BYRON SHIRE COUNCIL

2018 Annual Water Contamination Report

Myocum Landfill

Byron Shire Council

Annual Water Contamination Report 2018

Myocum Landfill, Byron Shire Council

Document Control

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0	Draft	K. Goldsworthy	L. Isaacson		
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Tables and Figures

1. Introduction

Byron Shire Council (BSC) operates the Myocum Landfill Facility, located on Manse road, under the Environmental Protection Licence (EPL) No. 6057, and dated 28 May 2008. The property is formally known as Lot 1 DP1052900. The site is located approximately 4.5km south of Mullumbimby and 12km North West of Byron Bay. The site location is shown in the local context in Figure 1-1. The neighbouring property to the west is also under Byron Shire Council ownership and is currently used as a quarry; it is formally referred to as Lot 1 DP591441.

In accordance with the Environmental Protection Licence, BSC implements an environmental monitoring program, as presented in the approved Landfill Environmental Management Plan (Maunsell 2002), and incorporates:

- Regional and Alluvial groundwater monitoring;
- Surface water monitoring;
- Leachate monitoring;
- Landfill gas monitoring; and
- Noise monitoring.

In 2003 the landfill monitoring program commenced, commensurate with the reopening of the landfill following an extended period of closure.

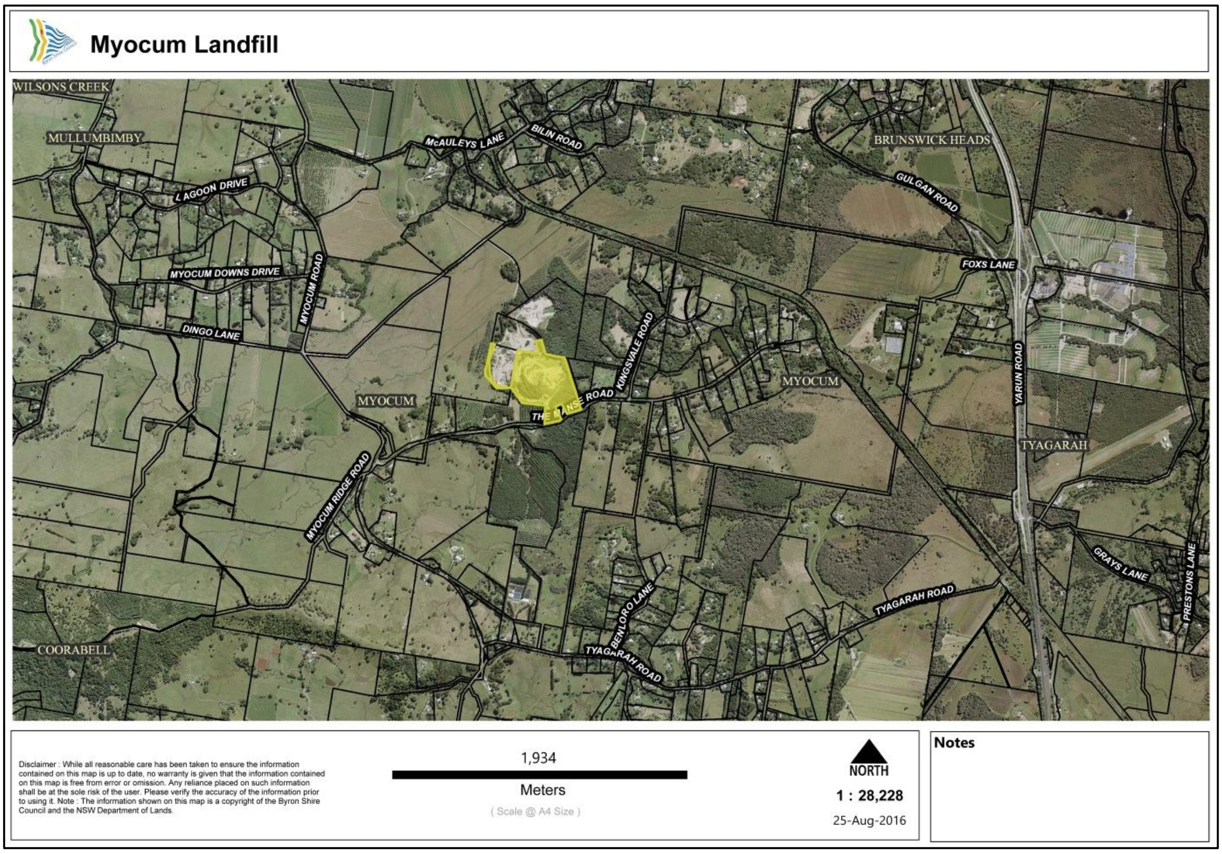


Figure 1-1: Myocum Landfill site in the locality

1.1 Project aims and objectives

The aim of this report is to present the annual 2018 monitoring data (September 2017 – September 2018), in accordance with condition U3.1 of the Environmental Protection Licence No. 6057 (EPL6057). Specific licence conditions, outlined in Section 1.2, state key requirements of this report, however key project objectives are to:

- Report all monitoring actions and results between September 2017 – 2018
- Compare monitoring results to past collected data and stated water quality trigger values
- Evaluate any human and environmental impacts resulting from the operation of the landfill
- Recommend mitigation measures for any identified human and environmental impacts

1.2 Licence conditions

Under the NSW EPL6057 issued by the NSW Environmental Protection Authority (EPA), BSC are required to annually submit a Water Contamination Report. As a minimum, this report must include the following:

Alluvial Groundwater:

(a) A tabular and graphical representation of the results of all alluvial groundwater monitoring undertaken for Monitoring Points 4 – 5 over the previous 12 months period in accordance with condition M2.

(b) Comparison of the results with the most relevant ANZECC/NWQMS triggers (see Table 1-1) and with results from previous annual reporting periods, including as assessment of any changes and trends over time.

(c) Evaluation of the nature and level of (and changes to) any human health and environmental risks to alluvial groundwaters and any other environmentally sensitive receivers.

(d) An assessment of weather the current detection monitoring program should be augmented to also sample for chemicals of concern (i.e. in additions to the leachate indicator analytes in M2).

(e) Any further mitigation measures proposed to be implemented for the subsequent 12 month period to further reduce contamination levels and risks to human health and the environment.

Regional Groundwater:

(a) A tabular and graphical representation of the results of all regional groundwater monitoring undertaken for monitoring Points 1-3 and 24-25 over the previous 12 month period in accordance with condition M2.

(b) Comparison of the results with the contamination trigger levels (see Table 1-1) and with results from previous annual reporting periods, including an assessment of any changes and trends over time.

(c) Evaluation of the nature and level of (and changes to) any human health and environmental risks to regional groundwaters and any other environmentally sensitive receivers.

(d) An assessment of weather the current monitoring regime should be augmented to also sample for chemicals of concern (i.e. in addition to the leachate indicator analytes in M2).

(e) Any further mitigation measures proposed to be implemented for the subsequent 12 month period to further reduce contamination levels and risks to human health and the environment.

Surface Water:

(a) A tabular and graphical representation of the results of all surface water monitoring undertaken for monitoring Points 6, 8 and 33 over the previous 12 month period in accordance with condition M2.

(b) Comparison of the results with the contamination trigger levels (see Table 1-1) and with results from previous annual reporting periods, including an assessment of any changes and trends over time.

(c) Evaluation of the nature and level of (and changes to) any human health and environmental risks to surface waters and any other environmentally sensitive receivers.

(d) An assessment of weather the current monitoring regime should be augmented to also sample for chemicals of concern (i.e. in addition to the leachate indicator analytes in M2).

(e) Any further mitigation measures proposed to be implemented for the subsequent 12 month period to further reduce contamination levels and risks to human health and the environment.

Table 1-1: Water quality triggers applied to data set

	Regional Groundwater (NSW EPA, 2011)	Alluvial Groundwater (ANZECC, 2006)	Surface water (NSW EPA, 2011)
pH	2.9 – 6.7	6.5 – 8.5	6.5 – 9.0
Conductivity (µS/cm)	3,800 (3.8mS/cm)	2,200 (2.2mS/cm)	610 (0.6mS/cm)
Calcium (mg/L)	2.0	-	20.7
Sodium (mg/L)	65	-	70
Potassium (mg/L)	1.0	-	11.8
Alkalinity (mg/L)	13.5	-	116
Chloride (mg/L)	118	-	150
Ammonia (mg/L)	1.74	1.43	0.36
Total Organic Carbon (mg/L)	13	-	20.3
Nitrate (mg/L)	1.84	-	3.4
Manganese (mg/L)	0.63	2.5	2.5
Sulfate (mg/L)	26.0	-	100
Magnesium (mg/L)	5.0	-	50
Iron (mg/L)	0.08	1	1
Dissolved Oxygen (mg/L)	-	-	>6.0

2. Relevant background information

The climate of coastal northern New South Wales is sub-tropical characterised by warm and wet summers with generally dry and mild winters. A summary of the monthly rainfall records from Myocum Landfill between September 2017 and August 2018 is provided in Table 2-1. Shown in Figure 2-1, monthly rainfall totals recorded have generally not been around the historical median.

Over the past 12 month reporting period there has been 5 above average rainfall periods in October, November and December 2017, and February and March 2018, with below average rainfall recorded in September 2017, and January, May, June, July and August 2018.

