568	0.448	0.284	0.0119	0.014	0.0795	0.0742	0.0477	0.0492	0.0039	0.001	0.001	0.001
	n	23	34	23	34	22	33	23	33	23	33	23	33	23	33	23	33	23	33
GPA5 (Gunpowder Creek Approximately 500m downstream of MCD release point)	Average	7.797	7.77286	575.045	646.1476	262.421	298.6	0.128	0.08	0.0058	0.00515	0.0013	0.0015	0.0021	0.0019	0.001	0.0019	0.001	0.001
	Standard Dev	0.65162	0.73778	786.696	924.0707	456.064	600.462	0.16615	0.10538	0.0027	0.00283	0.0013	0.0016	0.0011	0.0014	4.4E-19	0.0038	4E-19	5E-19
	Minimum	6.8	6.31	59.8	18	5	2	0.01	0.01	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Maximum	8.71	8.92	2607	3630	1600	2370	0.59	0.37	0.012	0.011	0.007	0.008	0.005	0.006	0.001	0.018	0.001	0.001
	95th Percentile	8.691	8.72	2216.55	2317	1177	1382	0.4095	0.313	0.0101	0.01005	0.0013	0.0033	0.0041	0.0041	0.001	0.0019	0.001	0.001
	n	20	21	20	21	19	20	20	20	20	20	20	20	20	20	20	20	20	13
GPA7 (Gunpowder Creek 100m upstream of confluence with Greenstone Creek)	Average	7.095	7.22	162.65	217.4125	130.5	34.625	0.1675	0.1525	0.0565	0.0075	0.0168	0.0025	0.01	0.0024	0.001	0.001	0.001	0.001
	Standard Dev	0.44019	0.45207	98.0195	202.137	201.641	52.2383	0.19585	0.11374	0.0984	0.00396	0.0283	0.0039	0.0125	0.0025	0.000	0.000	0.000	0.000
	Minimum	6.55	6.54	84	75	8	4	0.02	0.01	0.005	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Maximum	7.5	7.99	294	618	429	156	0.44	0.36	0.204	0.015	0.059	0.012	0.028	0.008	0.001	0.001	0.001	0.001
	95th Percentile	7.485	7.8045	277.05	557.8	376.2	122.4	0.401	0.3215	0.1751	0.0136	0.0511	0.0085	0.0252	0.0066	0.001	0.001	0.001	0.001
	n	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8
GDP1 (Gunpowder Creek Over 2km downstream of MCD release point. Downstream confluence with Greenstone Creek)	Average	8.17952	8.22	327.21	259.63	86.6	39.71	0.07095	0.02	0.011	0.005	0.0012	0.001	0.0012	0.001	0.00438	0.001	0.001	0.001
	Standard Dev	0.72235	0.52198	246.982	103.6776	105.037	26.418	0.10497	0.01865	0.0194	0.00206	0.0009	5E-19	0.0007	0.0005	0.01116	5E-19	4E-19	5E-19
	Minimum	7.38	7.45	117.6	117.60	10	10.00	0.01	0.01	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Maximum	9.64	9.01	1052	520.00	411	107.00	0.4	0.07	0.095	0.01	0.005	0.001	0.004	0.003	0.052	0.001	0.001	0.001
	95th Percentile	9.43	8.989	891	447.9	310.3	89.45	0.27	0.0635	0.012	0.00835	0.001	0.001	0.002	0.0017	0.009	0.001	0.001	0.001
	n	21	15	21	15	20	14	21	14	21	14	21	14	21	14	21	14	21	14

* The adopted contaminant limits are the site specific contaminant limit based on the adopted contaminant limits of GPU1 values on 1 February 2017.

¹ 2015/16 refers to the period 1 March 2015 - 1 March 2016

² 2016/17 refers to the period 1 March 2016 - 1 March 2017

Table 7 - Water quality statistics for Gunpowder Creek 2015-2017 - Total Metals

Sampling location	Parameter	Total Metals (mg/L)															
		Zinc		Aluminium		Copper		Cobalt		Nickel		Lead		Chromium		Zinc	
Adopted Contaminant Limit*		0.02955		1.782		0.01285		0.002		0.011		0.0034		0.00185		0.01495	
Year		2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
GPU1 (Gunpowder Creek approximately 3.8km upstream causeway)	Average	0.01648	0.00509	0.78087	0.553043	0.01043	0.00561	0.00148	0.00127	0.0018	0.00148	0.0016	0.0015	0.0014	0.0012	0.00643	0.0075
	Standard Dev	0.01107	0.00042	1.66088	0.519225	0.0171	0.00333	0.00127	0.00055	0.0013	0.00059	0.0014	0.0011	0.0017	0.0007	0.00423	0.0051
	Minimum	0.005	0.005	0.07	0.07	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005
	Maximum	0.045	0.007	8.02	1.92	0.08	0.013	0.007	0.003	0.007	0.003	0.007	0.006	0.009	0.004	0.022	0.025
	95th Percentile	0.005	0.005	0.0945	0.1809	0.00209	0.00209	0.001	0.001	0.001	0.001	0.0039	0.001	0.001	0.001	0.005	0.005
	n	23	23	23	23	23	23	23	23	22	23	23	23	23	23	23	23
GPA2 (Gunpowder Creek adjacent to causeway)	Average	0.02813	0.00706	0.6187	0.455152	0.01126	0.0107	0.03322	0.03203	0.0193	0.02012	0.0044	0.0013	0.0013	0.0012	0.00917	0.0095
	Standard Dev	0.01781	0.00395	1.51206	0.596878	0.00718	0.00702	0.03658	0.03717	0.0197	0.02239	0.0156	0.0008	0.0015	0.0004	0.00533	0.0065
	Minimum	0.005	0.005	0.03	0.04	0.004	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005
	Maximum	0.057	0.024	7.36	2.33	0.036	0.035	0.114	0.162	0.059	0.094	0.076	0.005	0.008	0.003	0.023	0.034
	95th Percentile	0.0499	0.0128	1.449	1.748	0.0189	0.0242	0.092	0.1034	0.0518	0.065	0.002	0.003	0.0019	0.002	0.0205	0.0216
	n	23	33	23	33	23	33	23	33	23	33	23	33	23	33	23	33
GPA5 (Gunpowder Creek Approximately 500m downstream of MCD release point)	Average	0.01375	0.0055	0.8235	0.63	0.01015	0.0093	0.0035	0.00325	0.0036	0.0029	0.0015	0.0014	0.0015	0.0013	0.0061	0.0071
	Standard Dev	0.01828	0.0014	1.3921	0.557768	0.0056	0.00461	0.00179	0.00222	0.0012	0.00152	0.0011	0.001	0.0014	0.0004	0.00283	0.0038
	Minimum	0.005	0.005	0.01	0.04	0.004	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.005	0.005
	Maximum	0.088	0.010	6.26	1.82	0.03	0.021	0.03	0.011	0.007	0.007	0.006	0.005	0.007	0.002	0.016	0.021
	95th Percentile	0.02625	0.00905	2.4315	1.7725	0.01575	0.0153	0.007	0.00625	0.0051	0.0051	0.0022	0.0031	0.0032	0.002	0.0122	0.0125
	n	20	20	20	20	20	20	20	20	20	20	20	20	20	16	20	20
GPA7 (Gunpowder Creek 100m upstream of confluence with Greenstone Creek)	Average	0.01825	0.01413	1.09	1.08	0.32125	0.01425	0.02425	0.00488	0.013	0.00425	0.004	0.0018	0.0013	0.0025	0.024	0.0206
	Standard Dev	0.0215	0.02311	0.69929	0.959464	0.61918	0.00358	0.03935	0.00439	0.0164	0.00345	0.0036	0.0012	0.0005	0.0013	0.0335	0.0201
	Minimum	0.005	0.005	0.22	0.12	0.009	0.008	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.005	0.006
	Maximum	0.05	0.071	1.91	2.87	1.25	0.019	0.083	0.015	0.037	0.01	0.009	0.004	0.002	0.004	0.074	0.066
	95th Percentile	0.04445	0.05035	1.811	2.562	1.06505	0.01795	0.07205	0.0122	0.033	0.00965	0.0083	0.0037	0.0019	0.0039	0.0647	0.0538
	n	4	8	4	8	4	8	4	8	4	8	4	8	4	4	4	8
GDP1 (Gunpowder Creek Over 2km downstream of MCD release point. Downstream confluence with Greenstone Creek)	Average	0.01657	0.01	0.24571	0.31	0.00981	0.01	0.00124	0.001	0.0014	0.001	0.0015	0.001	0.001	0.001	0.00695	0.01
	Standard Dev	0.02521	9E-19	0.33229	0.27468	0.0032	0.00297	0.00044	0.00043	0.0006	0.00047	0.0011	5E-19	4E-19	0.0003	0.00483	0.0063
	Minimum	0.005	0.01	0.02	0.08	0.004	0.001	0.001	0.001	0.001	0.00	0.001	0.001	0.001	0.001	0.005	0.005
	Maximum	0.122	0.01	1.29	0.30	0.018	0.01	0.002	0.002	0.003	0.00	0.004	0.001	0.001	0.002	0.023	0.03
	95th Percentile	0.028	0.005	0.94	0.6895	0.014	0.01135	0.002	0.002	0.002	0.002	0.004	0.001	0.001	0.0014	0.019	0.0211
	n	21	14	21	14	21	14	21	14	21	14	21	14	21	14	21	14

* The adopted contaminant limits are the site specific contaminant limit based on the adopted contaminant limits of GPU1 values on 1 February 2017.