Table 2-1: Summery of monthly rainfall records at Myocum Landfill

	2017				2018							
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Actual (mm)	0	257.5	167.5	158.25	83	282.5	354	162.5	48.5	64.5	50.5	27.5
Median (mm)	45.7	79.8	97.1	128.9	150.8	181.4	218.2	139.3	123.0	95.8	57.5	51.3

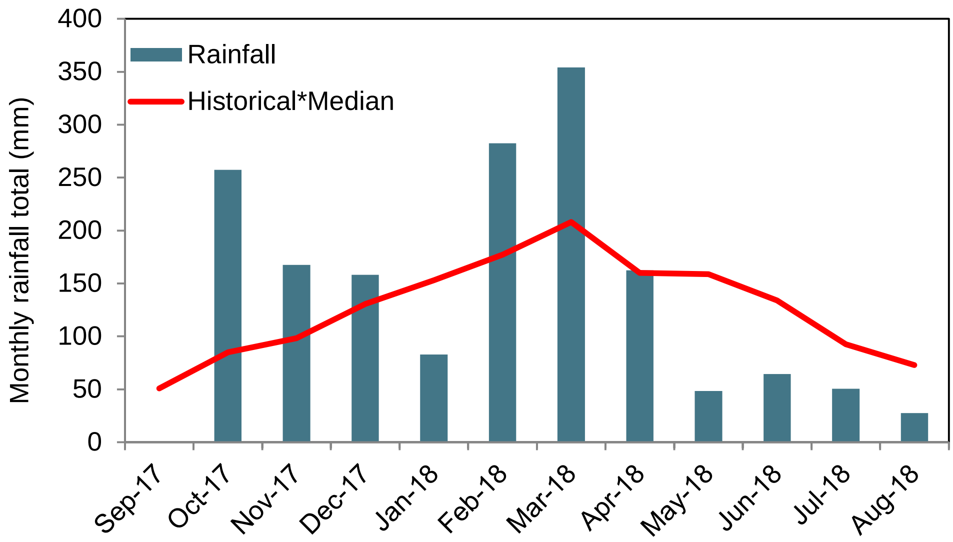


Figure 2-1: Monthly rainfall at Myocum Landfill between September 2017 and August 2018, showing historical median 50th percentile Data taken from BOM station 58007

2.1 Landfill description

In 2003, subject to the requirements of the EPL6057 and following landfill remediation works associated with leachate management, BSC recommenced landfilling activities at Myocum Landfill accept general solid putrescible waste to a maximum limit of 20,000t per annum plus other wastes specified in the EPL6057. In 2006, the NSW EPA approved the expansion of landfill operations to the south, termed ‘Southern Expansion’. There are two main landfilling areas within the Myocum Landfill:

- Northern Landfill (Original), accepting waste between 1976-2007 (not between 2000-03 due to leachate remediation works)
- Southern Landfill, accepting waste between 2007 to 2014

The Myocum Landfill currently operates as a transfer station, accepting waste from the entire Byron Shire area for transport to a Queensland licenced waste facility.

The layout of the Myocum Landfill is shown diagrammatically in Figure 2-2, showing:

- The original northern landfill area;
- Southern expansion area;
- Landfill infrastructure;
- Site sheds and offices; and
- Neighbouring land uses and receiving environments.

Figure 2-2: Layout of Myocum Landfill

2.2 Topography, drainage and geology

During the Mesonzic era (252-66 million years ago) the land formations surrounding the Myocum Landfill (and wider Claremont-Moreton Basin) was shaped via heat and pressure caused by tectonics. These landforms are a sequence of old fashioned metamorphosed sedimentary rocks consisting of chert quartzite and argillte-claystone deposited during the Paleozonic Era (541-252 million years ago). The soils present within the landfill area are a mixture of yellow and red podzolics, with yellow podzolics in dominance generally comprised of fine grained clay sediments associated with the residual weathered bedrock and/or localised alluvium deposits (Maunsels, 2002).

Topography of the site is characterised by undulating slopes with a generally westerly aspect; there has been substantial modification of ground surface due to the landfill operations and quarrying on the neighbouring allotment. To the west of the site is the flood plain with minor tributaries of the Brunswick River including Pipeclay Creek. Drainage from upslope of the landfill facility is captured and directed to the north in an unnamed drainage line that meets Pipeclay Creek.

The landfill site can be delineated into sub catchments with a variety of surface types and areas. A map showing sub catchments is provided in Figure 2-3. There are three main catchments within the Myocum Landfill, each further made up of minor sub catchments:

1. The northern catchment drains generally to the north with surface flow being directed to the sediment basin and ephemeral creek in the far north of the site (Northern Dam).
2. The southern catchment drains to the Southern Dam and ephemeral creek running along the southern boundary of the site.
3. The western catchment is predominantly vegetated on relatively undisturbed (not landfill) soil areas with an existing management and conveyance system that is adequate.

2.3 Hydrogeology

Two groundwater systems have been located within and surrounding the Myocum Landfill based on site investigation undertaken by HLA Envirosciences (2001):

1. Regional Aquifer within fractured bedrock; and
2. The perched alluvial aquifer within the alluvial soils along creek valley.

The groundwater level within the Regional Aquifer has historically ranged between 10 and 24mRL (Maunsell, 2002) with movement generally in a northerly direction following the topography. There is a local depression within the Regional Aquifer within the Quarry area, due to the extraction of material within the quarry. Recharge of the Regional Aquifer is most likely to occur via rainfall infiltration on the surrounding hillsides.

The perched alluvial aquifer has been recorded at between 2-4m below ground level, adjacent to the northern landfill face. Groundwater depth decreases with topography, in a northerly direction, again resulting in a northerly flow of groundwater likely to generally follow topography. Recharge of the alluvial aquifer is most likely to occur via direct surface water to infiltration along the creek valley.

For the purpose of this report, the network of monitoring bores at the landfill for both the Alluvial and Regional aquifers have been categorised as either upslope or downslope to better investigate the potential contamination of groundwater resulting from the presence and operation of the landfill. Based on the range of reduced groundwater levels (RLs), the location of the landfill and surrounding topography, each monitoring bore can be classified as either being upslope or downslope from the landfill, as shown in Table 2-2.

The groundwater levels provided in Table 2-2 are consistent with previous results, and indicate that the surface of the regional aquifer is sympathetic with the pre-development drainage configuration of the site.

Table 2-2: Range of monitoring groundwater levels

Bore No.		Bore Location	Range of Monitored Groundwater Levels (mRL)			
			Nov 17	Feb 18	May 18	Aug 18
Regional Aquifer	MW01	**Downslope** of Northern Landfill	14.046	13.246	13.946	10.146
	MW02	**Upslope** of Southern Landfill	25.059	24.059	29.459	25.659
	MW03	Base of Myocum Quarry, **Downslope**	-0.75	-0.65	-0.65	-0.65
Alluvial Aquifer	MW04	20m **Downslope** of leachate inception trench	15.183	14.083	14.683	11.583
	MW05	70 **Downslope** of Northern Landfill face	12.393	11.193	12.793	na

2.4 Monitoring regime

In accordance with EPL 6057, BSC monitors water quality parameters in both the Regional and Alluvial Aquifer along with surface waters to the north and south of the landfill. Figure 2-3 displays the location of monitoring sites within and adjoining Myocum Landfill. Table 2-4 details relevant EPA and BSC Monitoring Point identification, general location and specific ground/surface water systems monitored. Water quality samples from the regional and alluvial aquifer monitoring sites, surface water monitoring sites and leachate monitoring sites were obtained on the:

- 14 November 2017
- 8 February 2018
- 10 May 2018
- 9 August 2018

Table 2-3 presents accumulated rainfall data over a 1-8 week period leading up to each sampling date. Rainfall conditions prior to ground and surface water sampling were variable across the four sampling events, with the lead up to sampling in August 2018 representative of dry conditions.

Water samples were taken by Tweed Laboratory Centre in accordance with AS/NZS 5667:1998 *Standards on the sampling of waters, waste waters, sediments and sludges*. Samples were transported on ice under chain of custody to the Tweed Laboratory Centre for analysis on the parameters listed in Table 2-5 in accordance with AS ISO 7025:2018 – *General requirements for the competence of testing and calibration laboratories*. Tweed Laboratory Centre is NATA accredited for Accreditation No: 12745 (Chemical Testing – public testing service), and Accreditation No: 13538 (Biological Testing – public testing service).

Table 2-3: Rainfall preceding sample date

Sample date	Preceding cumulative rainfall (mm)					
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks
14-Nov-17	60.5	78.5	80.5	122	331.5	336
8-Feb-18	73.5	110.5	110.5	110.5	165	270.5
10-May-18	39	76.5	133	178.5	227.5	378
9-Aug-18	0	2.5	2.5	7.5	58.5	69

Table 2-4: Summary of water quality monitoring sites at Myocum Landfill relevant to condition U3.1

Monitoring Aspect and frequency	BSC Monitoring Site	EPA Monitoring Point	General Location
Groundwater Regional Aquifer Required every 6 months	MW01	EPA 01	Northern edge of landfill (within Sediment Dam B)
	MW02	EPA 02	Southern edge of landfill (up gradient from Southern Expansion)
	MW03	EPA 03	Western edge of landfill, within Myocum Quarry
	MW06	EPA 23	Southern edge of landfill (adjacent Southern Expansion)
	MW07	EPA 24	Within customer interface area to west of landfill
Alluvial Aquifer Required every 6 months	MW04	EPA 04	Northern edge of landfill adjacent Sediment Dam B
	MW05	EPA 05	Northern edge of landfill downstream from Sediment Dam B
Surface Water Required six months at a time when flow occurring	SW1	EPA 33	Simpsons Creek tributary (accessed from Mullumbimby Rd, 1km to the west of landfill site)
	SDP1	EPA 06	Sediment Dam B
	SDP2	EPA 08	Sediment Dam A

Table 2-5: List of parameters at each EPA Monitoring Point

EPA Monitoring Points	List of Parameters		
EPA 1-5, 23 & 24 Regional and Alluvial Groundwater	pH Temperature Electrical Conductivity Calcium Sodium	Magnesium Alkalinity Sulphate Chloride Potassium	Manganese Ammonia (as N) Nitrate (as N) Total Organic Carbon Iron
EPA 6, 8 & 33 Surface Water	pH Temperature Electrical Conductivity Calcium Sodium Suspended Solids	Magnesium Alkalinity Sulphate Chloride Potassium Dissolved Oxygen	Manganese Ammonia (as N) Nitrate (as N) Total Organic Carbon Iron
EPA 9, 10, 11 & 25 Leachate	pH Temperature Arsenic Calcium Sodium Fluoride	Magnesium Alkalinity Sulfate Chloride Potassium Organochlorine Pesticides	Manganese Ammonia (as N) Nitrate (as N) Total Organic Carbon Iron Total Phenolics