¹ 2015/16 refers to the period 1 March 2015 - 1 March 2016

²2016/17 refers to the period 1 March 2016 - 1 March 2017

3.2.2.1. pH

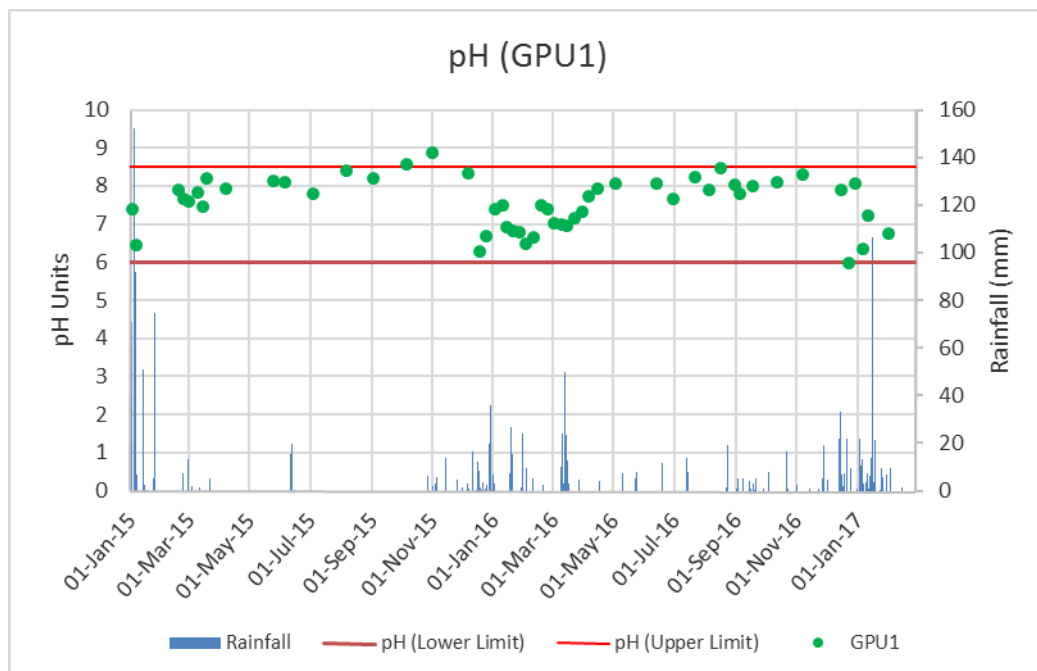


Figure 9. Reference site upstream of disturbance areas

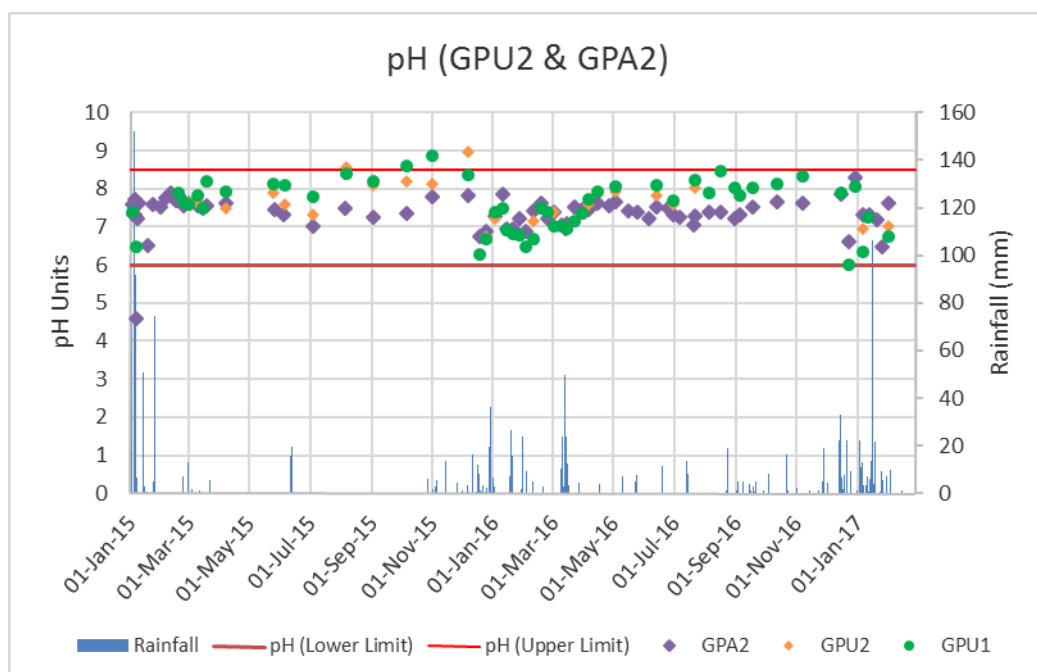


Figure 10. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

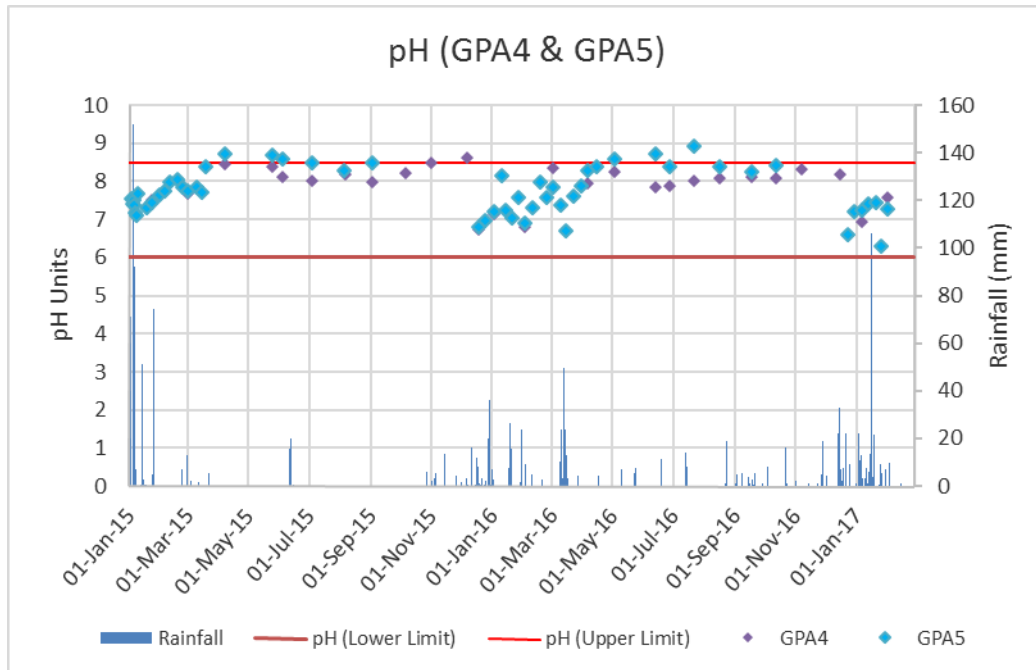


Figure 11. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

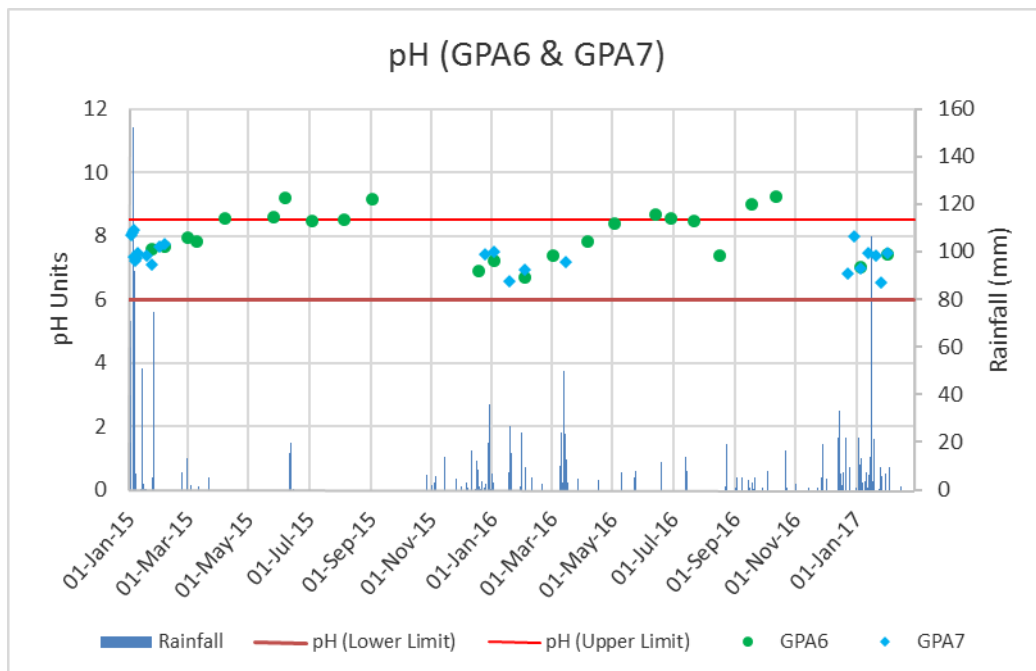


Figure 12. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

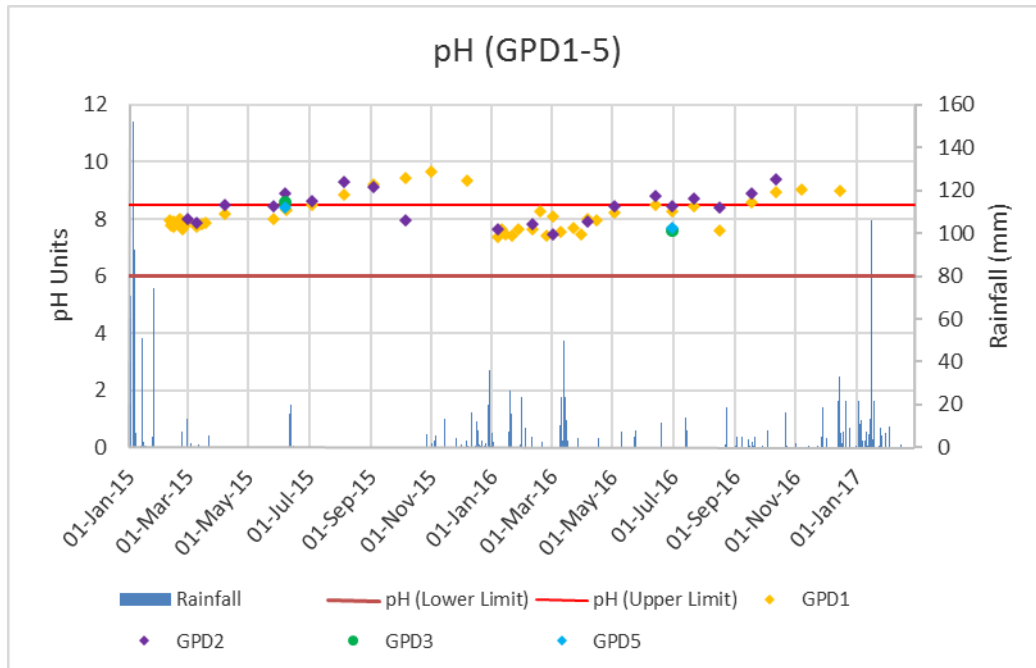


Figure 13. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

3.2.2.2. Electrical Conductivity

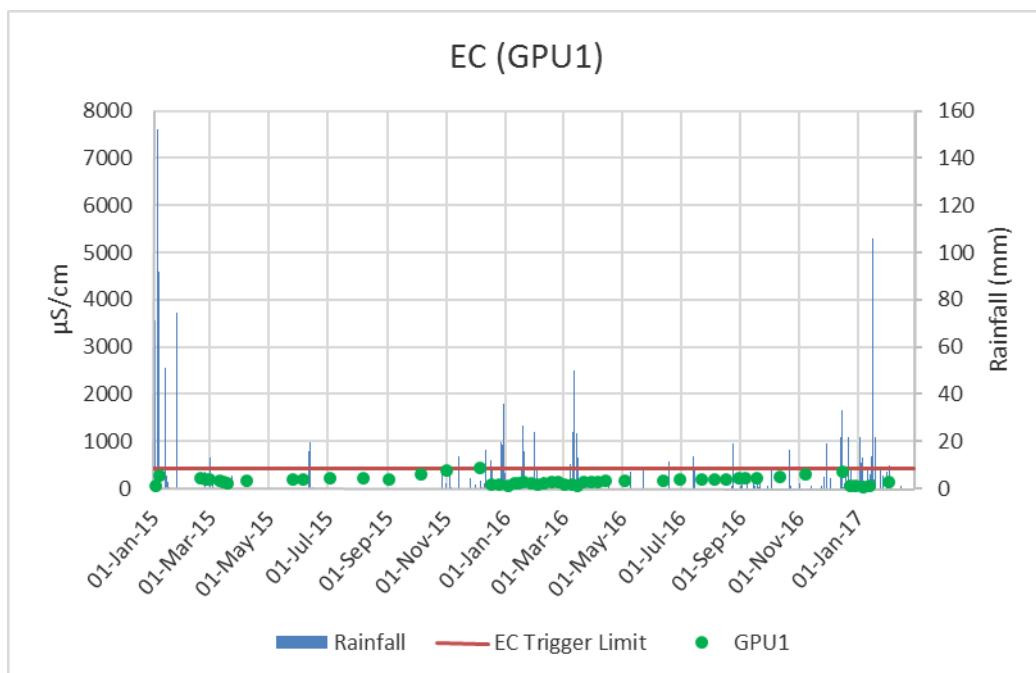


Figure 14. Reference site upstream of disturbance areas

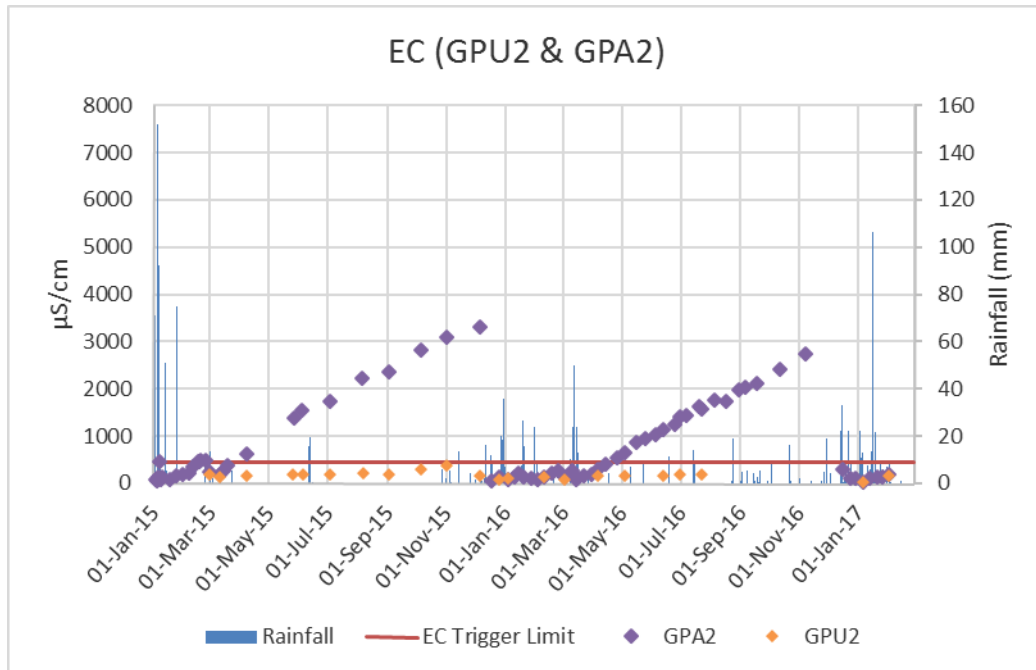


Figure 15. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

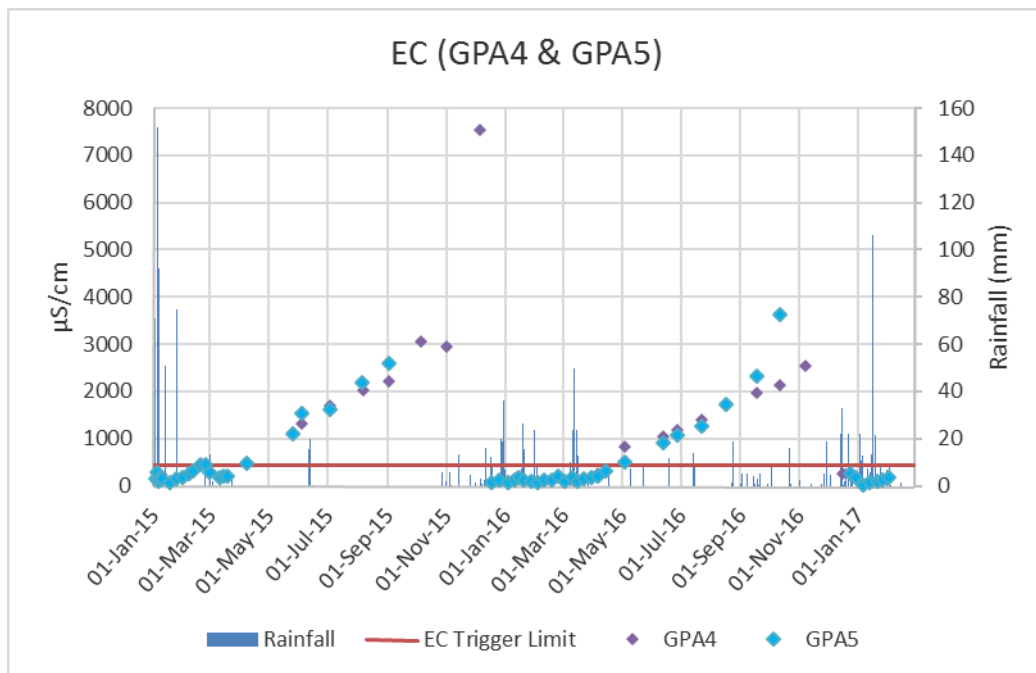


Figure 16. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

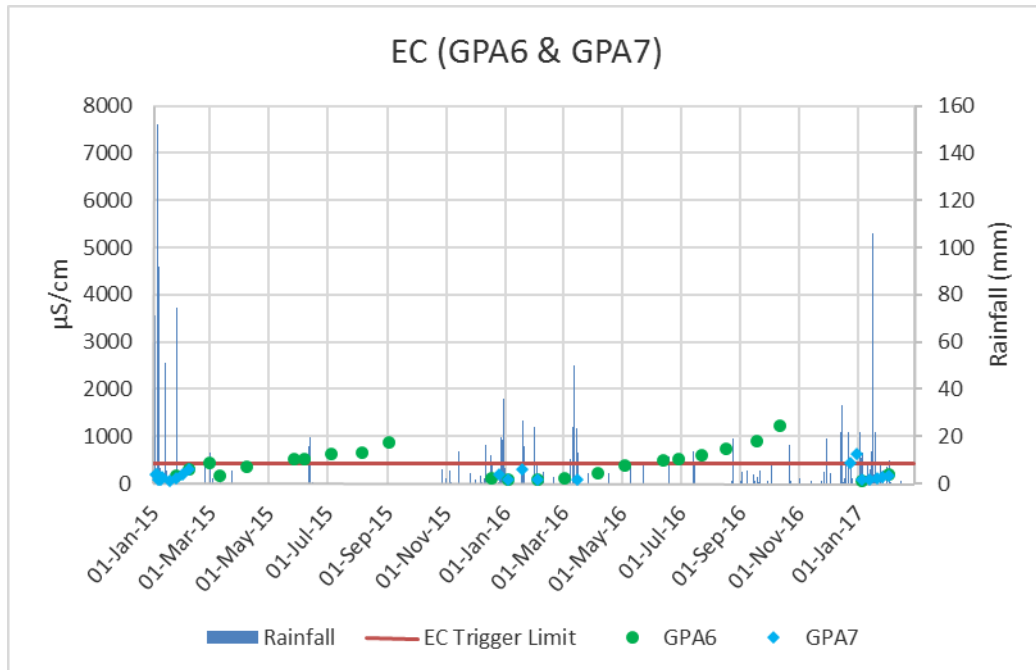


Figure 17. Receiving sites downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