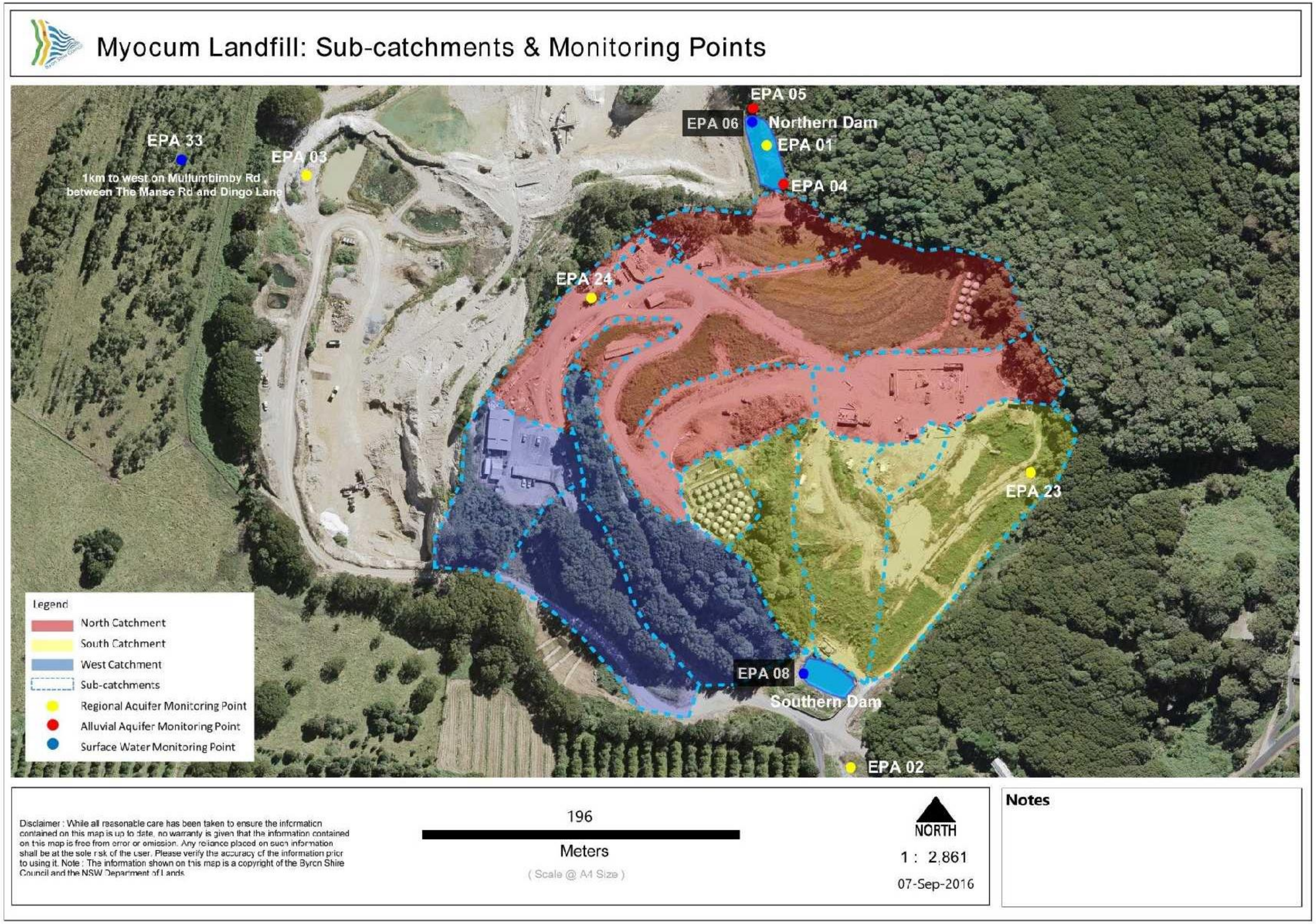


Figure 2-3: Myocum Landfill sub catchments, surface flow pathways and monitoring points

BSC Point	EPA Point		pH	Temperature	Conductivity	Alkalinity	Sulphate Filtered	Chloride	Calcium Filtered	Magnesium	Sodium Filtered	Potassium Filtered	Iron Total	Manganese Total	Manganese Filtered	Ammonia as N	Nitrate as N	Total Organic Carbon	DO	TSS
		Date		°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Regional Aquifer WQ Triggers			2.9 - 6.7	No trigger	3,800	13.5	26	118.0	2.0	5.0	65.0	1.0	0.08	No trigger	0.63	1.74	1.87	13.0	No trigger	
MW1	1	14-Nov-17	5.60	20.10	308.00	**42.00**	**49.00**	36.00	**13.00**	4.20	18.00	**8.00**	**15.80**	-	**1.08**	**2.08**	0.02	**14.00**	-	-
		8-Feb-18	5.40	22.60	298.00	**41.00**	**45.00**	35.00	**13.00**	4.20	19.00	**9.00**	**19.70**	-	**1.04**	**2.10**	0.09	**15.00**	-	-
		10-May-18	5.40	21.60	275.00	**25.00**	**43.00**	34.00	**13.00**	4.20	19.00	**8.90**	**6.68**	-	**1.07**	1.73	0.36	**15.00**	-	-
		9-Aug-18	5.50	19.90	291.00	**41.00**	**45.00**	32.00	**17.00**	4.50	18.00	**7.70**	**20.00**	-	**1.07**	**2.01**	0.04	**21.00**	-	-
MW2	2	14-Nov-17	4.40	22.20	172.00	2.00	12.00	32.00	1.60	4.20	18.00	**5.00**	**0.38**	-	0.06	0.02	**3.30**	0.60	-	-
		8-Feb-18	5.10	22.50	192.00	6.00	13.00	32.00	1.00	4.70	20.00	**5.00**	**0.23**	-	0.07	0.98	1.82	0.90	-	-
		10-May-18	4.20	23.40	183.00	1.00	12.00	32.00	0.90	4.70	20.00	**1.00**	**0.43**	-	0.06	0.02	**3.48**	0.90	-	-
		9-Aug-18	4.20	22.30	182.00	1.00	12.00	32.00	0.50	4.90	21.00	0.80	**0.29**	-	0.07	0.02	**3.41**	0.80	-	-
MW3	3	14-Nov-17	5.70	21.30	494.00	**28.00**	13.00	**120.00**	**12.00**	**8.90**	58.00	**5.00**	**1.28**	-	**3.53**	0.02	0.02	0.40	-	-
		8-Feb-18	6.00	23.90	492.00	**42.00**	12.00	**120.00**	**18.00**	**9.10**	58.00	**5.00**	**1.23**	-	**1.87**	0.02	0.06	0.70	-	-
		10-May-18	5.60	21.60	496.00	**25.00**	13.00	100.00	**10.00**	**9.20**	61.00	**1.60**	**1.83**	-	**6.32**	0.02	0.02	0.60	-	-
		9-Aug-18	5.50	17.30	493.00	**24.00**	13.00	**130.00**	**11.00**	**9.50**	64.00	**1.50**	**2.32**	-	**6.09**	0.02	0.03	1.10	-	-
MW6	23	14-Nov-17	4.20	21.20	290.00	1.00	21.00	66.00	0.70	3.70	36.00	**5.00**	**4.84**	-	**1.51**	0.02	0.87	0.80	-	-
		8-Feb-18	4.10	21.20	281.00	1.00	20.00	63.00	0.70	4.10	34.00	**5.00**	**3.14**	-	**3.57**	0.04	0.52	1.30	-	-
		10-May-18	4.30	21.50	283.00	1.00	19.00	63.00	0.90	3.70	39.00	0.80	**1.21**	-	**0.66**	0.02	0.86	1.10	-	-
		9-Aug-18	4.10	20.40	286.00	1.00	20.00	62.00	0.60	3.90	42.00	0.80	**1.42**	-	0.46	0.02	0.92	1.10	-	-
MW7	24	14-Nov-17	5.40	23.20	359.00	**21.00**	18.00	10.00	**29.00**	**7.00**	12.00	**10.00**	**13.70**	-	**2.28**	0.02	**22.90**	4.60	-	-
		8-Feb-18	5.10	23.40	329.00	11.00	7.60	28.00	**18.00**	**7.00**	16.00	**9.00**	**9.12**	-	**8.65**	0.02	**22.20**	2.80	-	-
		10-May-18	5.30	23.10	339.00	**20.00**	15.00	24.00	**26.00**	**6.90**	13.00	**10.00**	**5.04**	-	**4.87**	0.02	**22.60**	5.60	-	-
		9-Aug-18	5.00	22.40	267.00	11.00	8.10	26.00	**11.00**	**5.40**	17.00	**7.40**	**17.20**	-	**10.90**	0.03	**16.80**	12.00	-	-
Alluvial Aquifer WQ Triggers			6.5 - 9.0	No trigger	2,200	No trigger							1.0	No trigger	2.50	1.43	No trigger			
MW4	4	14-Nov-17	**6.00**	21.10	256.00	39.00	26.00	36.00	15.00	3.40	18.00	11.00	0.54	-	0.84	0.62	0.06	9.20	-	-
		8-Feb-18	**6.00**	23.20	273.00	53.00	21.00	34.00	14.00	3.60	20.00	14.00	**1.01**	-	0.77	**3.07**	0.12	10.00	-	-
		10-May-18	**5.90**	21.90	369.00	56.00	47.00	44.00	23.00	4.80	27.00	15.00	**1.25**	-	1.12	**2.81**	0.19	9.30	-	-
		9-Aug-18	**5.40**	20.40	462.00	23.00	75.00	62.00	10.00	3.60	49.00	17.00	**3.34**	-	0.86	**9.25**	1.06	13.00	-	-
MW5	5	14-Nov-17	**6.40**	20.50	329.00	94.00	10.00	38.00	31.00	3.90	16.00	12.00	**9.51**	-	0.79	0.47	0.05	11.00	-	-
		8-Feb-18	**6.00**	22.30	335.00	88.00	26.00	34.00	34.00	4.40	17.00	13.00	**16.50**	-	0.65	0.61	0.13	9.10	-	-
		10-May-18	**6.10**	21.70	353.00	85.00	39.00	29.00	35.00	4.80	17.00	13.00	**7.69**	-	1.61	0.29	0.03	8.80	-	-
		9-Aug-18	na	na	na	na	na	na	na	na	na	na	na	-	na	na	na	na	-	-
Surface Water WQ Triggers			6.5 - 9.0	No trigger	610	116.0	100	150.0	20.7	50	70	11.8	1.0	No trigger	2.50	0.36	3.40	20.3	>6.0	No trigger
SDP1	6	14-Nov-17	**9.70**	27.40	340.00	92.00	28.00	39.00	**38.00**	4.00	16.00	**12.00**	0.64	-	0.06	0.02	0.02	14.00	**17.00**	53.00
		8-Feb-18	**9.00**	26.90	344.00	108.00	19.00	35.00	**42.00**	4.50	17.00	**13.00**	0.47	-	0.14	0.03	0.07	13.00	**14.00**	26.00
		10-May-18	7.50	19.80	306.00	83.00	28.00	26.00	**36.00**	3.70	14.00	10.00	**1.26**	-	0.20	0.29	0.10	11.00	5.80	24.00
		9-Aug-18	7.30	14.30	367.00	106.00	26.00	34.00	**46.00**	4.10	18.00	10.00	**3.28**	-	0.38	0.02	0.02	**28.00**	**7.80**	64.00
SDP2	8	14-Nov-17	**9.00**	25.30	**640.00**	92.00	84.00	75.00	**50.00**	8.60	48.00	**21.00**	0.98	-	0.05	0.02	**6.11**	15.00	**12.00**	62.00
		8-Feb-18	**9.10**	27.30	558.00	77.00	76.00	72.00	**44.00**	8.20	43.00	**23.00**	0.31	-	0.07	0.02	**3.99**	18.00	**11.00**	19.00
		10-May-18	8.50	24.90	503.00	115.00	35.00	100.00	**37.00**	8.10	38.00	**26.00**	**3.84**	-	0.12	0.02	**4.09**	**24.00**	**11.00**	30.00
		9-Aug-18	7.40	17.40	578.00	**122.00**	57.00	63.00	**47.00**	9.70	50.00	**26.00**	0.36	-	0.02	0.02	2.20	**23.00**	**9.10**	6.00
SW1	33	14-Nov-17	6.70	19.40	286.00	45.00	5.60	56.00	9.10	7.90	32.00	5.00	**4.94**	-	0.29	0.05	0.02	12.00	3.40	24.00
		8-Feb-18	6.60	21.10	349.00	39.00	6.60	80.00	11.00	9.90	40.00	5.00	**2.44**	-	0.54	0.02	0.02	7.80	3.60	8.00
		10-May-18	7.10	17.40	277.00	50.00	3.30	51.00	11.00	8.40	32.00	2.00	**2.38**	-	0.15	0.03	0.02	10.00	4.00	9.00
		9-Aug-18	6.80	12.40	466.00	44.00	3.30	110.00	12.00	13.00	57.00	2.00	**1.91**	-	0.46	0.02	0.02	5.20	**8.00**	25.00