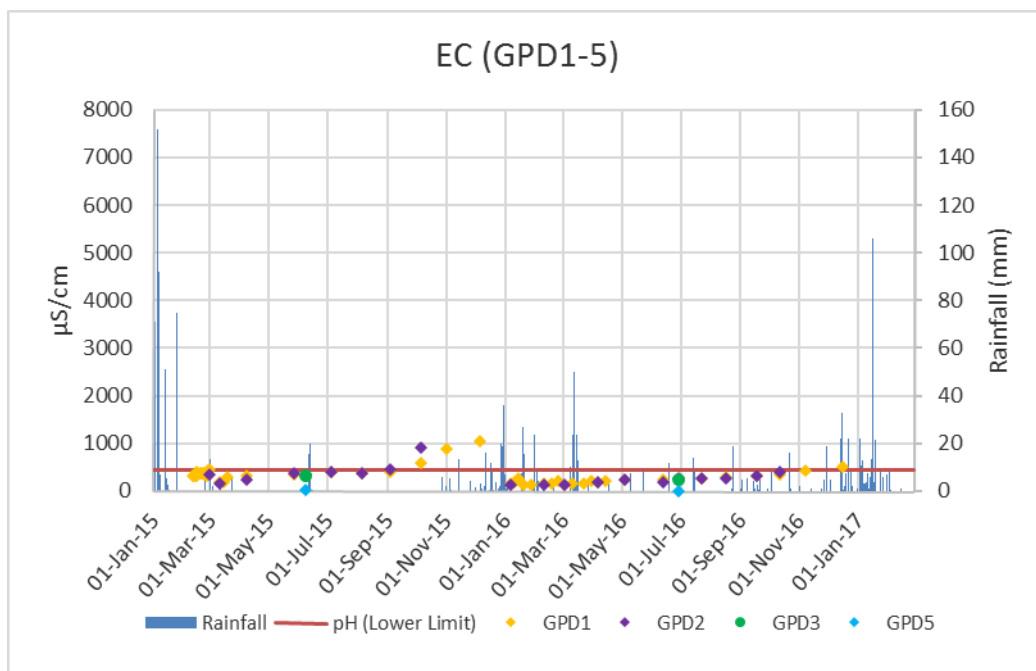


Figure 18. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

3.2.2.3. Sulphate

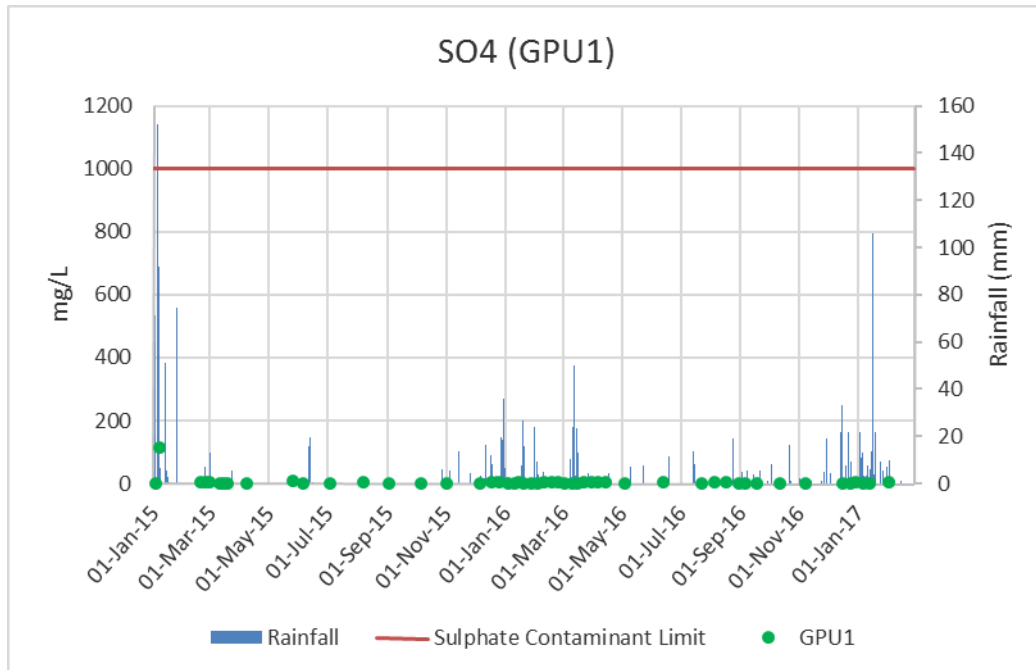


Figure 19. Reference site upstream of disturbance areas

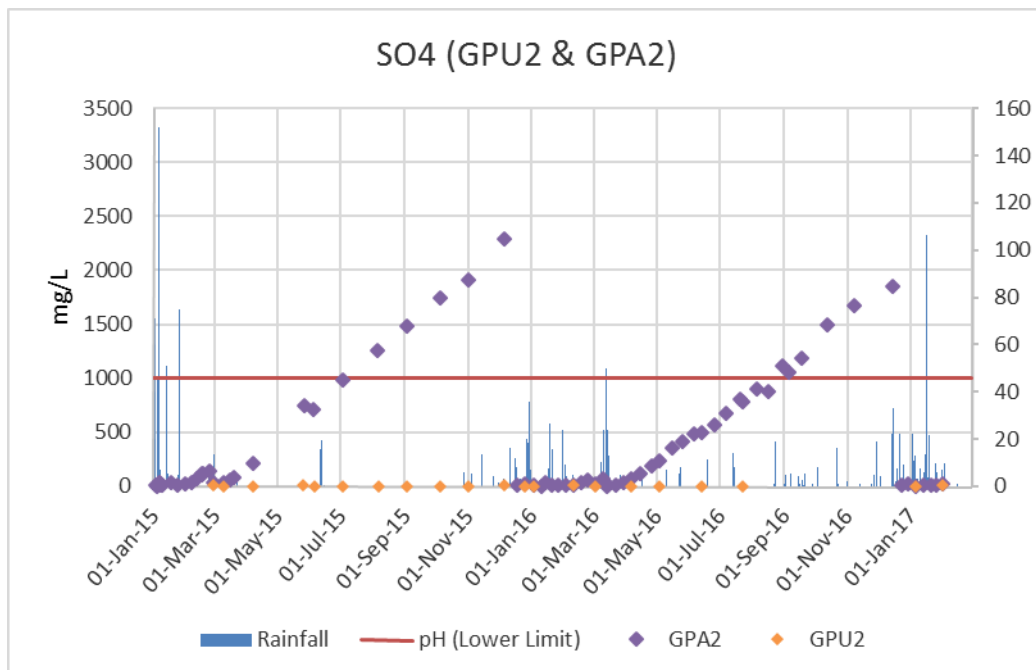


Figure 20. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

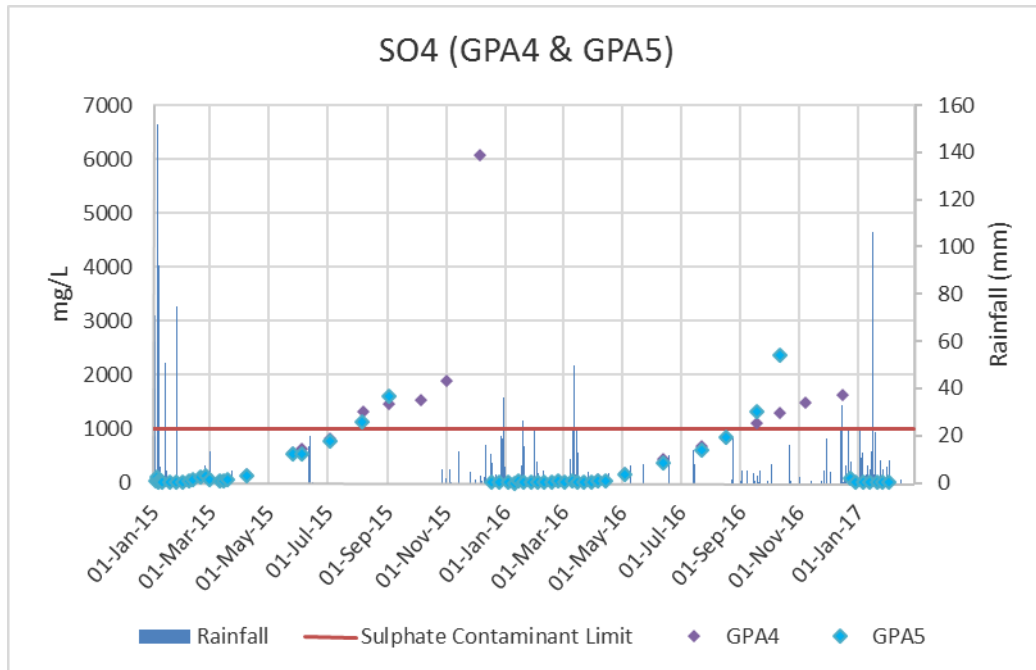


Figure 21. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

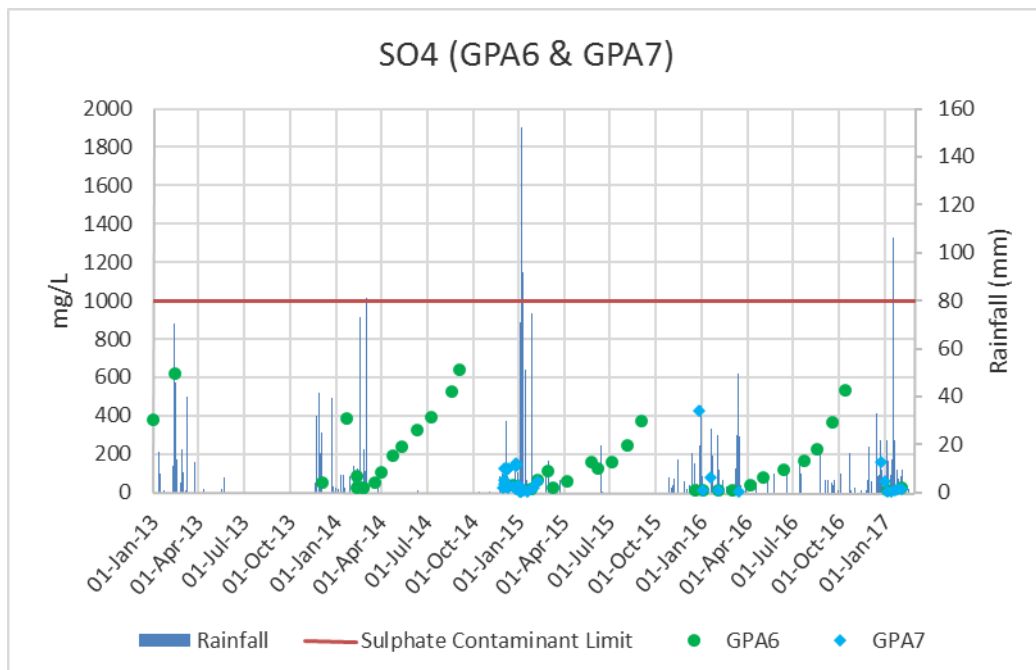


Figure 22. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

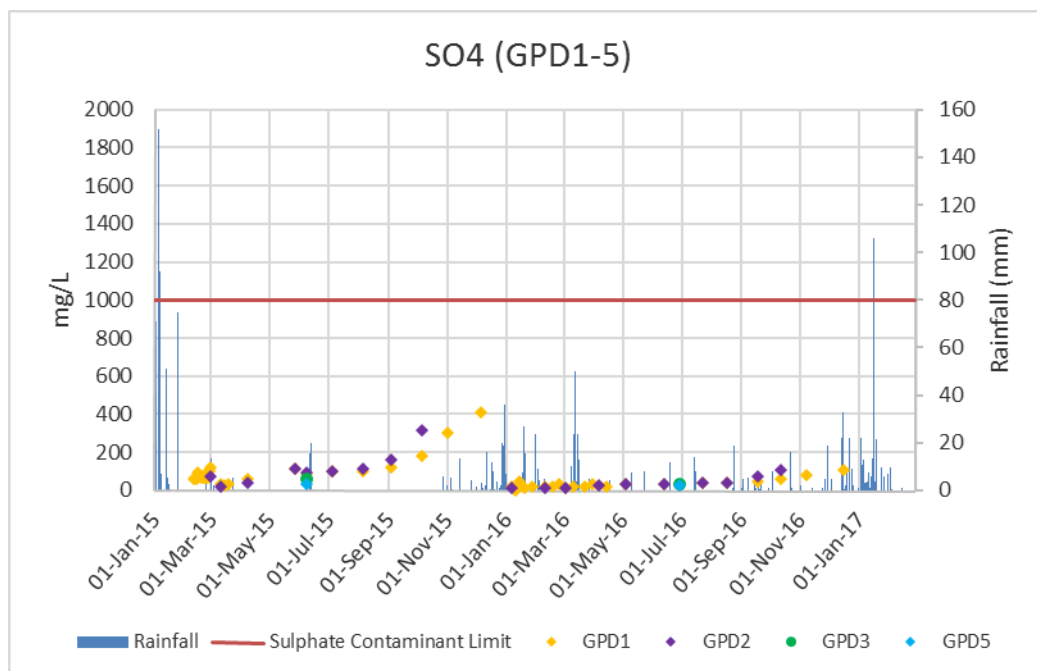


Figure 23. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

With the exception of GPA5, all sites showed a reduced average sulphate concentration in 2016/2017 compared with 2015/2016.

pH levels remained relatively consistent between 2015/2016 and 2016/2017.

3.2.2.4. Metals

Aluminium

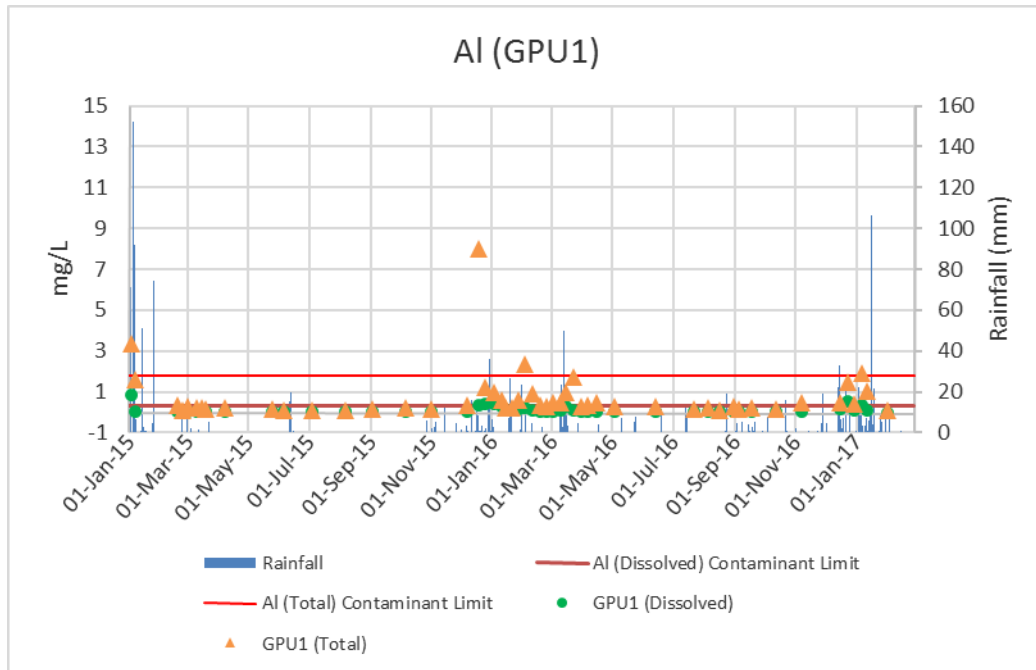


Figure 24. Reference site upstream of disturbance areas

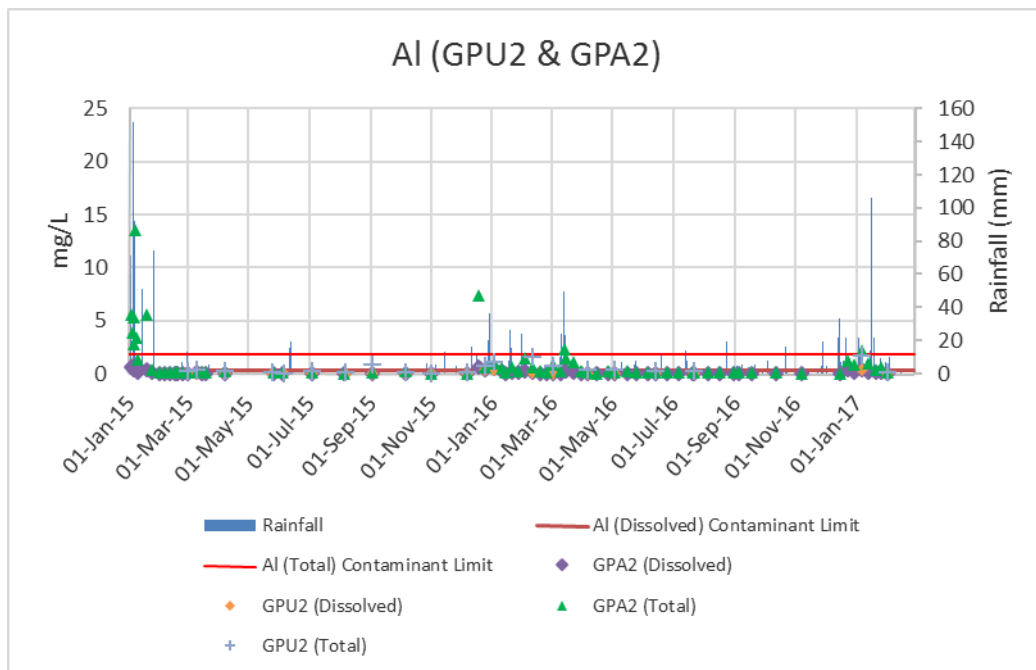


Figure 25. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

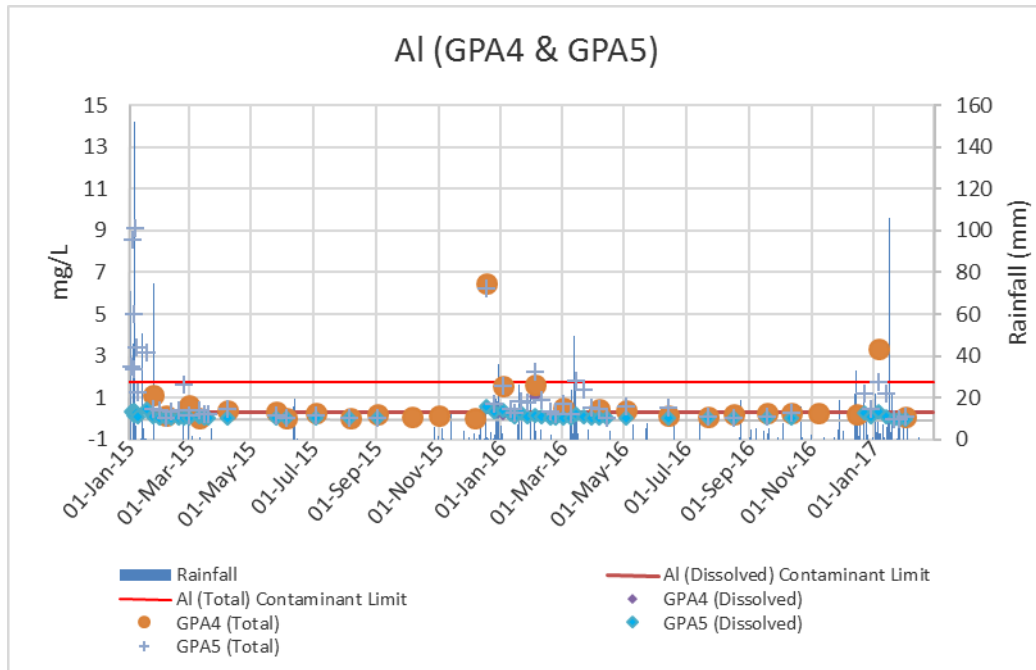


Figure 26. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

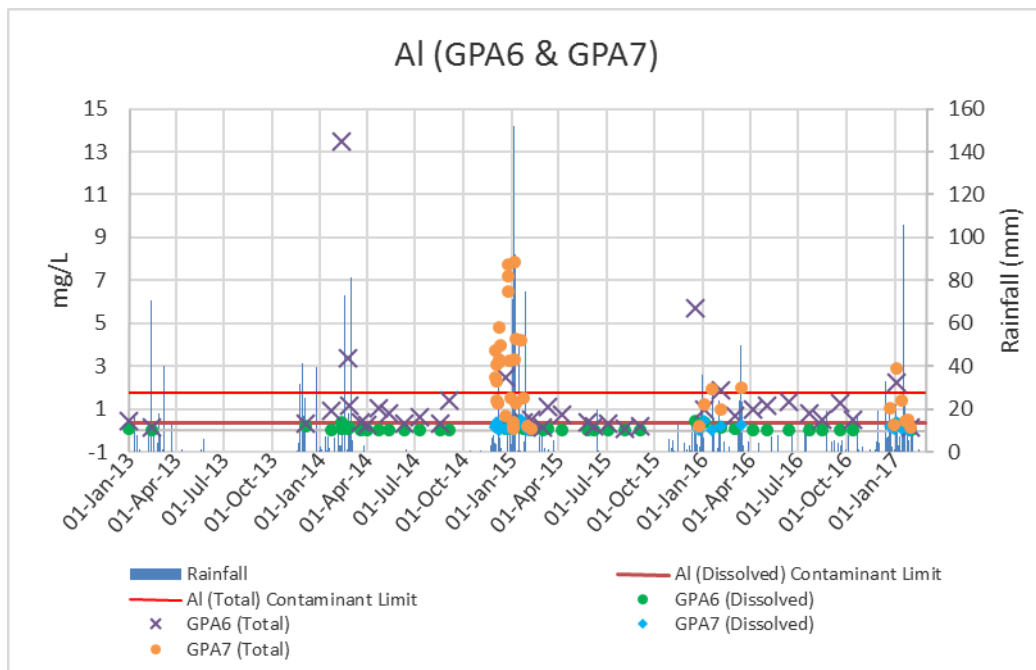


Figure 27. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

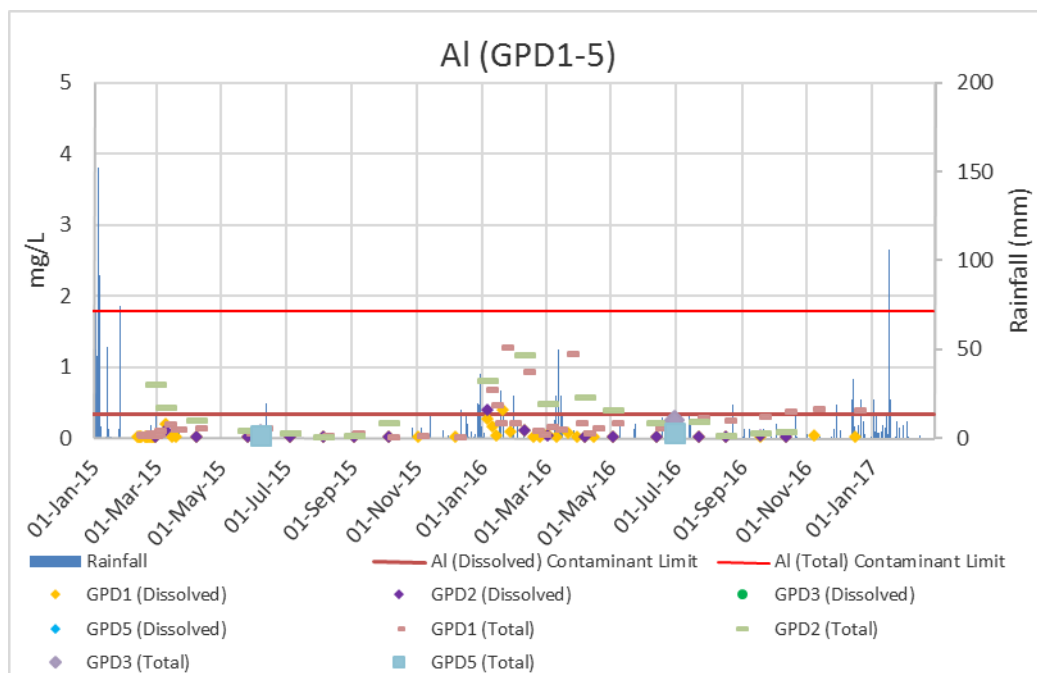


Figure 28. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

The high aluminium readings in the receiving water sites appear to be related with upstream high readings. It is clear that the high readings are focused in the wet season during flow events rather than dry season when Gunpowder Creek is not flowing.