Table 2-6: Tabulated summary of regional, alluvial and surface water monitoring results between Sep 2017 and Aug 2018. BOLD indicates exceedence of relative WQ trigger value

3. Monitoring results and discussion

The results of the 2017/18 ground and surface water monitoring at Myocum Landfill are provided in tabular form in table 2-6, showing raw results and any exceedences in stated water quality triggers (as per Table 1-1).

Figure 3-7 through to Figure 3-11 plot ground and surface water quality from all EPA monitoring points from early 2003 through to mid-2018. Table 3-1 outlines EPA monitoring sites and their applicable water management unit in which they are designed to monitor. For each of the specified water management units (regional groundwater, alluvial groundwater and surface waters), a comparison of the collected data with the stated water quality triggers (as per Table 1-1) are required, along with:

- An assessment of any spatial or temporal change in water quality
- An evaluation (if any) of the nature and level (and changes to) of human health and environmental risks to water management units and other environmentally sensitive receivers
- An assessment of whether the current monitoring program is adequate in detecting a full suite of possible leachate contaminants
- Any mitigation measures recommended to be implemented for the next 12 months to reduce contamination levels and risks to human health

Table 3-1: Reference site monitoring locations

Water Management Unit	Monitoring Site
Regional groundwater	EPA Points 1, 2, 3, 23 and 24
Alluvial groundwater	EPA Points 4 and 5
Surface water	EPA Points 6, 8 and 33

3.1 Alluvial Groundwater

As shown in table 2-6, a number of parameters monitored within the alluvial groundwater system exceeded the nominated trigger values. These include:

- Ammonia within upslope monitoring bore EPA 04
- pH in both upslope and downslope monitoring bores EPA 04 and 05
- Iron within upslope and downslope monitoring bores EPA 04 and 05

Within the upslope bore EPA 04, ammonia concentrations exceeded the predefined water quality trigger value of 1.43mg/L in all four sample values in this reporting period.

Review of annual median values show there has been a decline in Ammonia and Nitrate values since 2003 at both bores (EPA 04 and EPA 05) as shown in Figure 3-1. Appendix A displays yearly median results from all data gathered from the alluvial groundwater management unit between 2003 and 2018. These results show that over the past 15 years of data collection, there is a general decrease in conductivity, sodium, sulfate, magnesium, chloride and potassium concentrations, with an increase in iron concentration.

The full closure of the northern landfill area, enhanced storm water management works and general site management over the past years has resulted in a general improvement on the water quality in the alluvial groundwater. While ammonia is entering the alluvial groundwater system, it is being rapidly attenuated within the groundwater system, resulting in limited export of ammonia off site and compliance with the predetermined WQ trigger value of 1.43 mg/L in bore EPA 05.

Iron concentrations in mearly all samples collected from the upslope and downslope monitoring bores EPA 04 and EPA 05 exceeded the trigger value of 1.0mg/L. Table 2-6 shows an upward trend of elevated iron concentration in samples collected from the downslope monitoring bore EPA 05 since 2012.

3.1.1 Nature and level of human health and environmental risk

No contaminants have been recorded within any of the alluvial monitoring bores that would pose human health risks.

All pH levels within both monitoring bores EPA 04 and 05 are outside (below) the nominated trigger range. This is possibly caused by naturally acidic groundwater in the broader alluvial aquifer (caused by alluvial geology) (AWC, 2015).

As stated previously, ammonia concentrations in monitoring bore EPA 04 (upslope) exceed the nominated trigger value of 1.43mg/L, potentially posing an environmental risk to the downstream receiving environment. However, the downstream monitoring bore (EPA 05) records ammonia values routinely below the trigger value suggesting flow into the receiving environment complies with the nominated trigger value. Continued improvement in the operation and management of the Myocum Landfill is resulting in reduced environmental risk of the downslope alluvial aquifer.

Although iron concentration in the downstream monitoring bore regularly exceeds the trigger value, there is low risk of human health concerns. Iron concentrations have been found to be elevated in many of the other monitoring bores onsite, including upslope. Refer Sections 0 and 3.3 below.

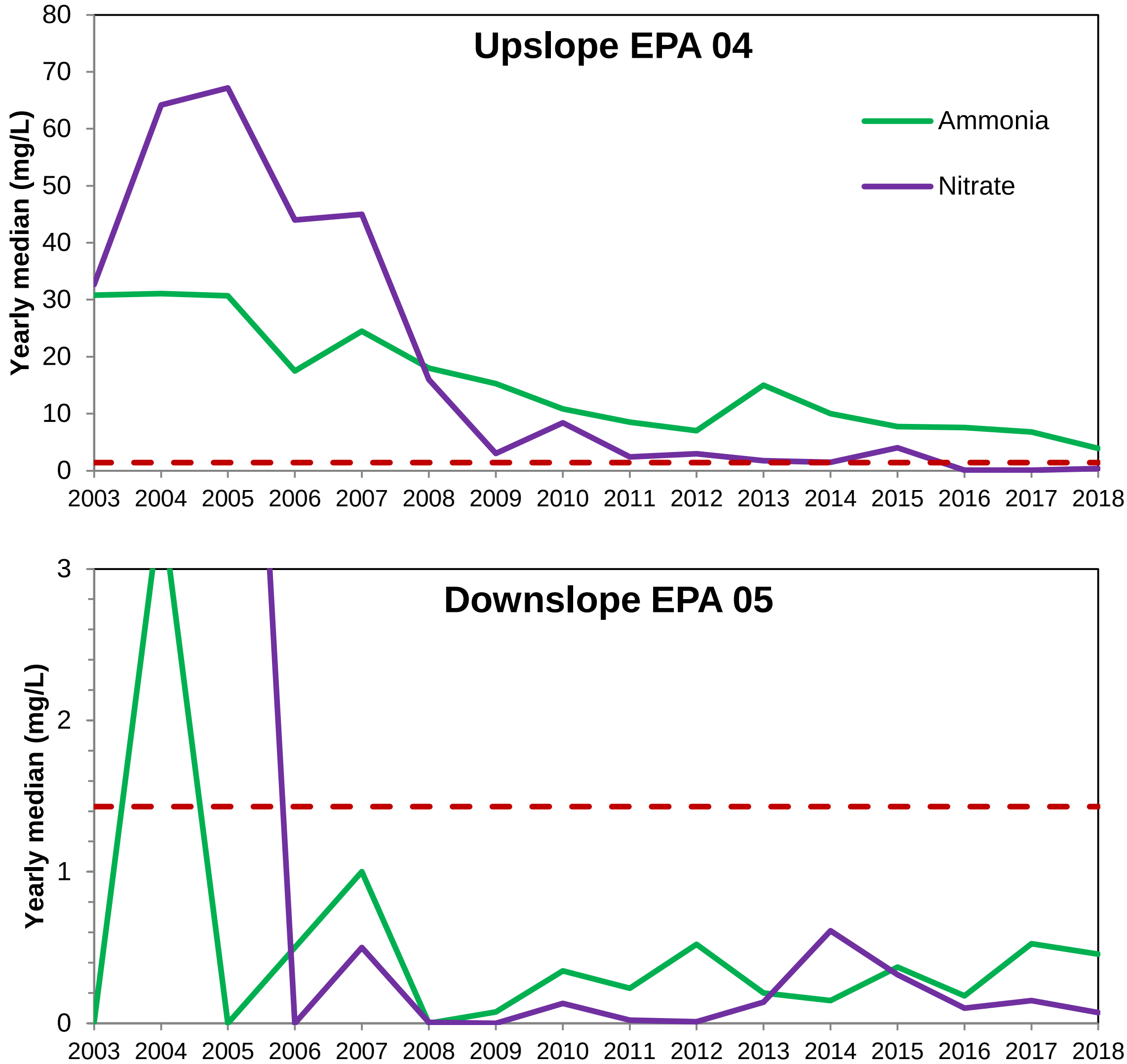


Figure 3-1: Yearly median Ammonia and Nitrate values at alluvial groundwater bores (EPA 04 upslope and EPA 05 downslope)