All sites showed a reduction in average dissolved Aluminium concentration in 2016/2017 compared with 2015/2016 levels. All sites, with the exception of GDP1, showed a reduction in average total Aluminium concentration in 2016/2017 compared with 2015/2016 levels.

Copper

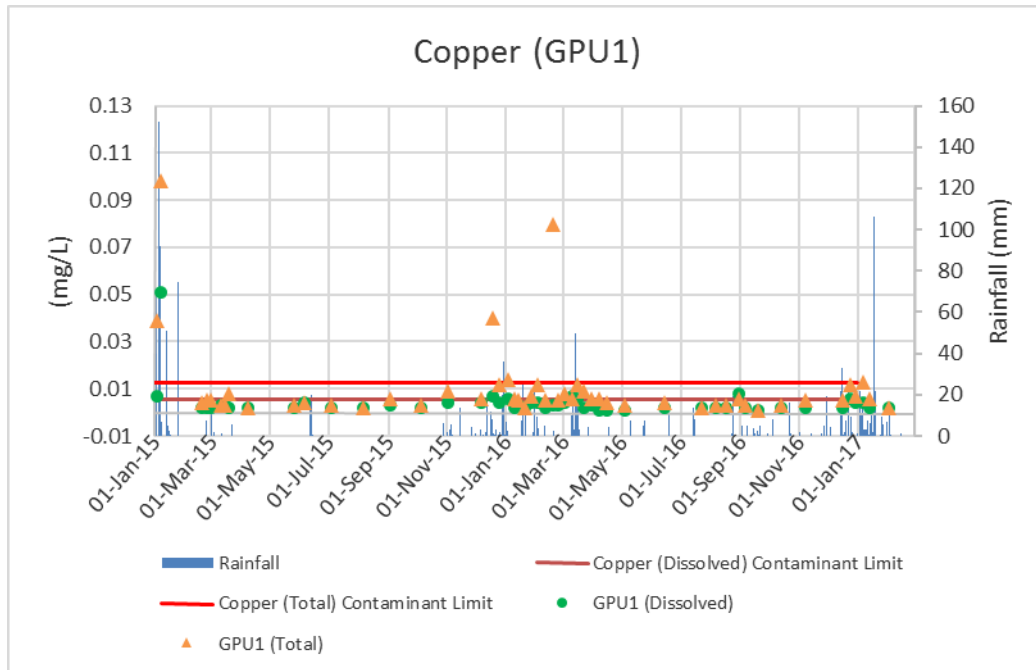


Figure 29. Reference site upstream of disturbance areas

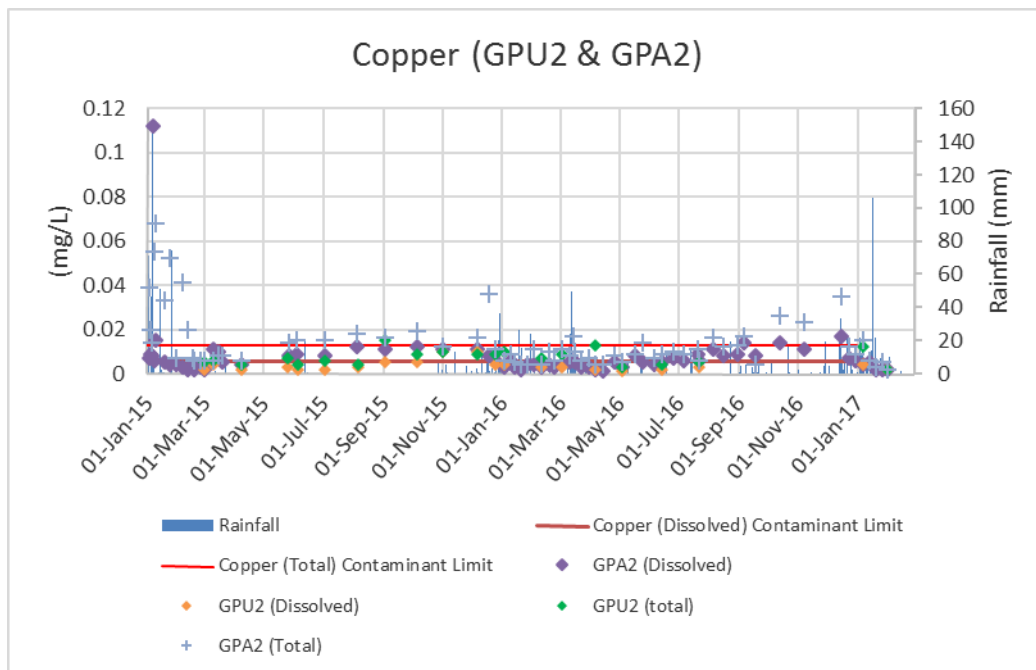


Figure 30. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

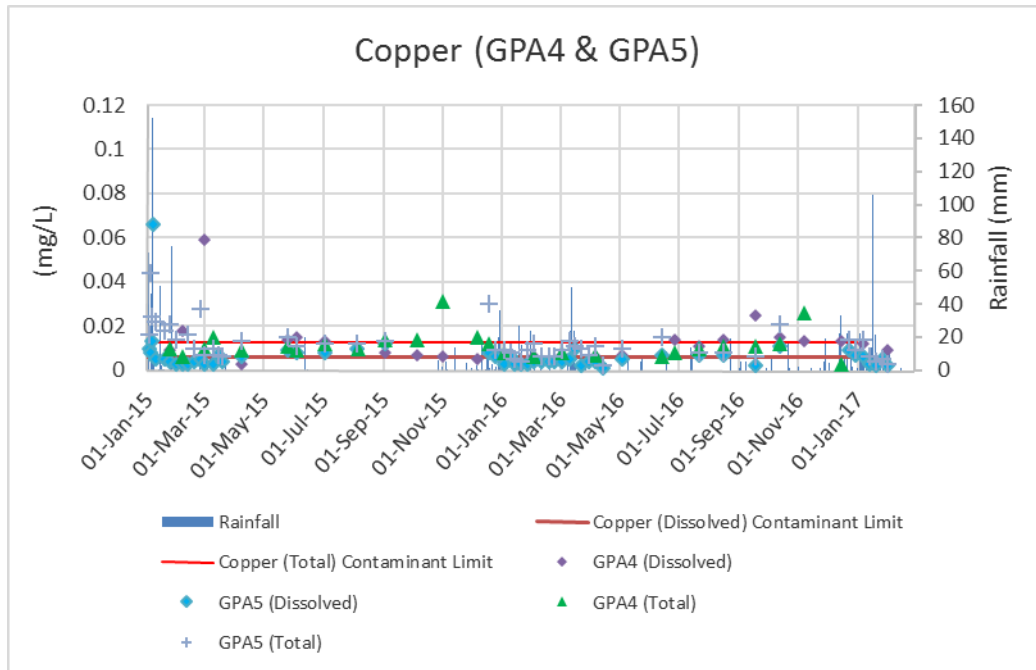


Figure 31. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

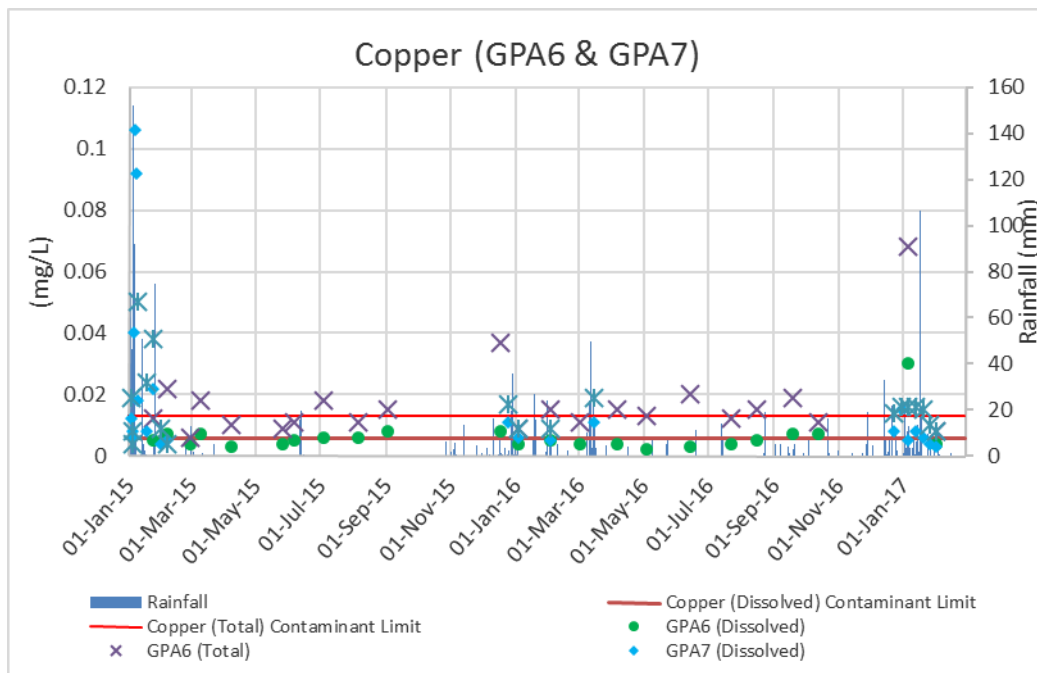


Figure 32. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

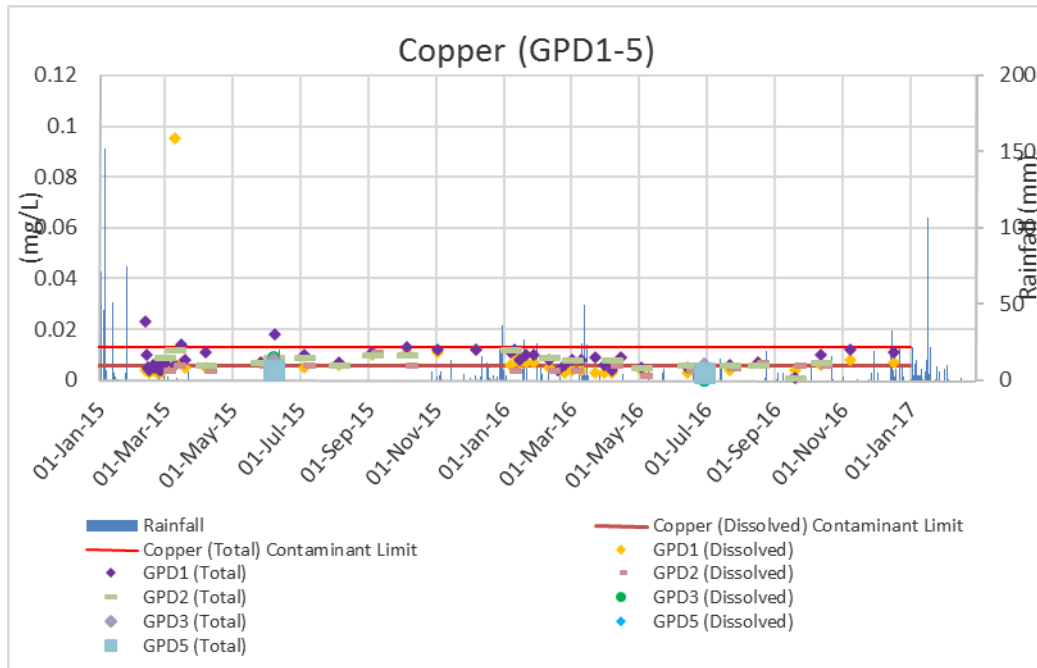


Figure 33. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

All sites showed a reduction in average dissolved and total Copper concentration in 2016/2017 compared with 2015/2016 levels.

Cobalt

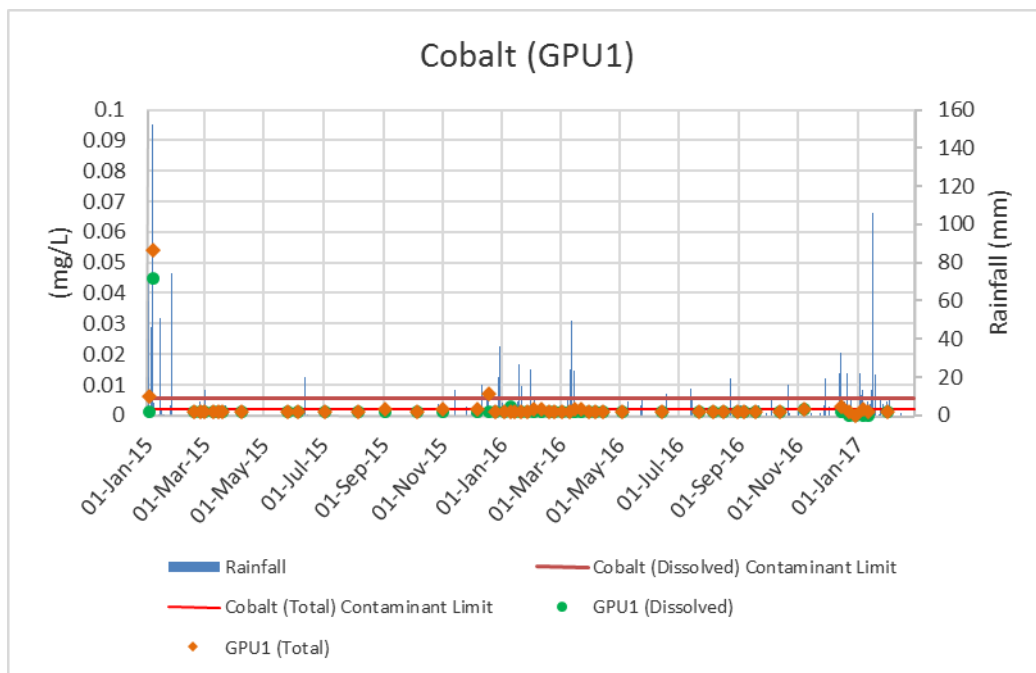


Figure 34. Reference site upstream of disturbance areas

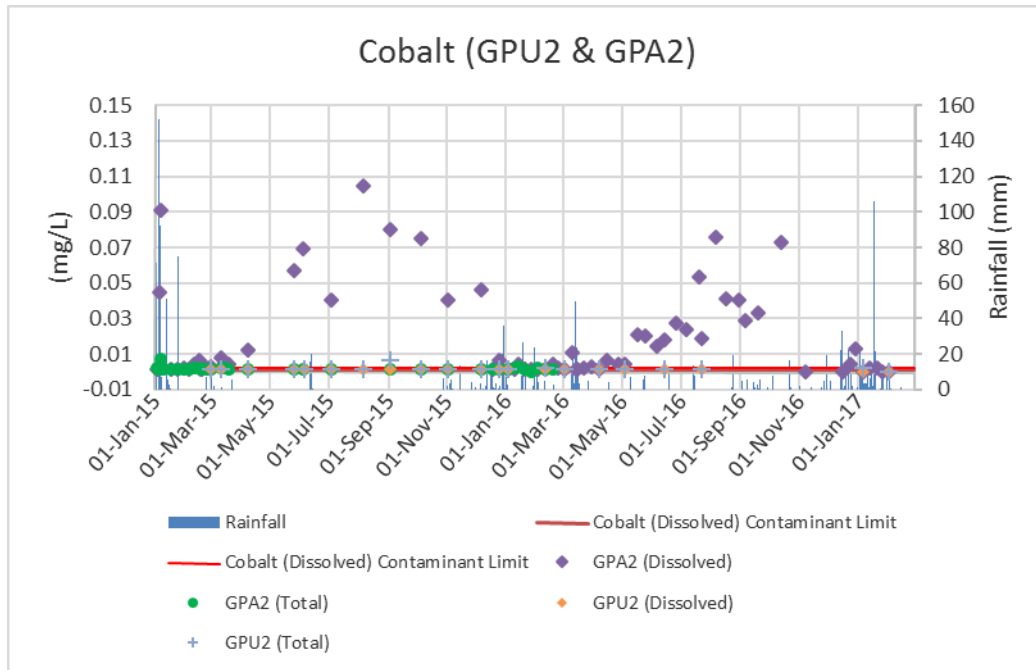


Figure 35. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

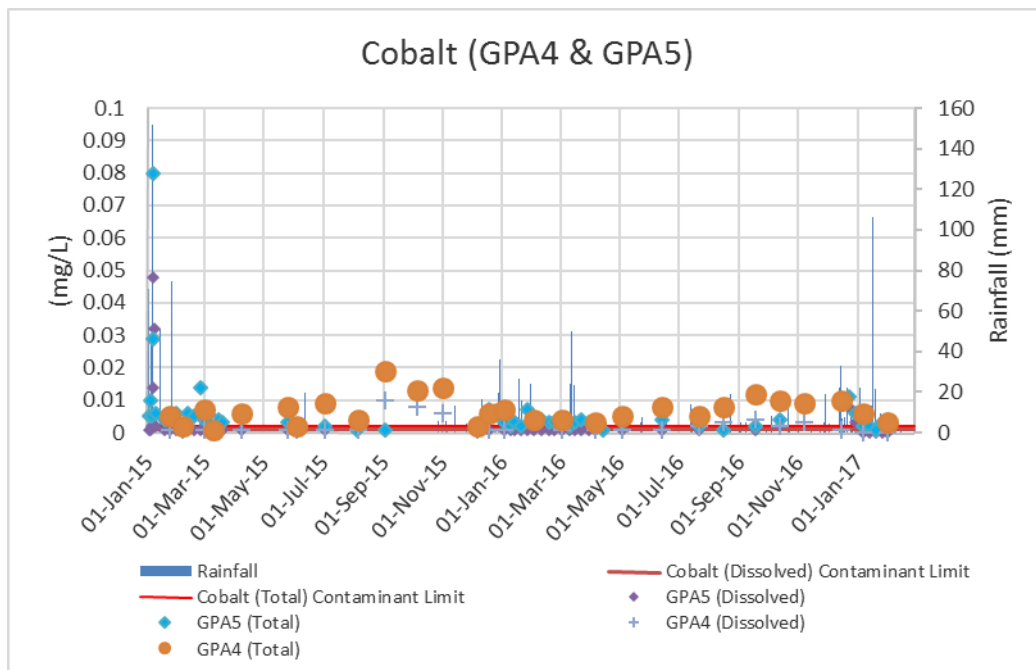


Figure 36. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

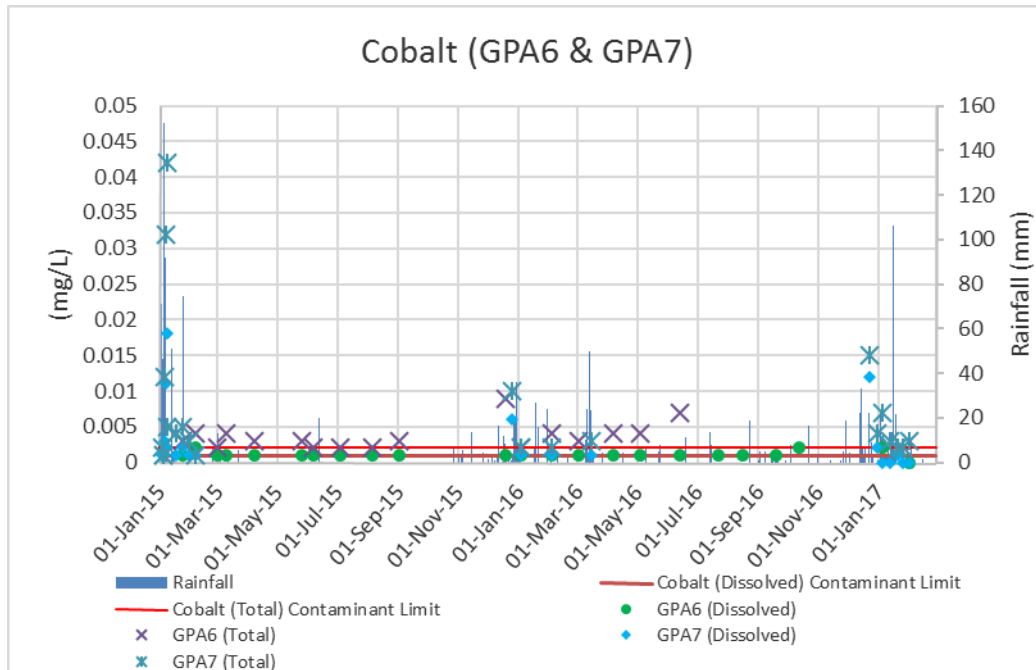


Figure 37. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

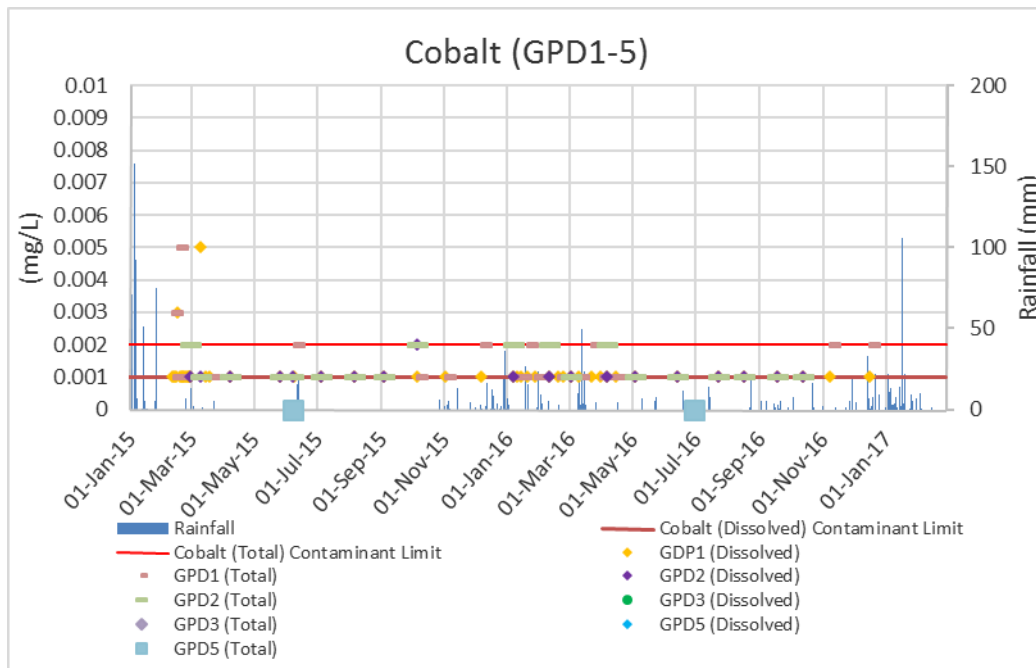


Figure 38. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

Cobalt average readings have remained similar or slightly reduced in the current year.