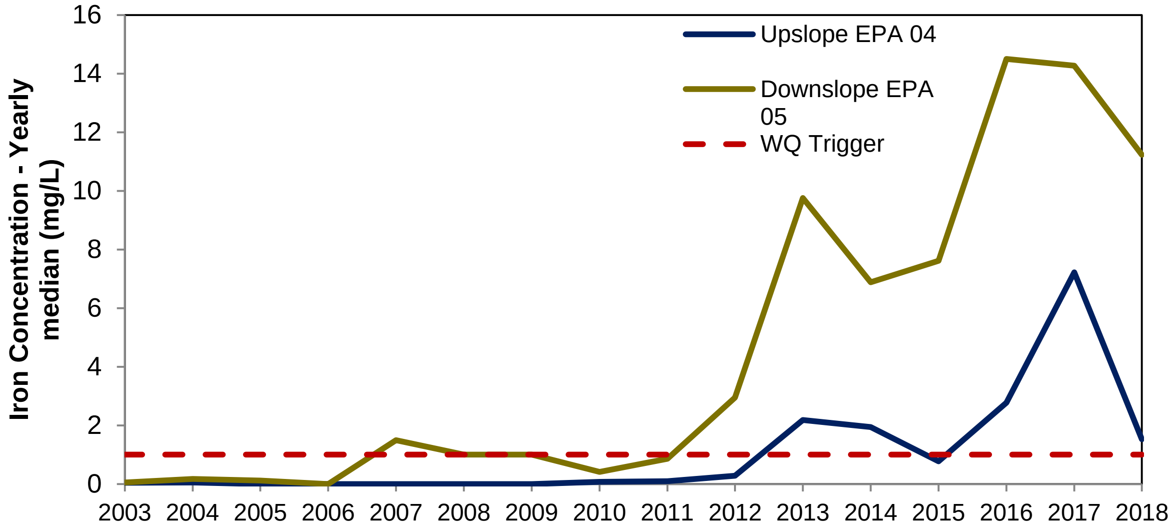


Figure 3-2: Yearly median Iron concentration values at alluvial groundwater bores (EPA 04 upslope and EPA 05 Downslope)

3.1.2 Augmenting the current monitoring regime

The current monitoring program employed to assess the potential impacts of the Myocum Landfill on the alluvial aquifer adequately monitors water quality within the aquifers moving in a northerly direction. The sampling regime provides a good temporal scale of data collection, allowing the assessment of the continued reduction of ammonia concentration within monitoring bore EPA 04 and the continued compliance of alluvial aquifer water quality in downslope monitoring bore EPA 05.

There will be a review of the analyte manganese within the existing monitoring regime. The existing sampling plan measures total manganese while the trigger value is based on filtered manganese. A review will determine whether there needs to be any variation to the existing sampling plan and what effect this may have had on previous monitoring of manganese.

3.2 Regional Groundwater

3.2.1 Upslope bores – EPA 2 and EPA 23

Two of the five regional groundwater bores can be viewed as 'upslope bores' (Bores EPA 02 and 23) and hence be used to infer whether the operation of the Myocum Landfill is impacting on the regional groundwater system. Shown in

, upslope monitoring bores EPA 02 and 23 were compliant with most monitoring parameters; exceptions being Nitrate (EPA 2 only), Potassium, Iron and Manganese (EPA 23 only):

- Potassium and iron in nearly all samples collected from the regional aquifers (upstream and downstream) exceeded the trigger value of 1.0mg/L. However, many of the values presented are at the laboratory detection limits of <5mg/L, as such the actual values may be substantially lower.
- All iron concentrations for the regional aquifer (upstream and downstream) during the reporting period, exceeded the trigger value of 0.08mg/L.
- Three quarters of the nitrate values from monitoring bore EPA 02 were all above the trigger value of 1.87mg/L. however all results from monitoring bore EPA 23 complied with the trigger value (refer Figure 3-3).
- Monitoring bore EPA 23 had three exceedences of Manganese which occurred on the 11th November 2018, 8th February 2018 and 10th May 2018. These exceedences may have been caused by higher than average rainfall recorded between September 2017 and March 2018 (refer Figure 2-1).
- Due to the location of upslope monitoring bores EPA 02 and 23, the above discussed exceedences are unlikely to be the result of the operation of the landfill. Observed increases in Nitrate, Potassium and Iron are possibly the results of other catchment / climatic influences, including upslope domestic onsite wastewater treatment / disposal systems (nitrate) and/or dry/wet conditions surrounding sampling resulting in more mobile Iron within the soil column (AWC, 2015).

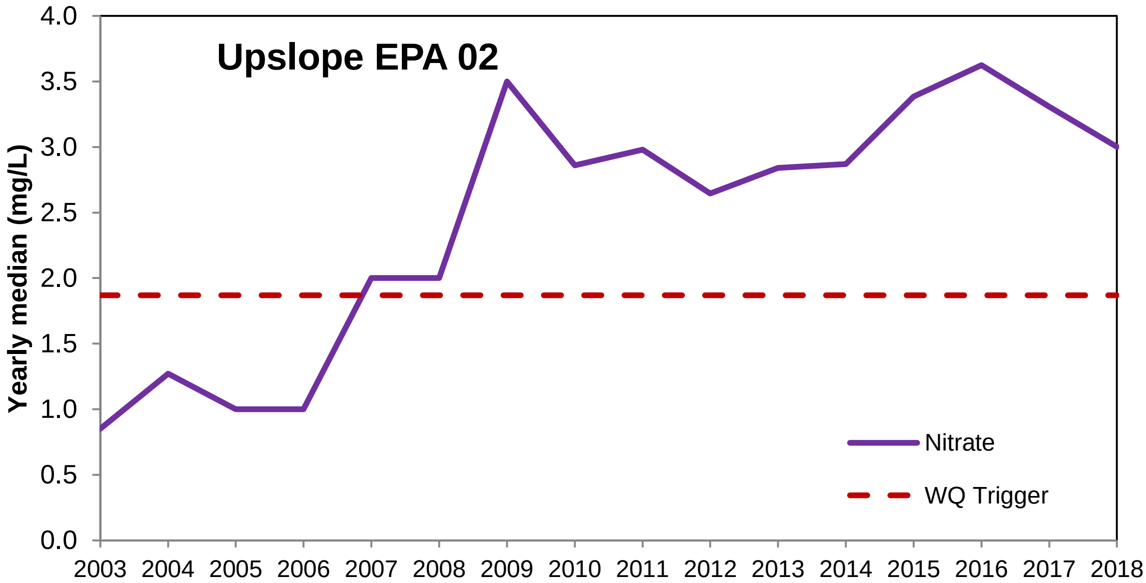


Figure 3-3: Increase in Nitrate within monitoring bore EPA 02

3.2.2 Downslope bores – EPA 1, EPA 3, and EPA 24

The remaining three regional groundwater monitoring bores (EPA 01, 03 and 24) are located downslope of the landfill:

- Just west of the refuse transfer bins;
- Within the quarry to the west of the landfill; and
- North of Sediment Dam B.

This network of bores has been located to track potential groundwater contaminants in the regional aquifer to the west and north-west of the site, in a similar direction to the topography of the site.

As shown in table 2-6, the ammonia trigger value of 1.74mg/L was exceeded in monitoring bore EPA 01 only, with the Nitrate trigger value of 1.87mg/L exceeded in monitoring bore EPA 24.

Furthermore, the Total Organic Carbon trigger value of 13.0mg/L was exceeded at all four monitoring events at EPA 01, however concentrations at the other two downstream bores complied with the trigger.

Additionally, numerous test analytes in all three sampling bores consistently exceeded their nominated trigger values, including:

- Alkalinity
- Sulphate
- Calcium
- Chloride
- Potassium
- Iron
- Manganese
- Magnesium

Select yearly median results from downslope monitoring bores EPA 01, 03 and 24 are shown in Figure 3-4.

As shown, ammonia concentration within EPA 01 (northern side of landfill) increased significantly in 2008, thereafter plateauing with yearly median concentrations ranging between 2.0 to 3.14mg/L. In reference to the alluvial groundwater sampling bores that are both upslope (EPA 04) and downslope (EPA 05) of this regional monitoring bore (refer to Figure 3-1), ammonia contained within the alluvial groundwater management unit may be entering the deeper regional groundwater management unit, hence resulting in the observed presence of low concentrations of ammonia. As observed with the alluvial monitoring bores, it is likely that this observed impact reduces with distance from the landfill. All ammonia concentrations recorded for the EPA 01 monitoring bore during this monitoring period (two samples) exceeded the trigger value of 1.74mg/L however the other two downstream bores' ammonia concentrations complied with the trigger.

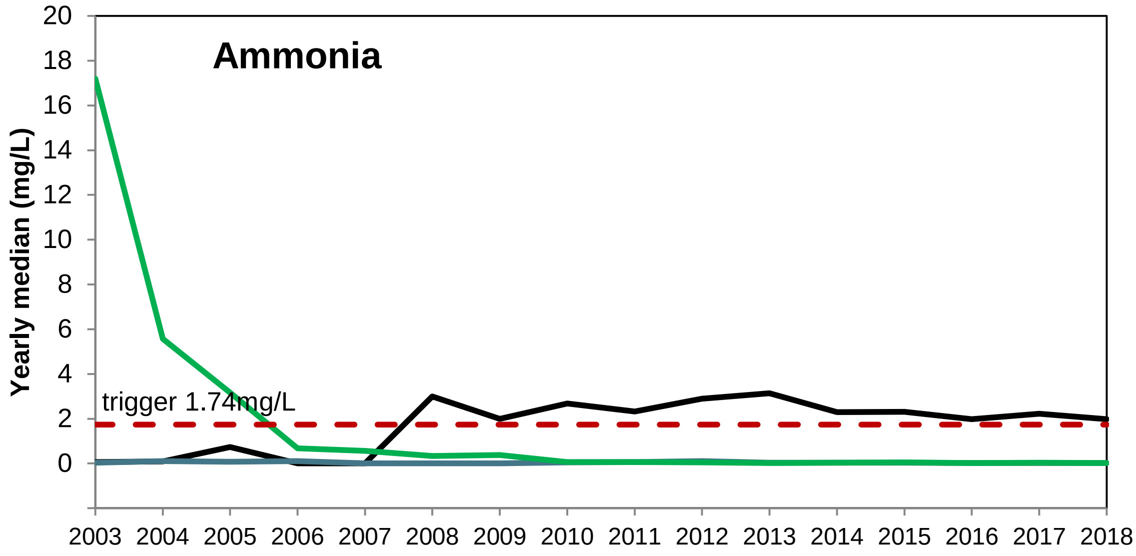
Calcium, Alkalinity and Sulfate median values markedly increased at the 2008 time period at the EPA 01 and 24 monitoring sites, values have since decreased and have become relatively stable, they do however generally exceed the trigger values assigned.