Nickel

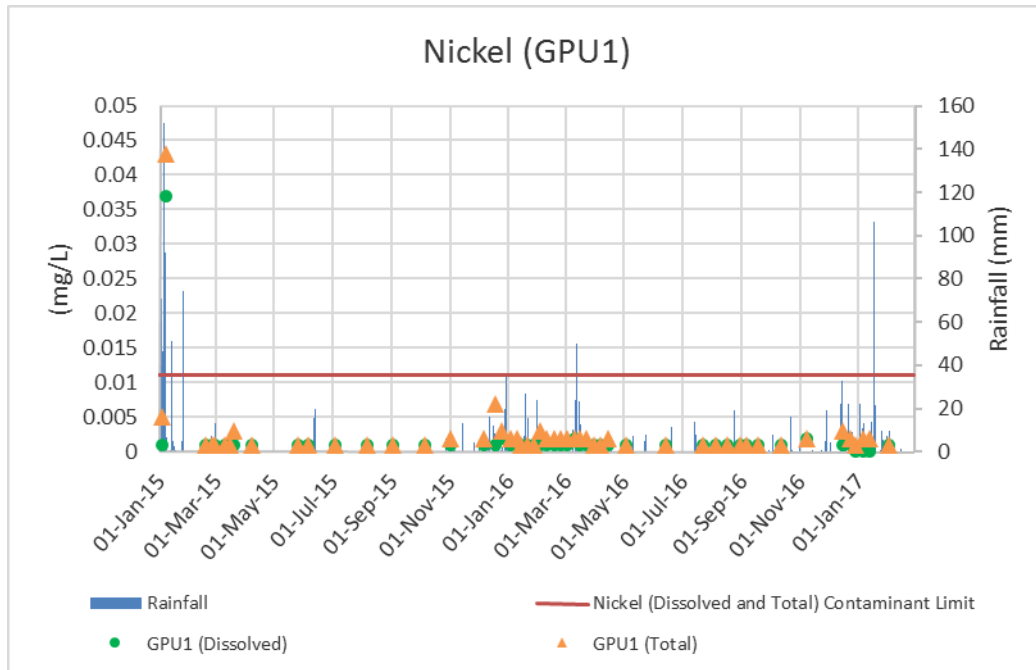


Figure 39. Reference site upstream of disturbance areas

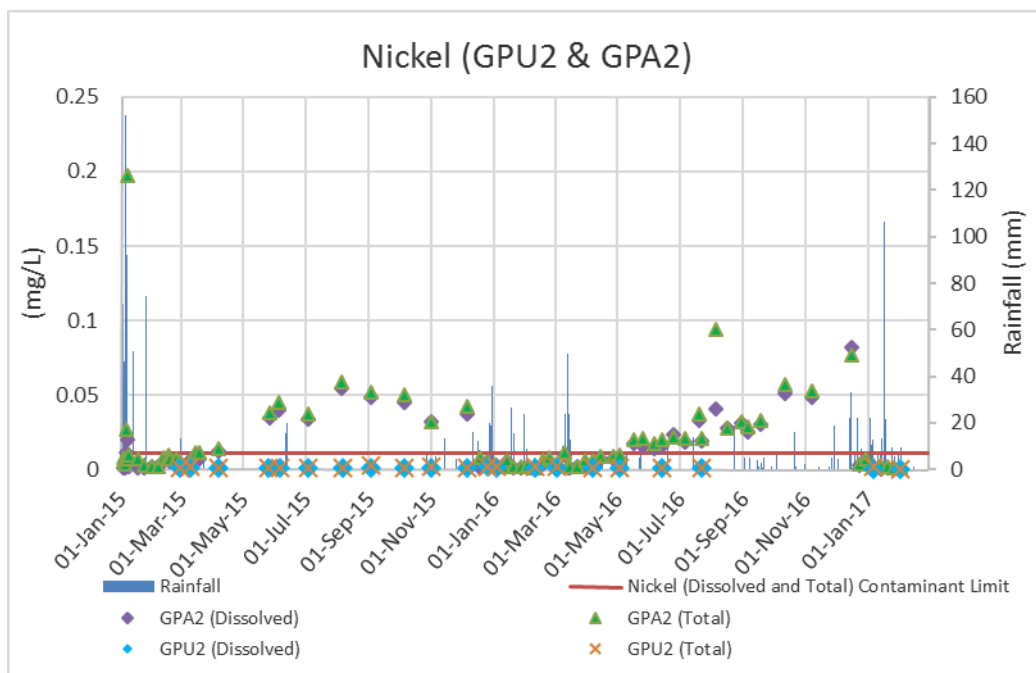


Figure 40. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

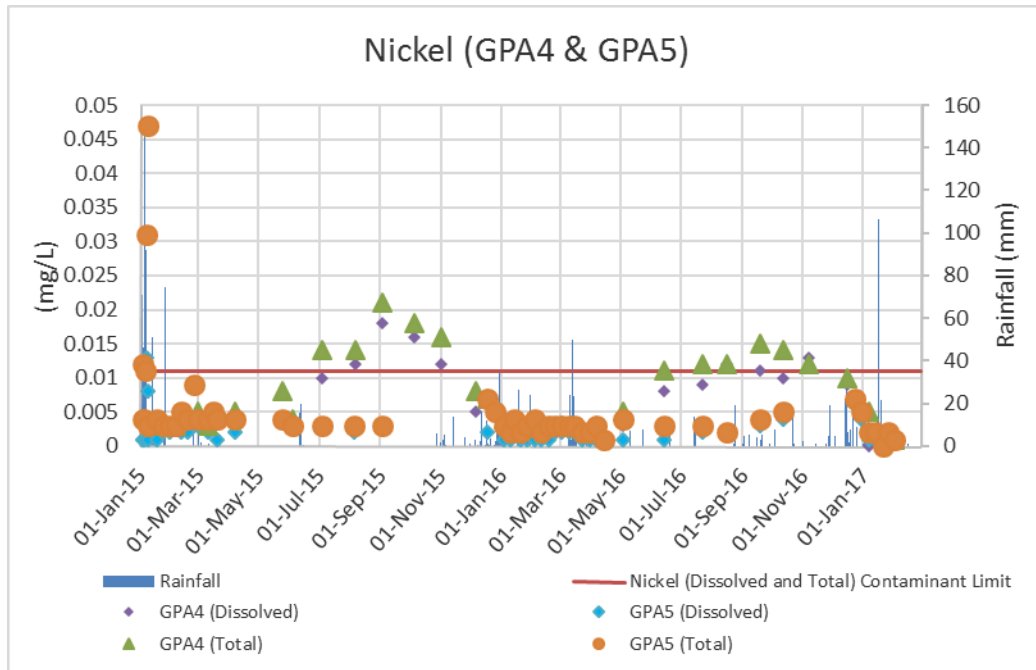


Figure 41. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

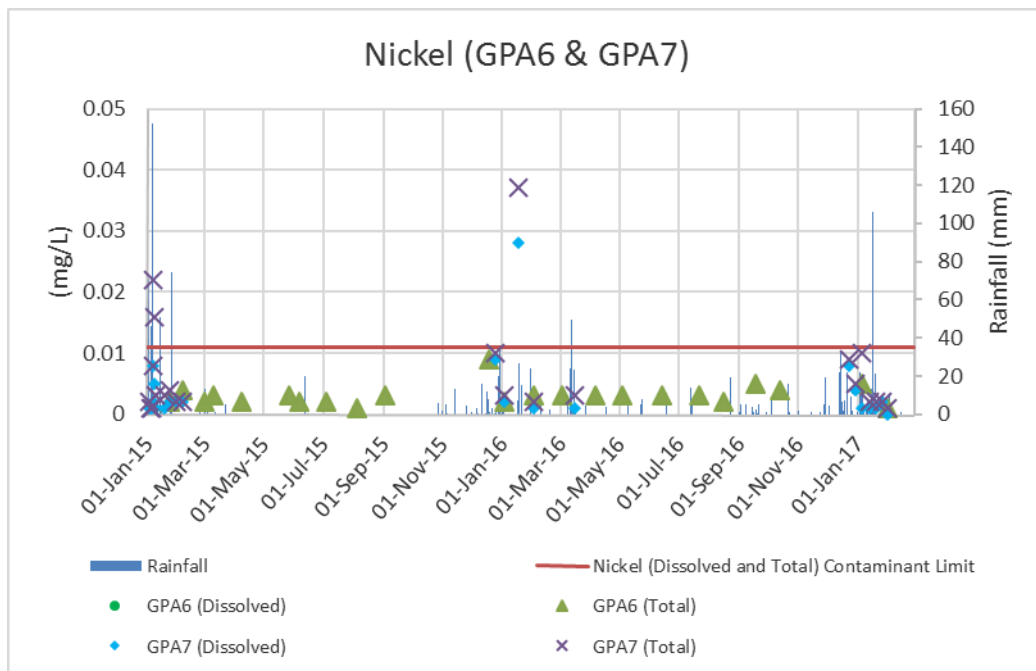


Figure 42. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

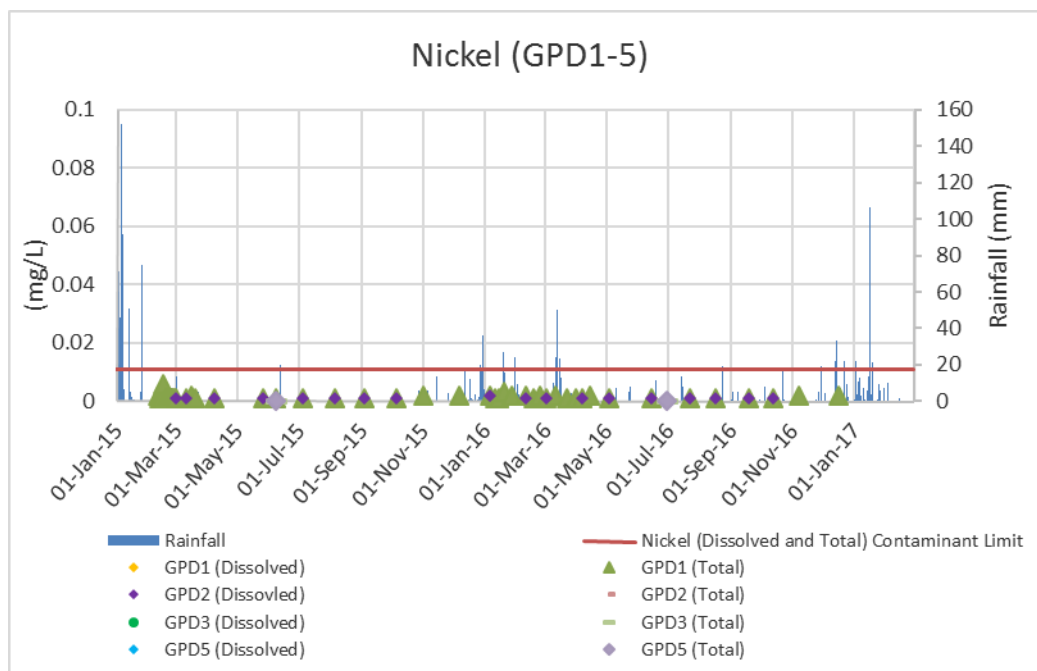


Figure 43. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

Lead

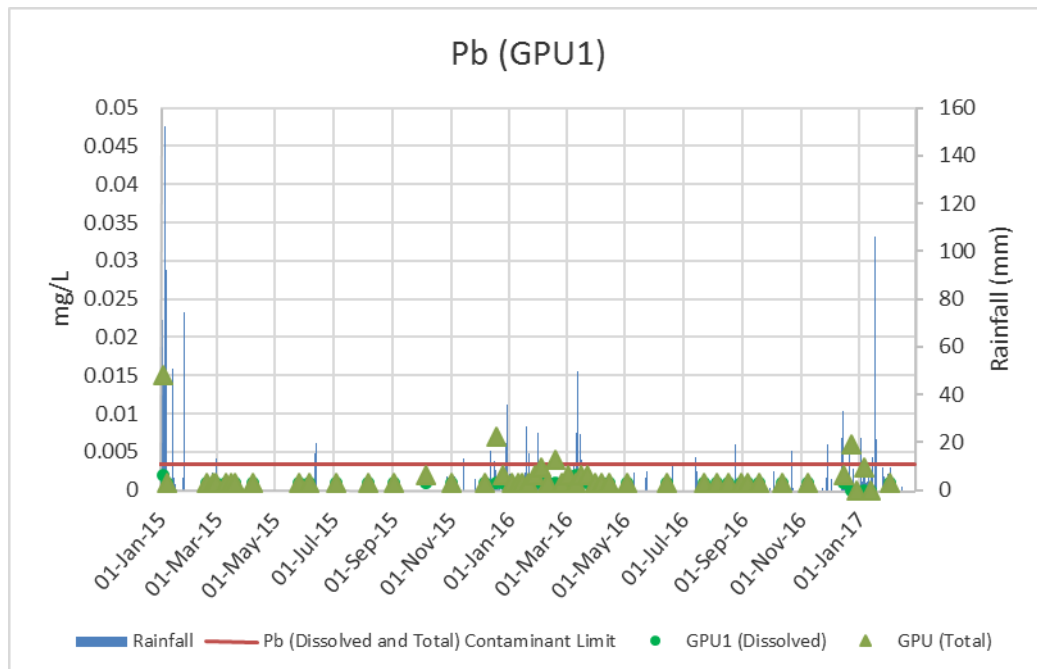


Figure 44. Reference site upstream of disturbance areas

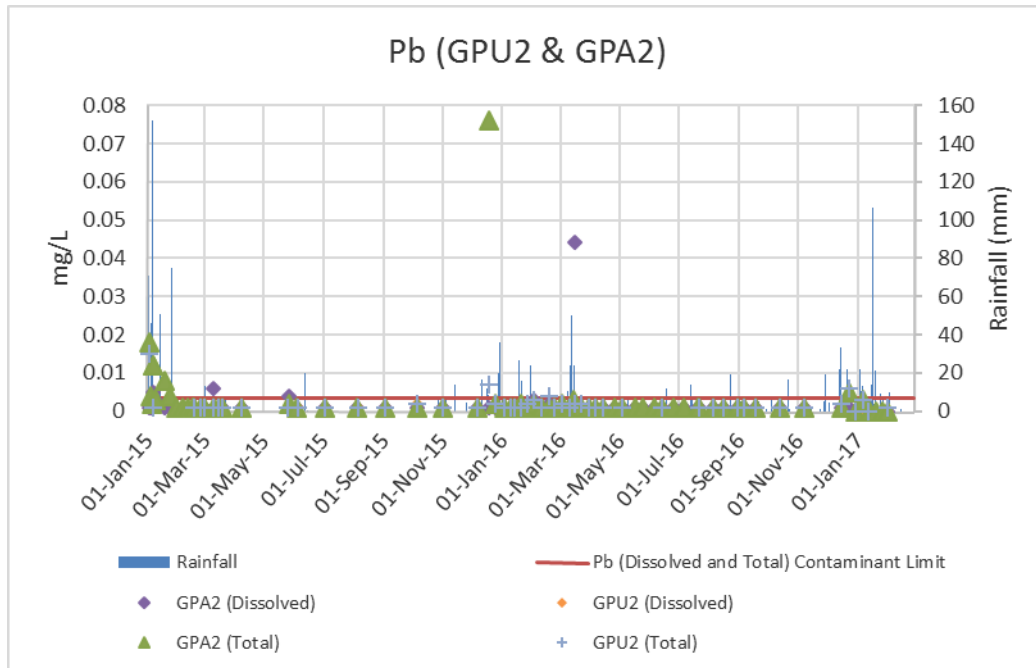


Figure 45. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

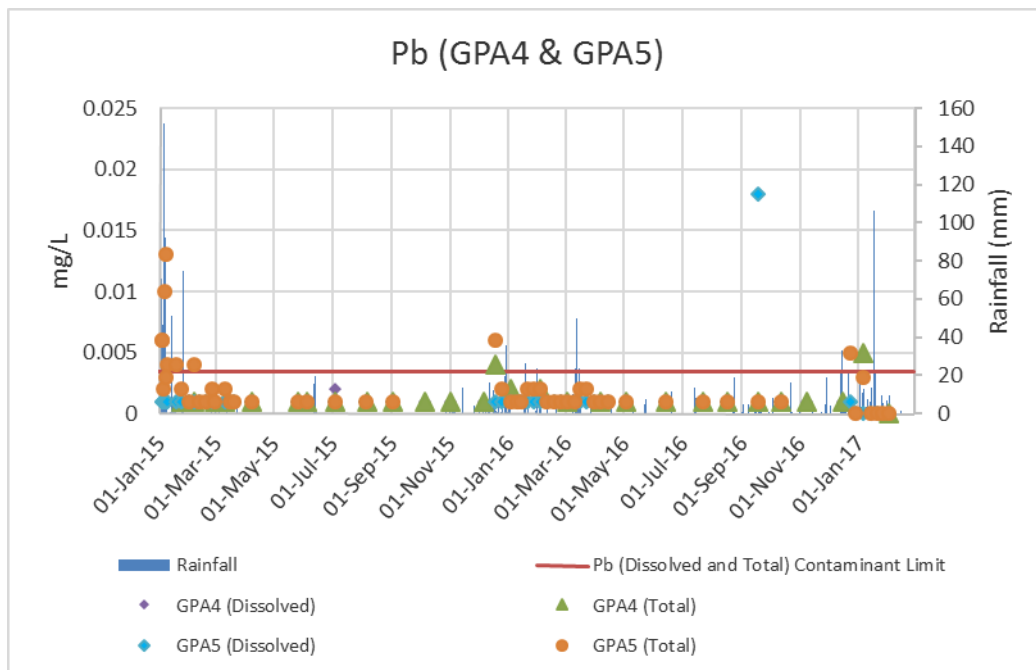


Figure 46. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

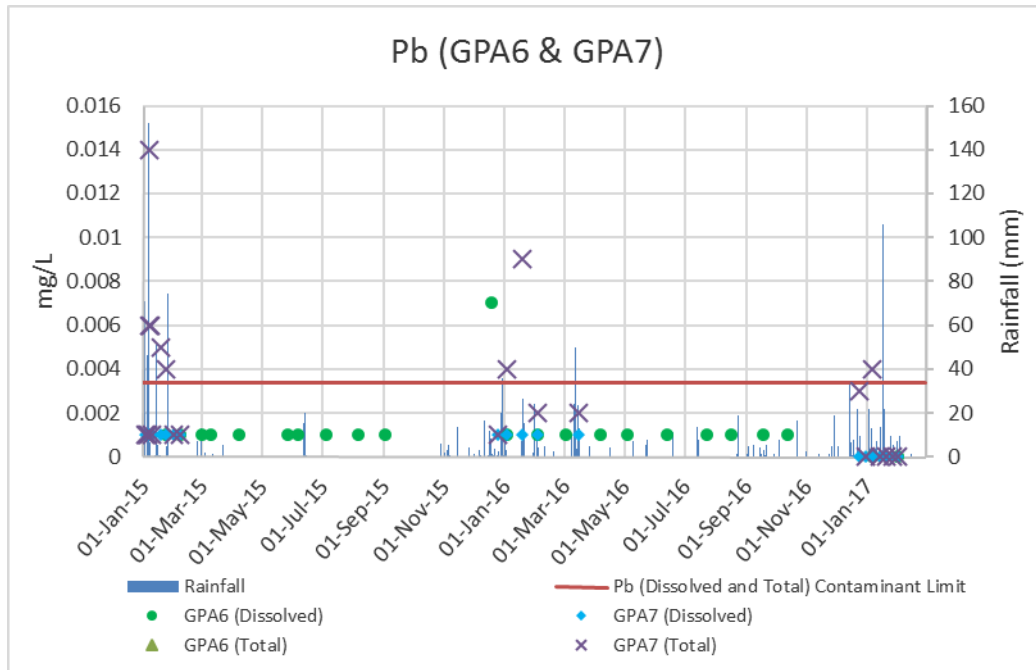


Figure 47. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

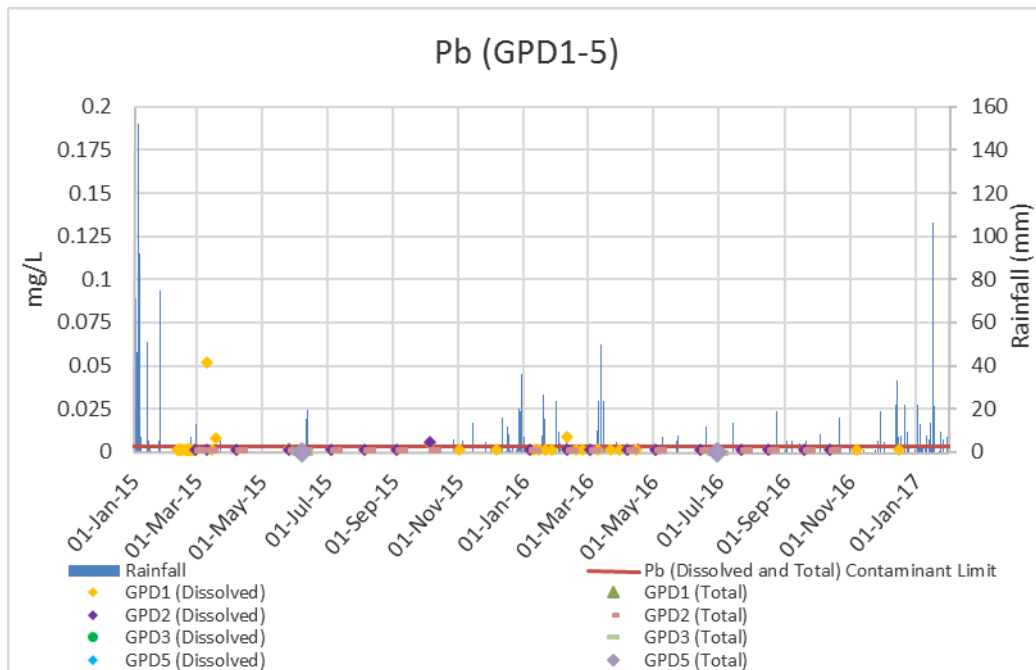


Figure 48. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

Current year average lead and nickel concentrations have reduced or remain stable from 2015/2016.

Chromium

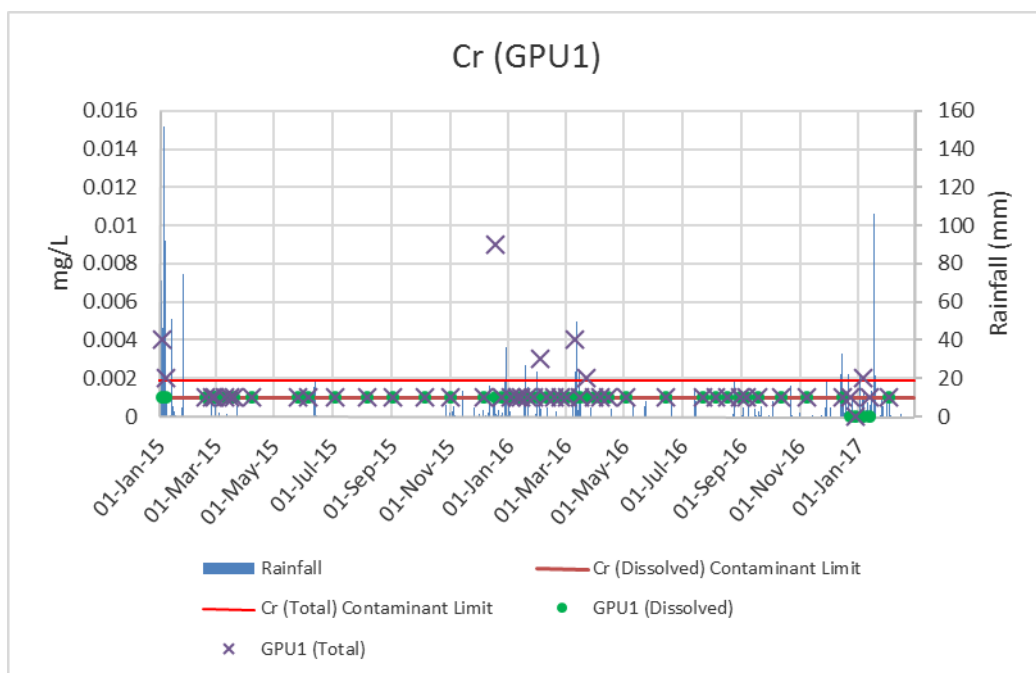


Figure 49. Reference site upstream of disturbance areas

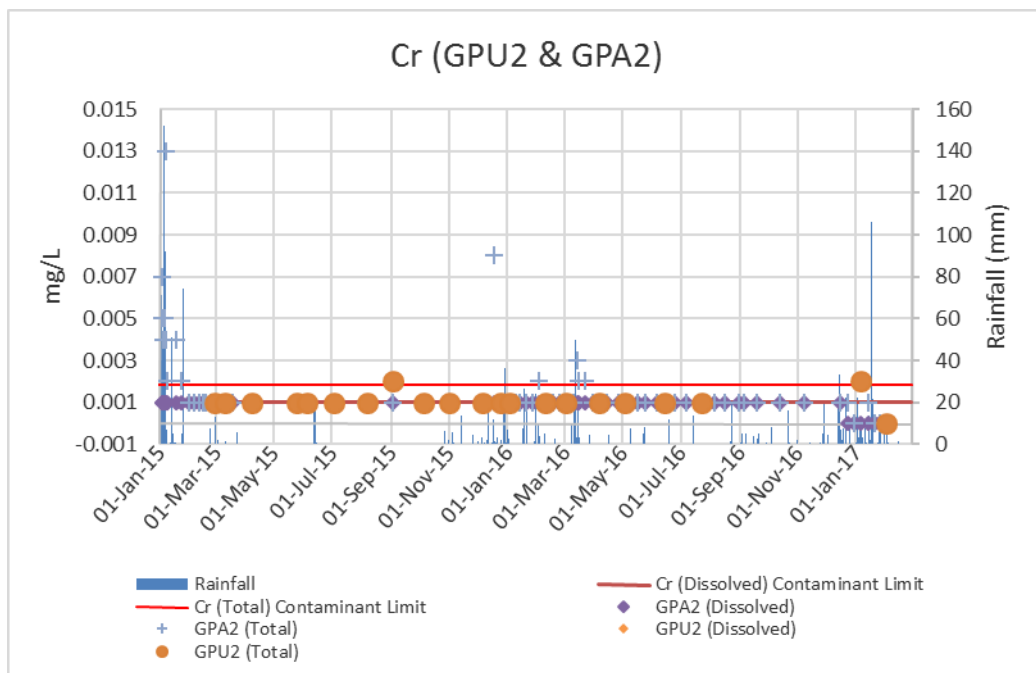


Figure 50. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

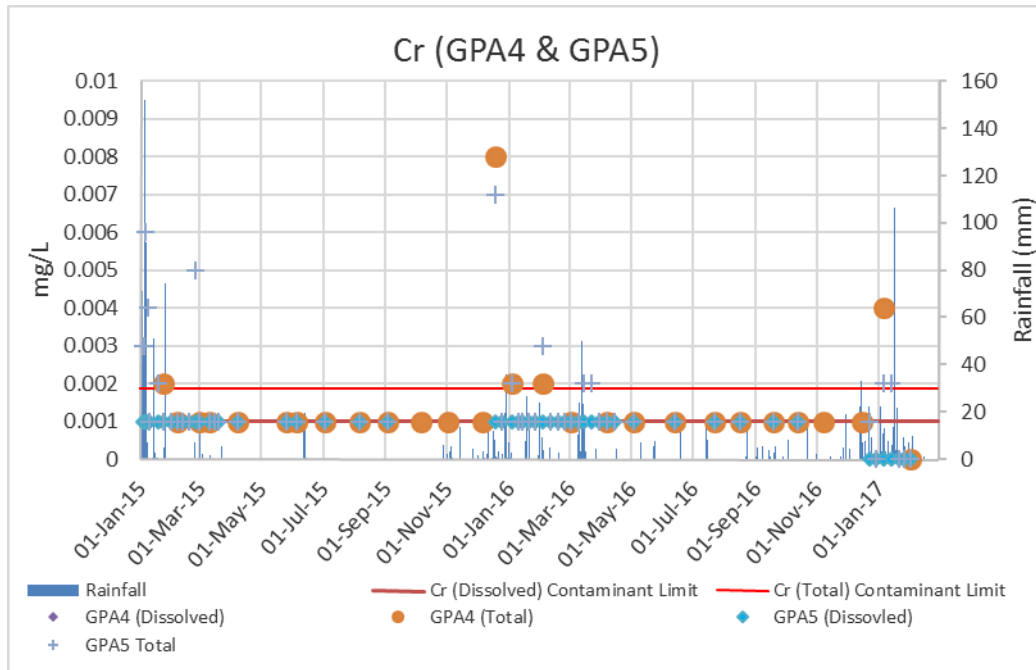


Figure 51. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

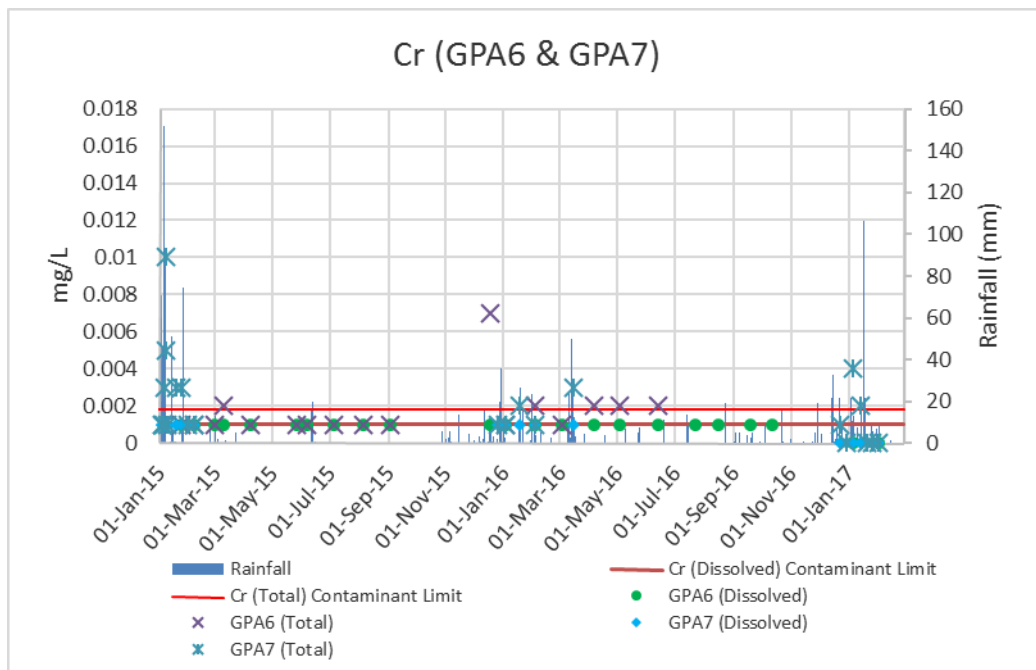


Figure 52. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

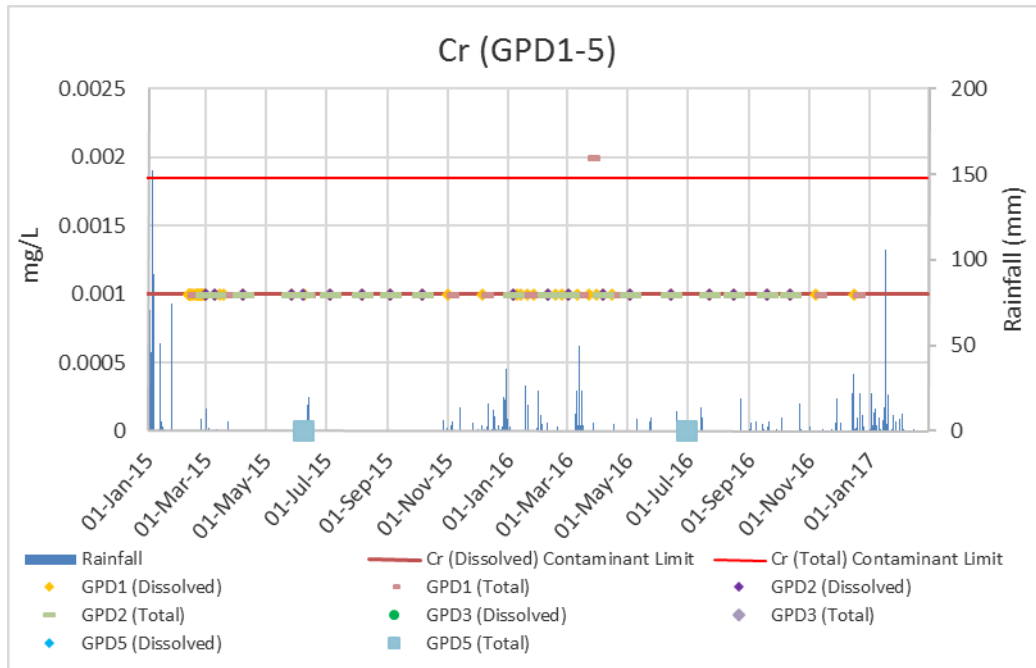


Figure 53. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

The average chromium levels have improved or remained stable with exception of GPA7.

Manganese

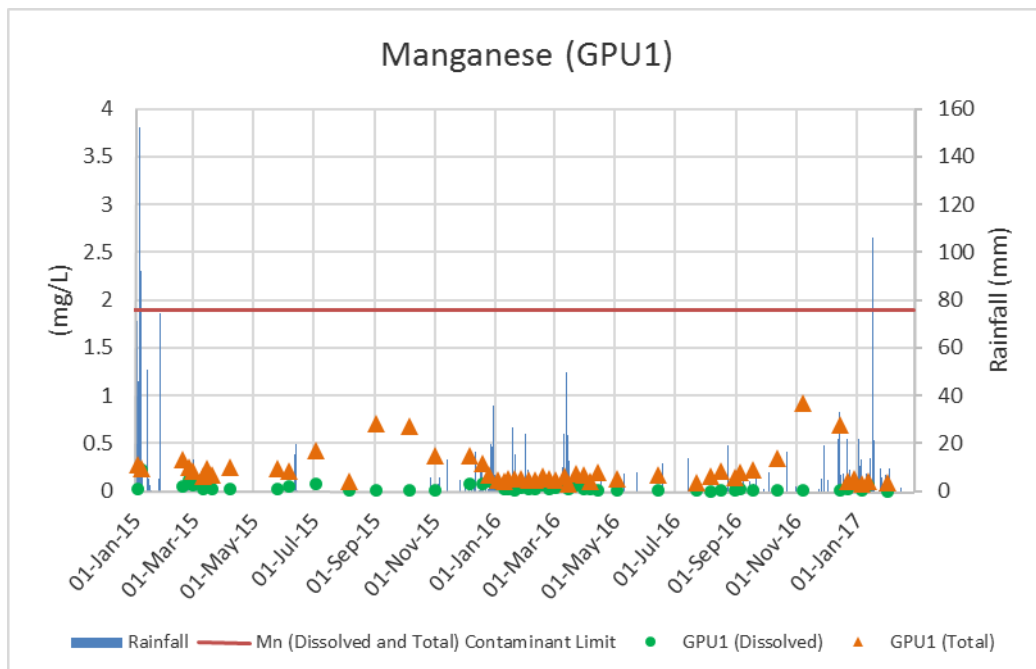


Figure 54. Reference site upstream of disturbance areas

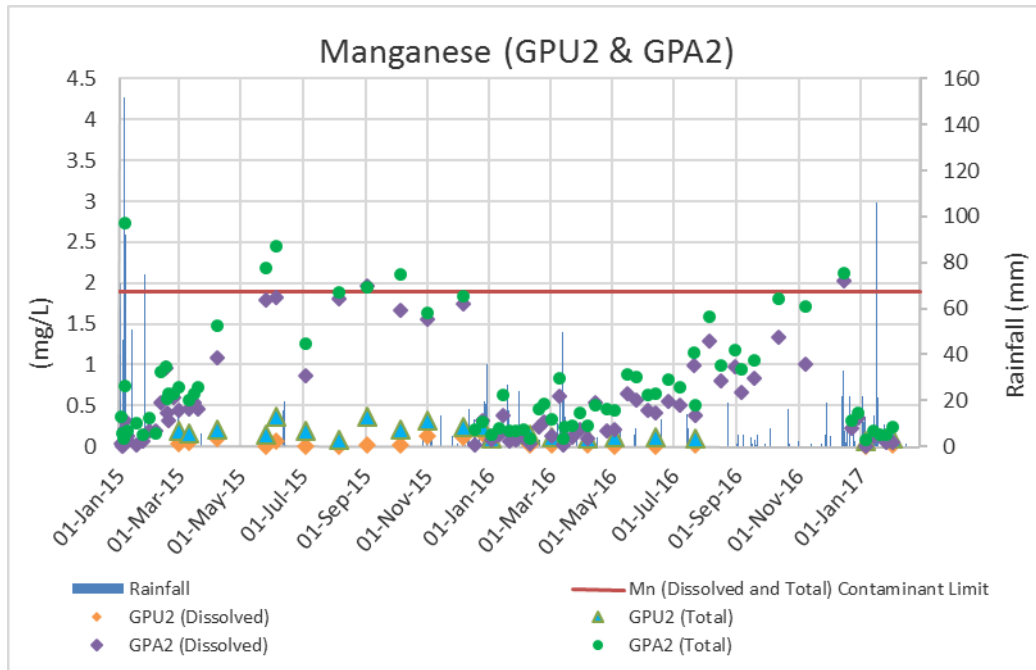


Figure 55. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

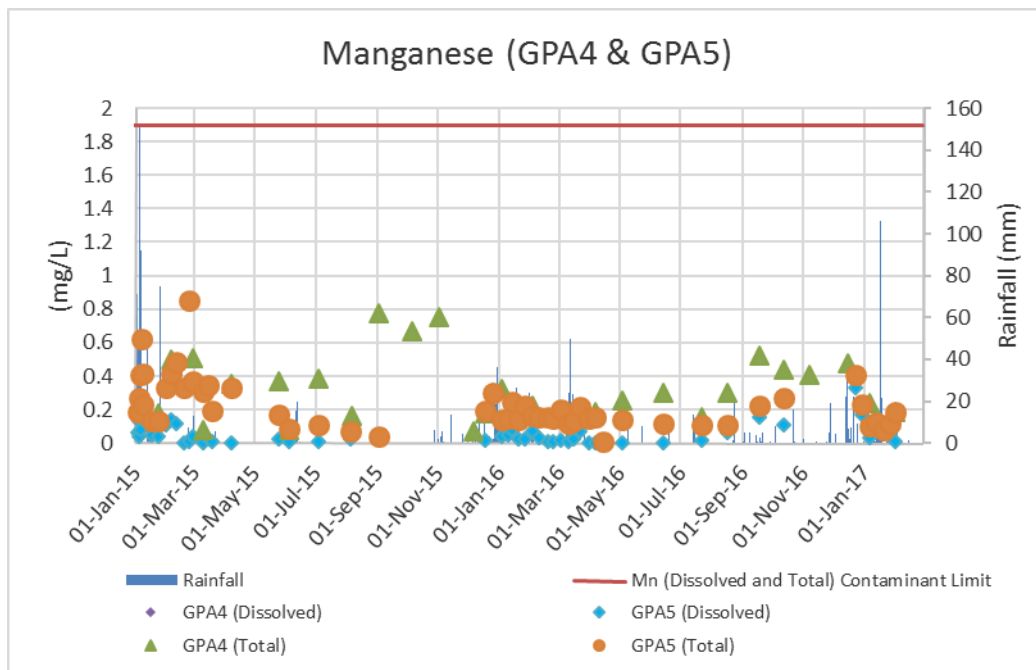


Figure 56. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

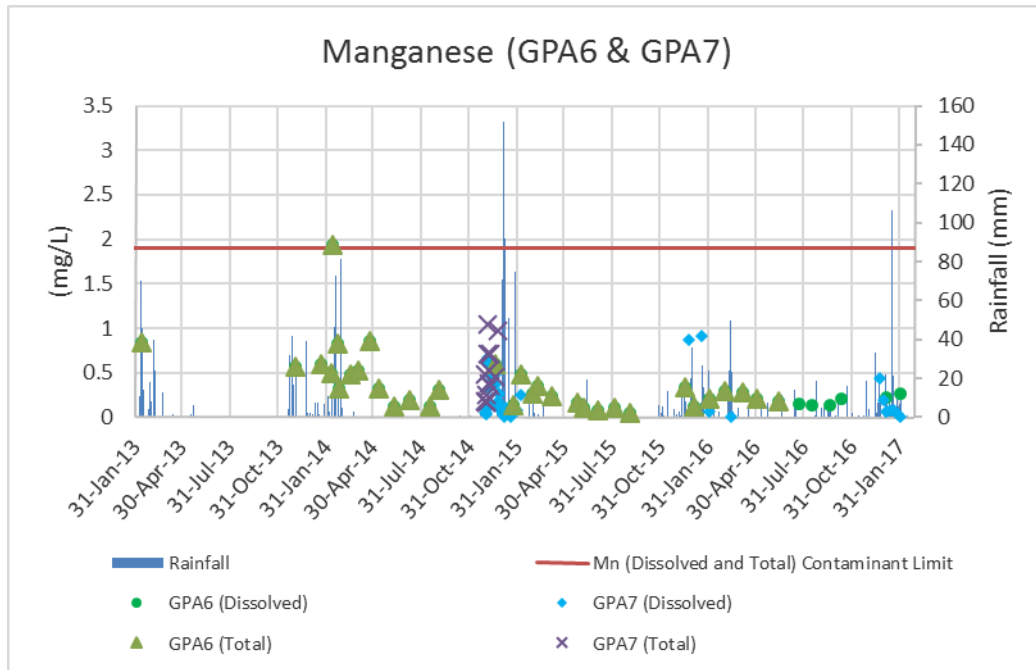


Figure 57. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

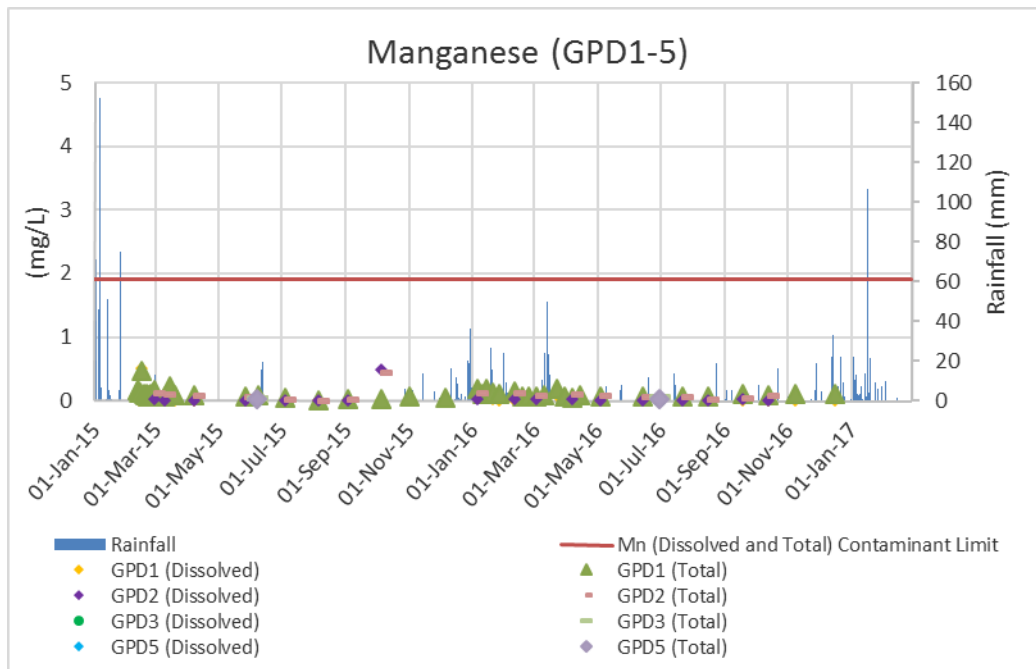


Figure 58. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

Manganese values in 2016/2017 remained below contaminant limits with one exception being GPA2 which had a single exceedance for both dissolved and total manganese.

Zinc

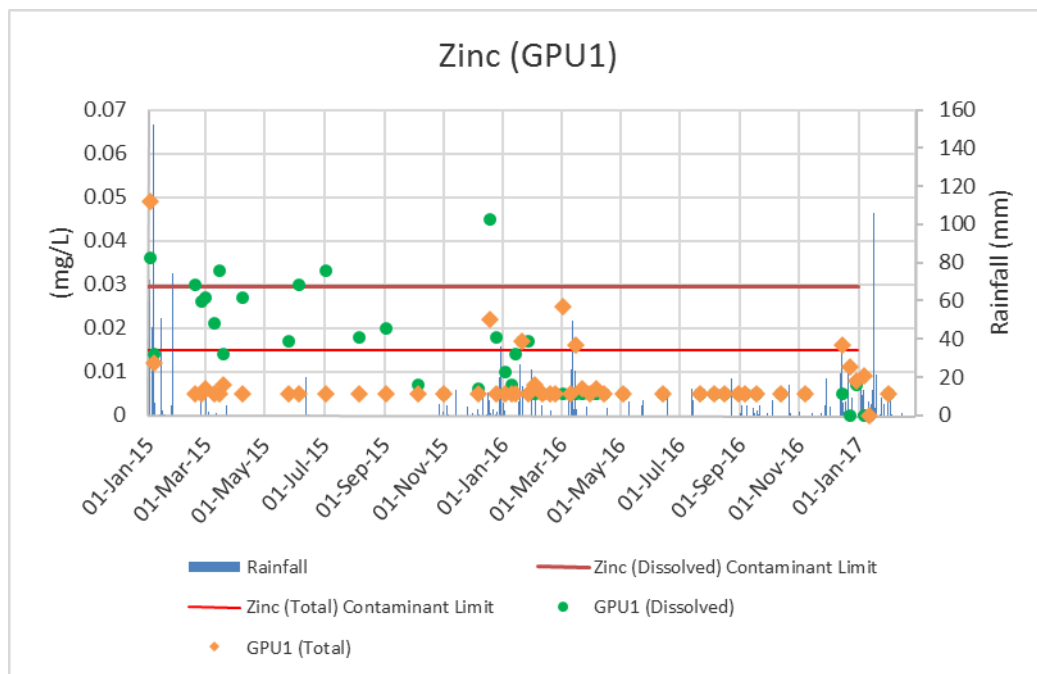


Figure 59. Reference site upstream of disturbance areas

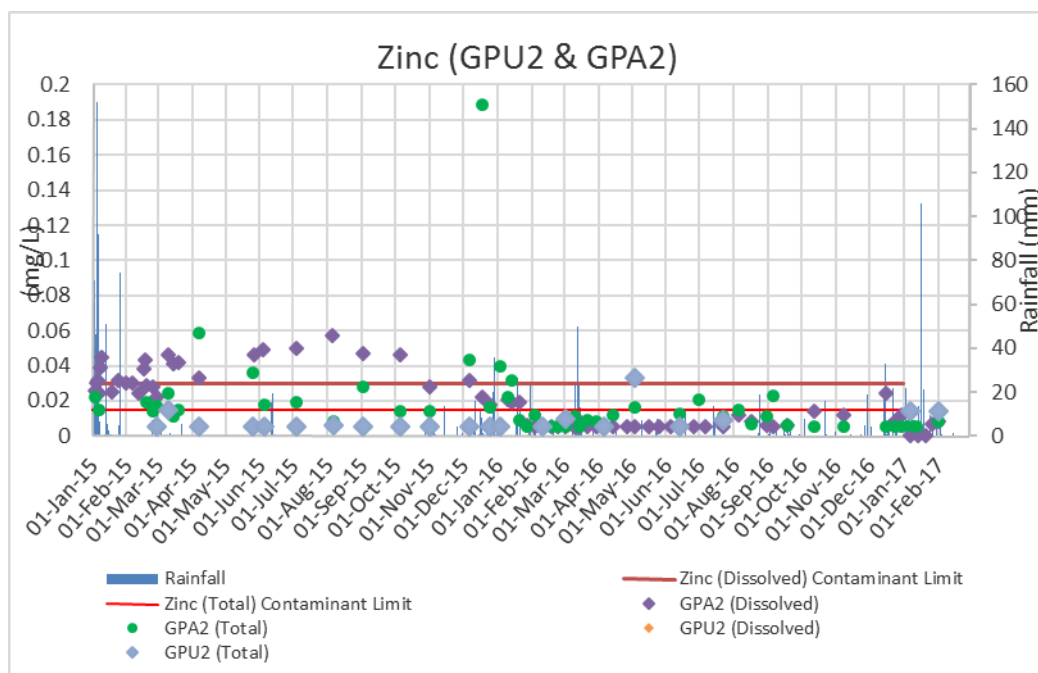


Figure 60. Receiving sites downstream of Esperanza TSF, Saddle Dam 2 and Saddle Dam 3 (GPU2 and GPA2)