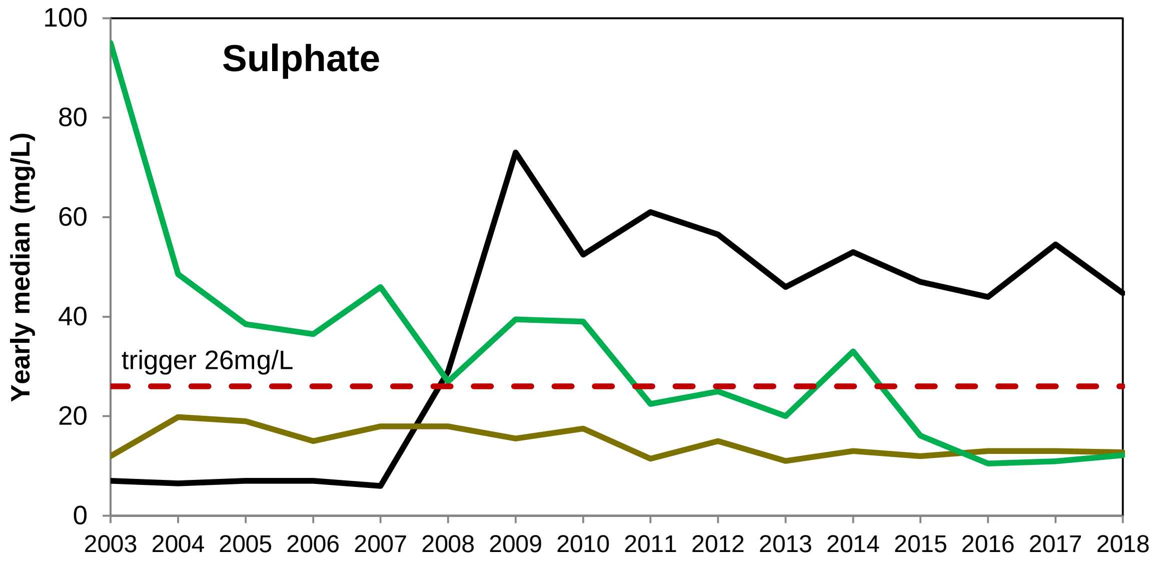
3.2.3 Nature and level of environmental risk

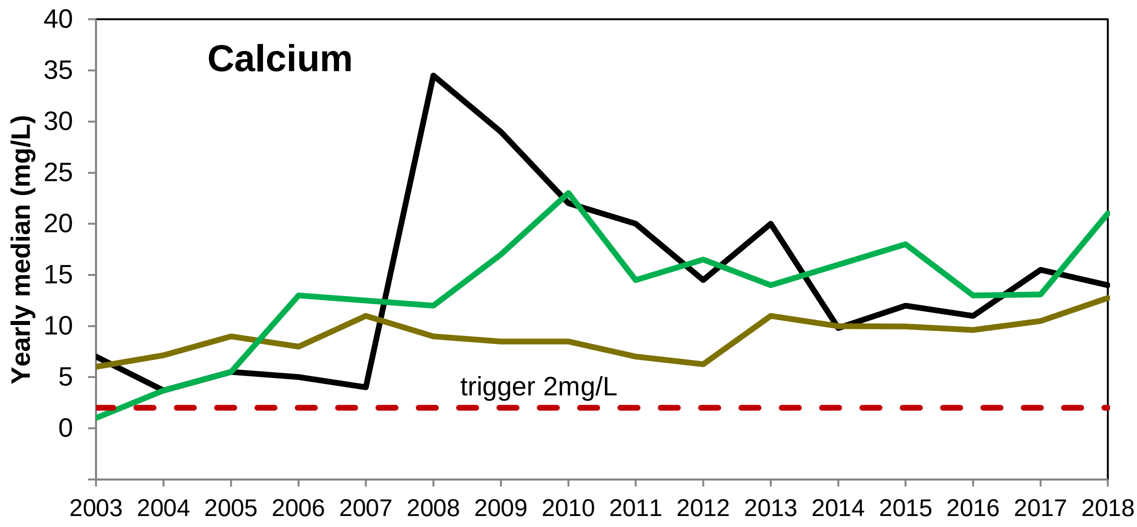
No contaminants have been recorded within any of the regional monitoring bores at concentrations that would pose significant human health risks.

Many contaminants within monitoring bores EPA 01, EPA 03 and EPA 24 exceeded their nominated trigger value, and as such pose a theoretical level of environmental risk. The location of EPA 01 is within the Northern Sediment Basin (Dam B), and since 2008 has yielded results vastly different to that collected prior to 2008. As such, water taken from monitoring bore EPA 01 is not viewed as being indicative of the wider regional aquifer.

Although there is exceedence of some analytes in the upslope bores, there is a higher degree of exceedence in the downslope bores. This may indicate the landfill site as a contamination source for the regional groundwater aquifer. For example, alkalinity, sulphate, chloride, calcium and magnesium during the current monitoring period exceed their trigger values in the downslope monitoring bores; however values are generally compliant in the upslope monitoring bores.


Ammonia
Yearly median (mg/L)
trigger 1.74mg/L
20
18
16
14
12
10
8
6
4
2
0
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018


Sulphate
Yearly median (mg/L)
trigger 26mg/L
100
80
60
40
20
0
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018


Calcium
Yearly median (mg/L)
trigger 2mg/L
40
35
30
25
20
15
10
5
0
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

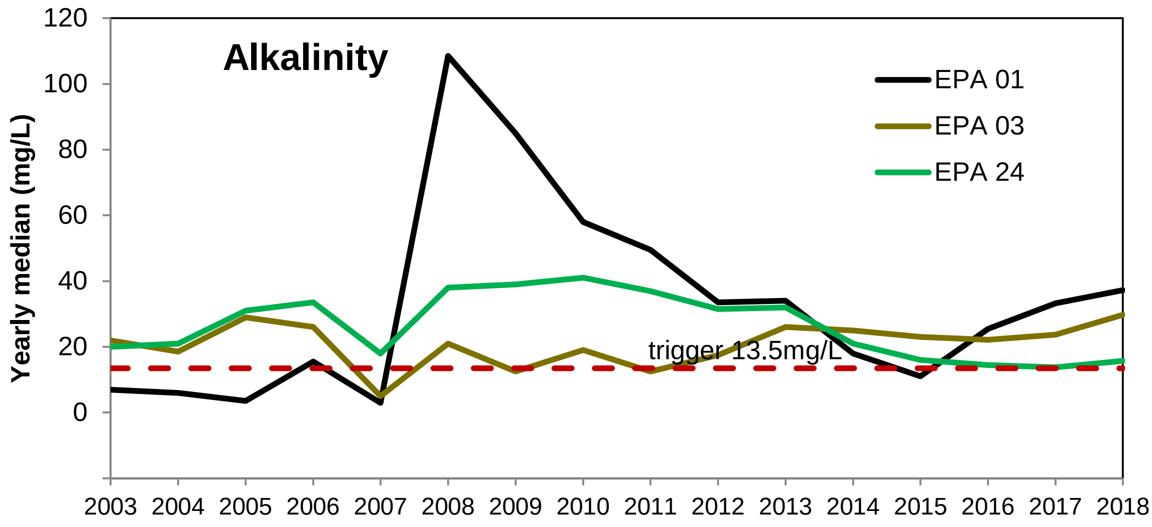


Figure 3-4: Select analytes yearly median results from downslope monitoring bores of the Regional Aquifer

3.2.4 Augmenting the current monitoring regime

The monitoring regime provides a good temporal scale of data collection and a wide variety of analytes associated with assessing both environmental and human health risks. There are, however, some issues with the location of downslope monitoring bores, highlighted in the previous annual reports. The location of monitoring bores EPA 01 and 03 may yield results that inadequately describe the quality of the regional aquifer.

Council has liaised with the EPA with regard to potentially decommission monitoring bore EPA 01 and installing another downslope regional monitoring bore north of the Northern Sediment Basin (Dam B). Council will continue to liaise with the EPA regarding this, however will need to be cognisant of any unintended impacts on any inconsistency that may arise when analysing new well data with historic data sets.

While monitoring bore EPA 03 is yielding fairly consistent results since 2003, its location within the operating quarry and low depth to groundwater (due to quarrying activities), has in the past not represented the best location to assess the impact of the landfill on the broader downslope regional aquifer (AWC, 2015). This was due to the regional aquifer surrounding monitoring bore EPA 03 possibly being subjected to localised hydraulic and quality impacts associated with the operation of quarry. However, quarry activities have ceased during this monitoring period, and will continue to be until the quarry is completely decommissioned in the forthcoming monitoring period. It is therefore not expected that the location of EPA 03 will impact future monitoring of EPA 03.

There will be a review of the analyte manganese within the existing monitoring regime. The existing sampling plan measures total manganese while the trigger value is based on filtered manganese. A review will determine whether there needs to be any variation to the existing sampling plan and what effect this may have had on previous monitoring of manganese.

3.3 Surface water

Surface water sampling sites are located at the spill way of both sediment dams, and within the Simpson Creek Tributary, 1km west of the landfill site. It is important to note that results presented from sites EPA 06 and EPA 08 do not represent waters discharging to receiving environment, as samples are taken from water within the sediment basins (at the spillway end), not from water overtopping the spillway.

shows recorded values for the current monitoring period and Appendix A shows a table containing the collated median values.

During the 2017-18 monitoring period, all calcium and most potassium values recorded from monitoring site EPA 06 and EPA 08 exceeded the trigger values of 20.7mg/L and 11.8mg/L respectively. Additionally, a number of isolated trigger exceedences occurred with other analytes, namely:

- Three of the four dissolved oxygen values at EPA 06
- Two of the four pH and iron values at EPA 06
- Single occurrences of total organic carbon at EPA 06
- All the dissolved oxygen values at EPA 08
- Three of the four nitrate values at EPA 08
- Two of the four pH and total organic carbon values at EPA 08
- Single occurrence of iron, conductivity, and alkalinity values at EPA 08

The far downstream background surface water monitoring site on Simpson Creek (EPA 33) only exceeded Dissolved Oxygen (DO) and iron water quality triggers, none of which are likely to be caused by landfill operations. Although the monitoring point EPA 33 is required to have samples taken and results compared with the relevant trigger values, the licence identifies the monitoring point as a background surface water monitoring point.

Iron is a prevalent soil and groundwater element occurring at elevated levels naturally within the region, and is highly mobile within the soil and groundwater environment. During low rainfall conditions, it is probable that the concentration of iron within surface and shallow groundwater system increase due to lack of dilution from rainfall and enhanced oxidation and mobilisation of iron bound clay particles within the wider soil profiles surrounding monitoring point EPA 33 (AWC, 2015). Annual median values for iron recorded at EPA 33 have steadily increased since 2011 with an increase in 2017 and 2018 for EPA 33 as shown in Figure 3-5.

DO is a highly variable water quality parameter with concentrations constantly affected by complex biological and physical influencing environmental factors (e.g. diffusion and aeration, photosynthesis, respiration and decomposition, seasonal temperature, the amount of naturally occurring organic matter, salinity, algal presence and the time of day the sample was taken). As such, an exceedence of the DO trigger value at monitoring sites EPA 33, 6 and 8 is not considered to pose an environmental or health risk . Values of DO from 6-15mg/L can actually benefit types of aquatic life (e.g. fish). The trigger level for DO of >6mg/L may require review by the EPA and council may seek clarification regarding whether a DO of 6mg/L may be a minimum requirement for water quality.

Since environmental monitoring commenced at Myocum Landfill, water quality within monitoring sites EPA 06 and EPA 08 has consistently exceeded trigger values for alkalinity, calcium, potassium and total organic carbon (TOC), as shown in Figure 3-6.

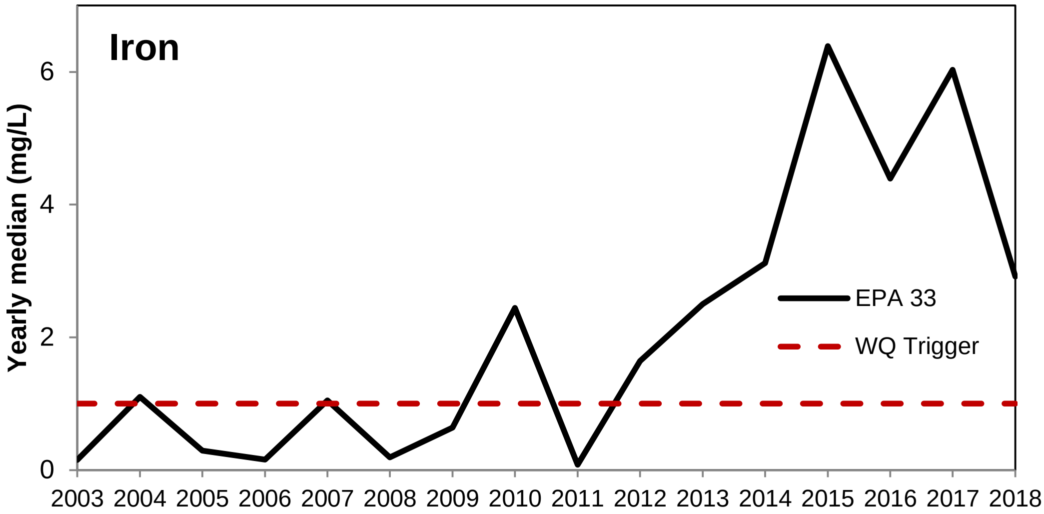


Figure 3-5: Iron annual median values recorded at EPA 33

3.3.1 Nature and level of environmental risk

No contaminants have been recorded at any of the surface water monitoring locations that would pose human health risks.

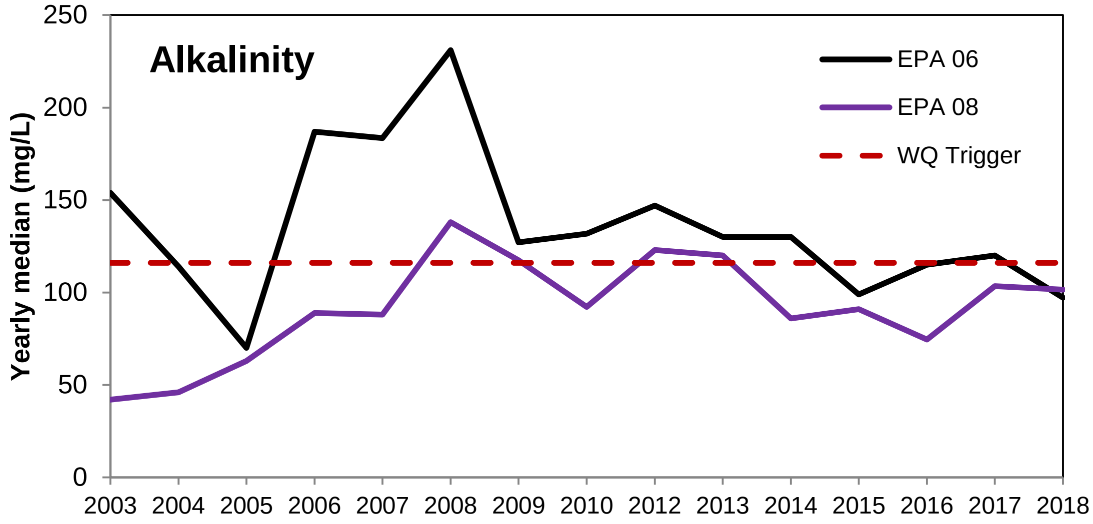
Numerous contaminants within monitoring points EPA 06 and 08 exceeded their nominated trigger values (Potassium, Calcium, Iron), however these contaminants are mostly restricted to salts, which pose minor concern for the environment at the concentrations observed.

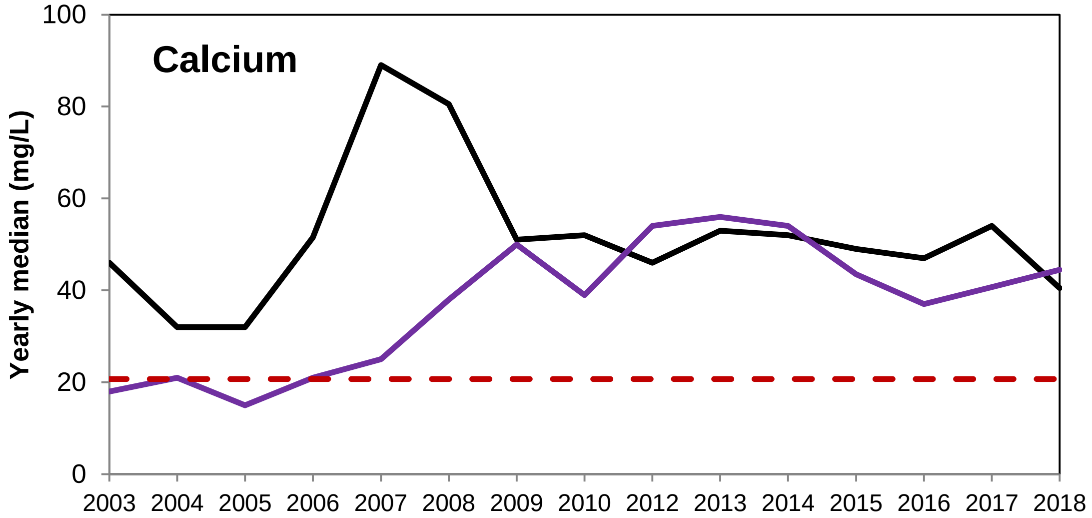
It is important to reiterate that the data reported for monitoring points EPA 06 and EPA 08 is that of the water within the ponds, rather than that exiting the ponds during wet weather events. As such, high salt concentrations of the water is expected at certain times of year, based on rainfall and evaporation patterns diluting or concentrating salts within the water column of the sediment ponds.

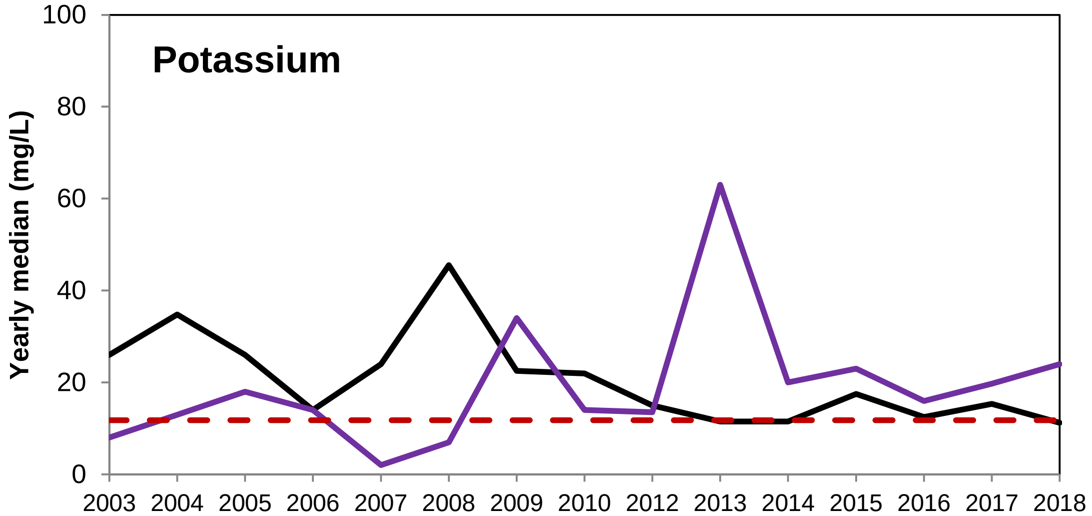
3.3.2 Augmenting the current monitoring regime

There will be a review of the analyte manganese within the existing monitoring regime. The existing sampling plan measures total manganese while the trigger value is based on filtered manganese. A review will determine whether there needs to be any variation to the existing sampling plan and what effect this may have had on previous monitoring of manganese.

There will be a review of the DO trigger level with the EPA to establish whether 6mg/L is a minimum requirement rather than a threshold for water quality.