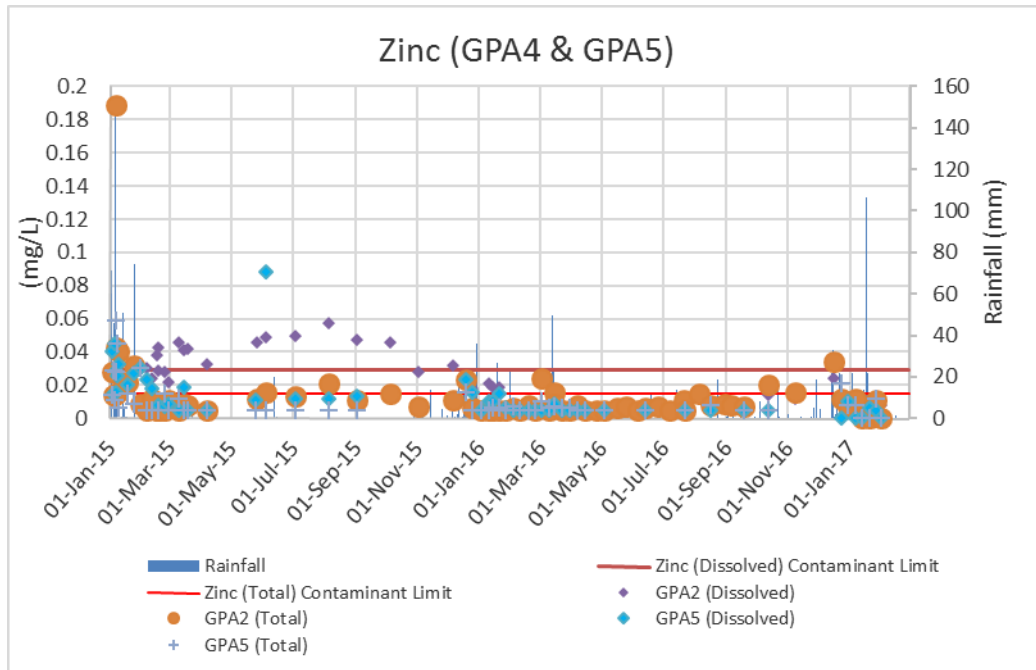


Figure 61. Receiving sites down stream of Mill Dam release point W1 (GPA4 and GPA5)

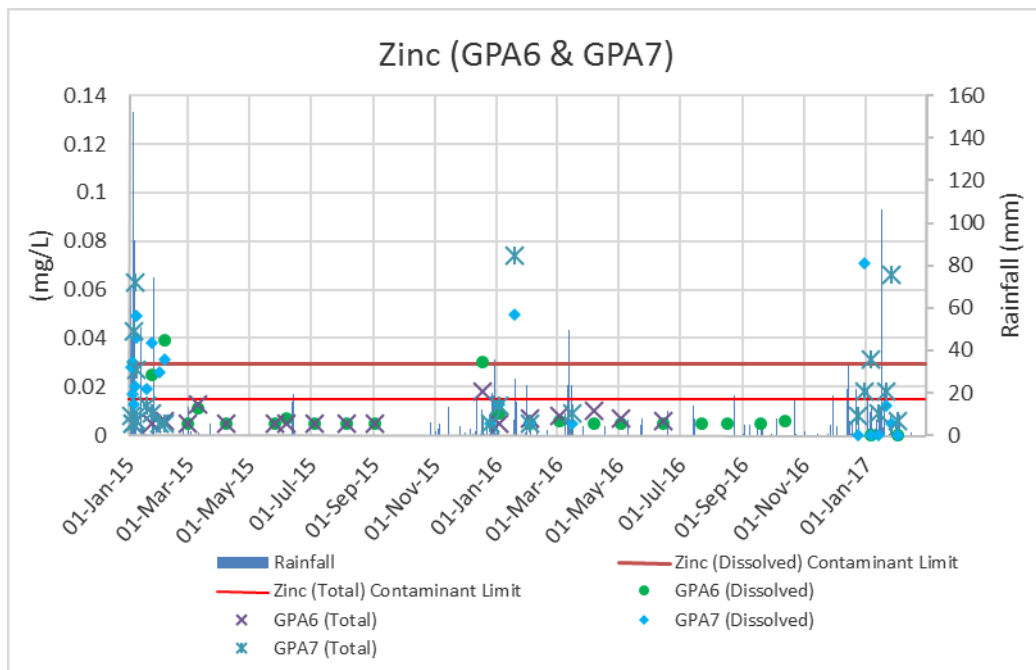


Figure 62. Receiving site downstream of Old Mammoth Dam and Sump 6 are that has contaminated groundwater (GPA6 and GPA7).

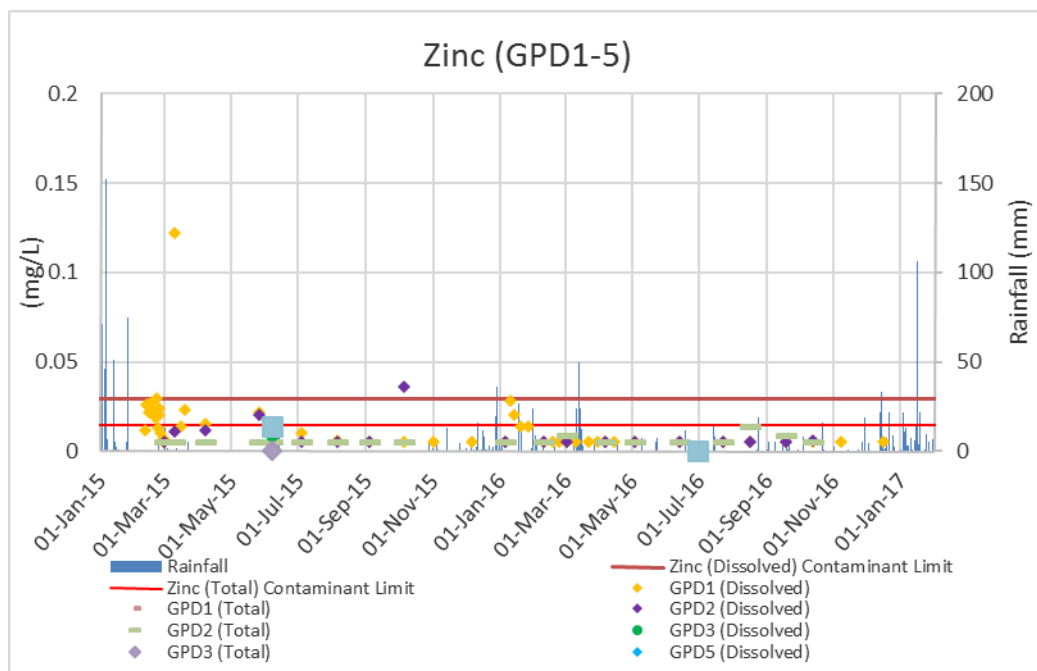


Figure 63. Receiving sites downstream of Greenstone Creek confluence (GPD1-5)

There was no significant change in zinc levels between 2016/2017 and 2015/2016. Levels at some sights increased slightly however average concentrations were below contaminant limits for total zinc.

4. Seepage Interception

Throughout the reporting period, seepage recovery from Sump 6 seepage interception continued. Table 8 – Sump 6 rates of recovered seepage below details the rates of seepage recovery for this reporting period compared to the previous reporting period. The continuous seepage recovery from the old TSF is resulting in improvements in water quality of receiving water sites, particularly receiving water sites GPA6 and GPA7.

Table 8 – Sump 6 rates of recovered seepage

1 March 2016 – 31 August 2016	1 Sept 2016 -1 March 2017
13,243 m ³	11,322 m ³

5. Notifications submitted to EHP

The table below show all notification generated due to identification of receiving waters contaminant exceedences and submitted to EHP pollution hotline and forwarded to relevant landholders.

Note that CCM notifies exceedences according with EA contaminant limits, regardless of whether it is an authorised exceedence under TEP interim contaminant limits.

In line with condition A8-2 of the EA, all exceedences identified within Gunpowder Creek, regardless of whether it is a site specified in Schedule C Table 3, have been reported to EHP.

Table 9 - Receiving waters related EA exceedence notifications submitted to EHP from September 2017 to February 2017

Date	Time	Notified to	Notification Type	Site Location	Subject	EHP Ref.#
17-Sep-16	1:31:00 PM	Pollution Line, Landholders	EA Exceedence	GPA2	CR75134 - Notification of Co, Cu, Ni and So4 exceedence	CR75134
17-Sep-16	1:31:00 PM	Pollution Line, Landholders	EA Exceedence	MGA1	CR75134 - Notification of Cu exceedence	
19-Sep-16	3:54:00 PM	Pollution Line, Landholders	EA Exceedence	GPA6	CR75157 - Notification of pH exceedence	CR75157
				GPD1		
				GPD2		
13-Oct-16	6:39:00 PM	Pollution Line, Landholders	EA Exceedence	GPA6	CR75477- CCM_EA Exceedence Notification_pH@GPA6, GPD1&GPD2	CR75477
				GPD1		
				GPD2		
8-Nov-16	5:03:00 PM	Pollution Line, Landholders	EA Exceedence	GPD1	CCM_EA Exceedence Notification_pH@GPD1	CR75862
			EA Exceedence	GPA4		

16-Dec-16	1:05:00 PM	Pollution Line, Landholders	EA Exceedence	GPD1	CCM_EA Exceedence Notification_pH@GPD1_161216	CR76513
21-Jan-17	1:44:00 PM	Pollution Line, Landholders	Uncontrolled Release & Exceedences	Magazine Creek Sump (MGA1) and Sump 6	CR76950 - CCM_EA Exceedence Notification – Magazine Creek Sump Overflow and flood damage to Sump 6	CR76950
25-Jan-17	1:42:00 PM	Pollution Line, Landholders	EA Exceedence	Receiving Waters (Lab results)	Event Notifications- Condition (A-8-3) of EA\2017\CCM_EA Exceedence Notification Receiving Waters - 20170125.	CR77042

6. TEP Action Program

Birla Objective No.	Birla TEP Objective	Action Item Number	Birla TEP Action	Action Status to Date	TEP Nominated Due Date
1)	Prevent unauthorised contaminant release from Old TSF area to GP Creek	1-6	Management of Old TSF from a final closure perspective to cease seepage through the facility.		
1a)	Cease surface seepage expression downstream of Old TSF	1	Removal of equipment hardstand (including old gen-set), which may have induced consolidation.	Noted in May-14 TEP Report as completed.	22-Aug-14
		2	Associated earthworks to ensure surface of Mammoth TSF cannot pool water.	Noted in Sep-15 TEP Report: <i>Completed before due date.</i> CCM will continue to monitor the shape of the TSF surface and perform grading works if necessary.	14-Nov-14
		3	Improve drainage to shed water and no external catchment. Including interception of any surface run-off from the Concentrate Shed.	Further drainage works and re-shaping of surface of Old TSF will be conducted by CCM where necessary before the 2016/17 wet season. Noted in Sep-15 TEP Report: <i>Completed before due date.</i>	14-Nov-14
1b)	Define and implement an appropriate final landform and cover design for Old TSF	4	Develop "Old TSF Final Landform and Cover Design" including engineering drawing to construction specifications for cover.	Noted in Sep-15 TEP Report: <i>TSF final landform and cover design completed by EMM. Final report received.</i> Refer to letter from Capricorn Copper to EHP dated 28 July 2016.	21-Aug-15
		5	Physical earthworks required to execute Old TSF - Final Landform and Cover Design report, including construction of a cover if so recommended.	CCPL will shortly seek an amendment to the TEP to extend the due date to 1 March 2019. The extension will be sought on the basis of CCPL's ongoing studies in to the feasibility of beneficially reusing low sulphur tailings as a cover to rehabilitate certain areas of the mine site, including the Mammoth TSF. It is anticipated that the beneficial reuse of low sulphur tailings will accrue substantial environmental benefits, including significant waste reduction and increased rehabilitation outcomes.	7-Mar-17

TEP Progress Report Capricorn Copper Mine

1c)	Interim management of Old TSF seepage	6	Continuation of the sump 6 seepage interception & monitoring system.	Noted in Sep-15 TEP Report: <i>Sump 6 seepage recover system was upgraded to include a secondary contingency pump and alarm. Continue to operate the system for seepage recovery.</i> Ongoing.	Term of the TEP
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Birla Objective No.	Birla TEP Objective	Action Item Number	Birla TEP Action	Action Status to Date	TEP Nominated Due Date
2)	Return to compliance with water quality contaminant limits of Table C-4 for Magazine Creek.	7-11	Remediate known point sources for contaminant inflows, resulting in a return to compliance of surface flows.		
2a)	Remediate all known point sources of contaminant generation impacting Magazine and Greenstone Cr.	7	Decommission the Heap Leach Evaporation Pan #2 (HELP), by undertaking associated earthworks to ensure surface of HELP#2 cannot pool water.	Noted as completed in May-14 TEP Report on 8-Nov-13.	14-Nov-14
		8	Develop "HELP#2 Final Landform and Cover Design" including engineering drawings to construction specifications for cover.	Noted in Sep-15 TEP Report: <i>TSF final landform and cover design completed by EMM. Final report received.</i> Refer to letter from Capricorn Copper to EHP dated 28 July 2016.	21-Aug-15
		9	Physical earthworks required to execute HELP#2 - Final Landform and Cover Design report, including construction of a cover if so recommended.	CCPL will shortly seek an amendment to the TEP to extend the due date to 1 March 2019. The extension will be sought on the basis of CCPL's ongoing studies in to the feasibility of beneficially reusing low sulphur tailings as a cover to rehabilitate certain areas of the mine site, including the Mammoth TSF. It is anticipated that the beneficial reuse of low sulphur tailings will accrue substantial environmental benefits, including significant waste reduction and increased rehabilitation outcomes.	7-Mar-17
2b)	Investigate if any additional point sources of contamination.	10	Continue the monitoring program Stage 1 - existing monitoring program (water quality at Mammoth Portal, HELP#2, WC03, sediment transect along Magazine Cr) and monitoring of accumulated contaminated soil in Magazine Creek by annual sediment sampling (before end of July each year - 1st qtr of dry season).	Noted in Sep-15 TEP Report: <u>Sediment monitoring:</u> completed as per EA <u>Surface waters:</u> completed as per EA <u>Ground waters:</u> completed as per EA Monitoring programs ongoing as per TEP and EA.	Term of the TEP

			Stage 2 - additional investigation sampling if required.		
2c)	Minimise risk of contaminated flows occurring past Mammoth Portal Sump	11	Capture contaminated water before it reports to Greenstone Creek (prior to completion of actions 7-9).	Additional sump installed at junction of east and west Magazine Creeks. Refer Appendix I, figures 1 & 2	7-Mar-17

Birla Objective No.	Birla TEP Objective	Action Item Number	Birla TEP Action	Action Status to Date	TEP Nominated Due Date
3)	Return to compliance with water quality contaminant limits of Table C-4 for Gunpowder Creek.	12-15	Reduction of the sulphate and metal contamination load entering Gunpowder Creek to a point whereby no exceedences of receiving water contamination limits occurs (EA Table C4).		
3a)	Improved Esperanza TSF seepage management	12	Operation of the Esperanza TSF in accordance with the EA condition G9-1 "Esperanza TSF Master Seepage Report"	Noted in Sep-15 TEP Report: <i>Site under C&M and Esperanza TSF is not in use.</i> No site water is pumped to the TSF. There are two pumps located in the decant pond, which operate whenever rain events cause water to pool in the pond, reporting the water to the Esperanza Pit.	As per EA requirements
		13	Continuous operation of North Waste Rock Dump, Saddle Dam #2 & Saddle Dam #3 seepage pump systems	Noted in Sep-15 TEP Report: <i>In compliance and operating the seepage system at SD2 and SD3 as and when seepage occurs.</i> <i>General trend of decreasing seepage rates has been observed.</i> Ongoing.	Term of the TEP
3b)	Ensure that discharge does not unnecessarily increase sulphate load in Gunpowder Creek at	14	Discharge in accordance with Court Order #3267 of 2013 (i.e. when creek flowing >1.1m ³ /s for sufficient dilution and movement)	No discharge since last progress report. Noted in Sep-15 TEP Report: <i>Water discharge occurred as per Court Order conditions only.</i> <i>Preparations continue for the upcoming 2015-16 wet season.</i>	Term of the TEP or Court Order

	beginning of dry season.				
3c)	Reduce groundwater and soils contamination (from Sump 6), to reduce the contamination load entering Gunpowder Creek.	15	Annual scalping of visually evident seepage induced efflorescence in the area known as Sump 6 (immediately downstream of Old TSF)	Not required in October 2016.	31 October each year if required

7. Conclusion

In general average metal concentrations were reduced during the 2016/2017 season.

Overall, sulphates in Gunpowder Creek show a clear improvement in the current year.

An assessment of Magazine Creek West performance is difficult due to lack of data. MGA1 continues to be dry much of the time and this reflects CCM's water management which aims to reduce water flows past the MGA1 section of the creek, and thus reduce copper contaminant flows.