Alkalinity
EPA 06
EPA 08
WQ Trigger
Yearly median (mg/L)
0
50
100
150
200
250
2003 2004 2005 2006 2007 2008 2009 2010 2012 2013 2014 2015 2016 2017 2018


Calcium
Yearly median (mg/L)
0
20
40
60
80
100
2003 2004 2005 2006 2007 2008 2009 2010 2012 2013 2014 2015 2016 2017 2018


Potassium
Yearly median (mg/L)
0
20
40
60
80
100
2003 2004 2005 2006 2007 2008 2009 2010 2012 2013 2014 2015 2016 2017 2018

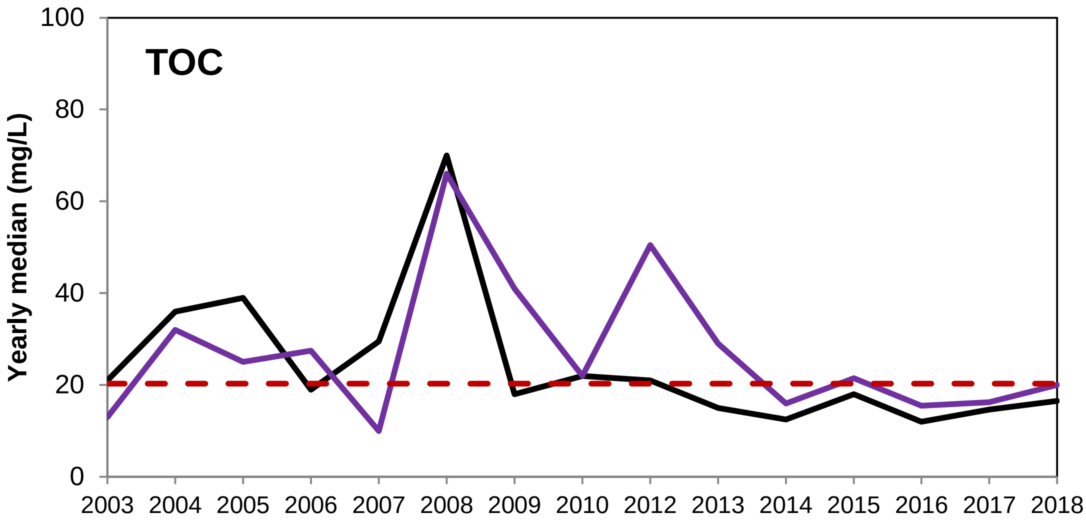


Figure 3-6: Select yearly median results from surface water Sediment Dams

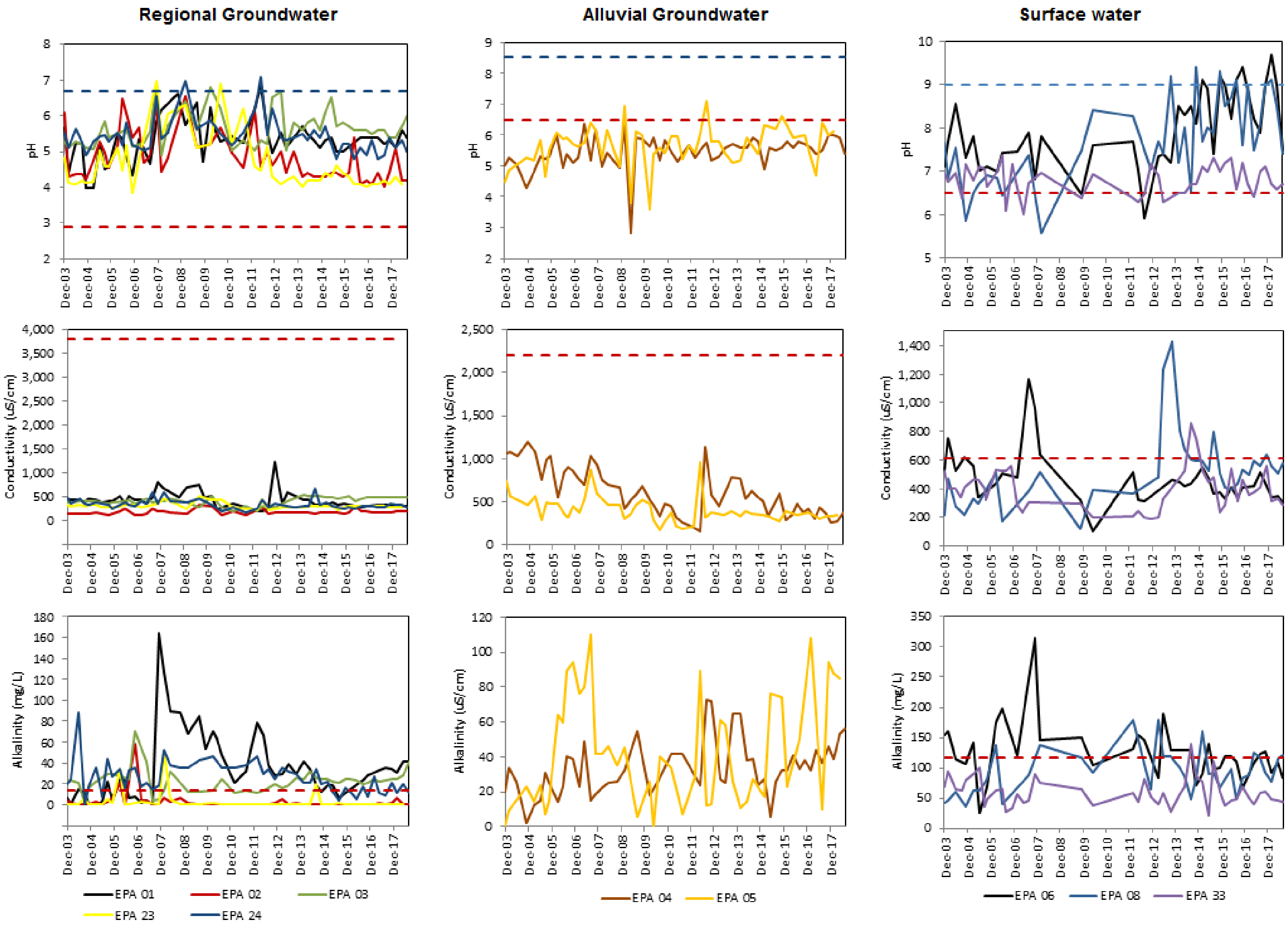


Figure 3-7: Regional Groundwater, Alluvial Groundwater and Surface water monitoring results between 2003 and 2018

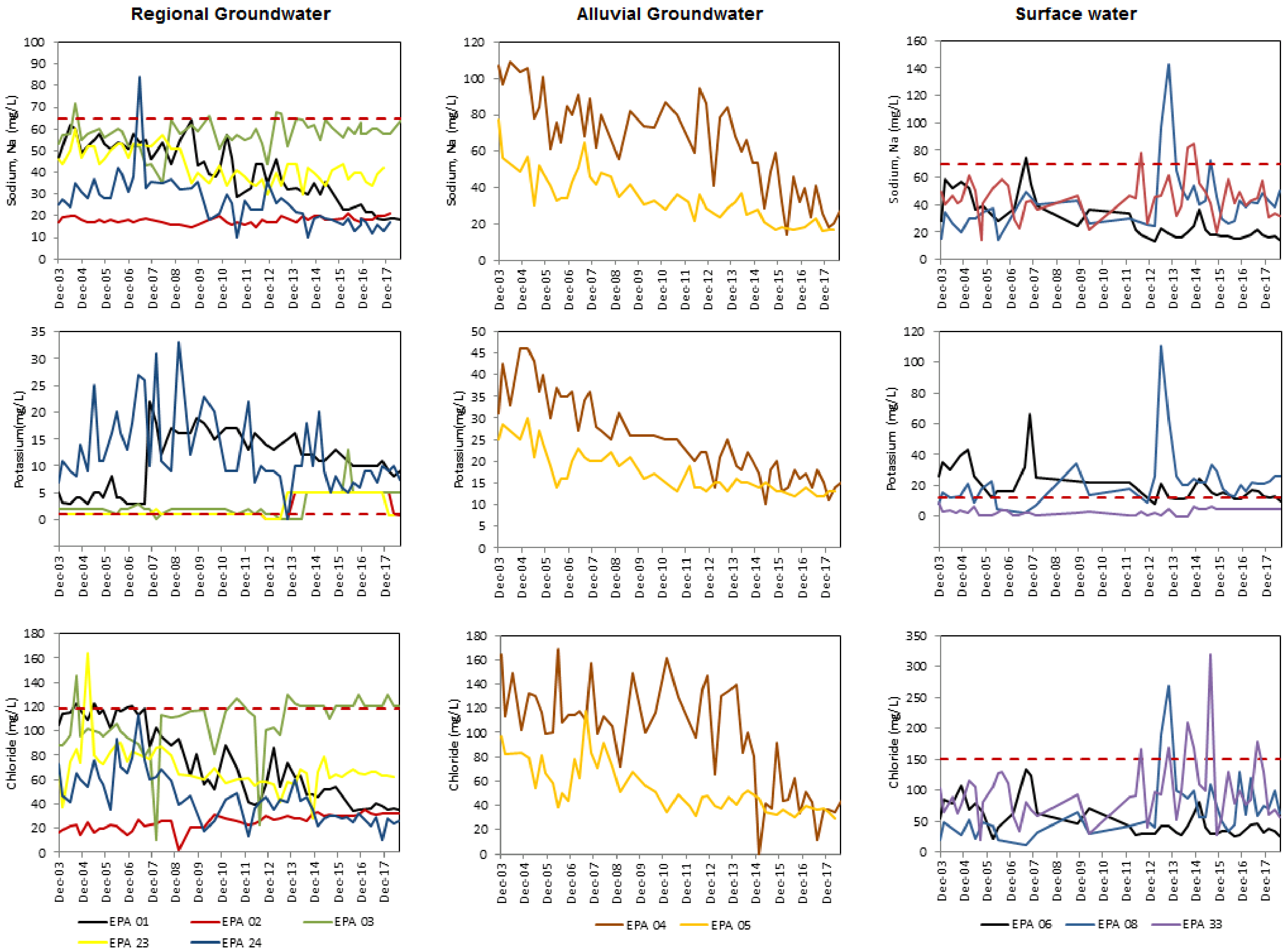


Figure 3-8: Regional Groundwater, Alluvial Groundwater and Surface water monitoring results between 2003 and 2018

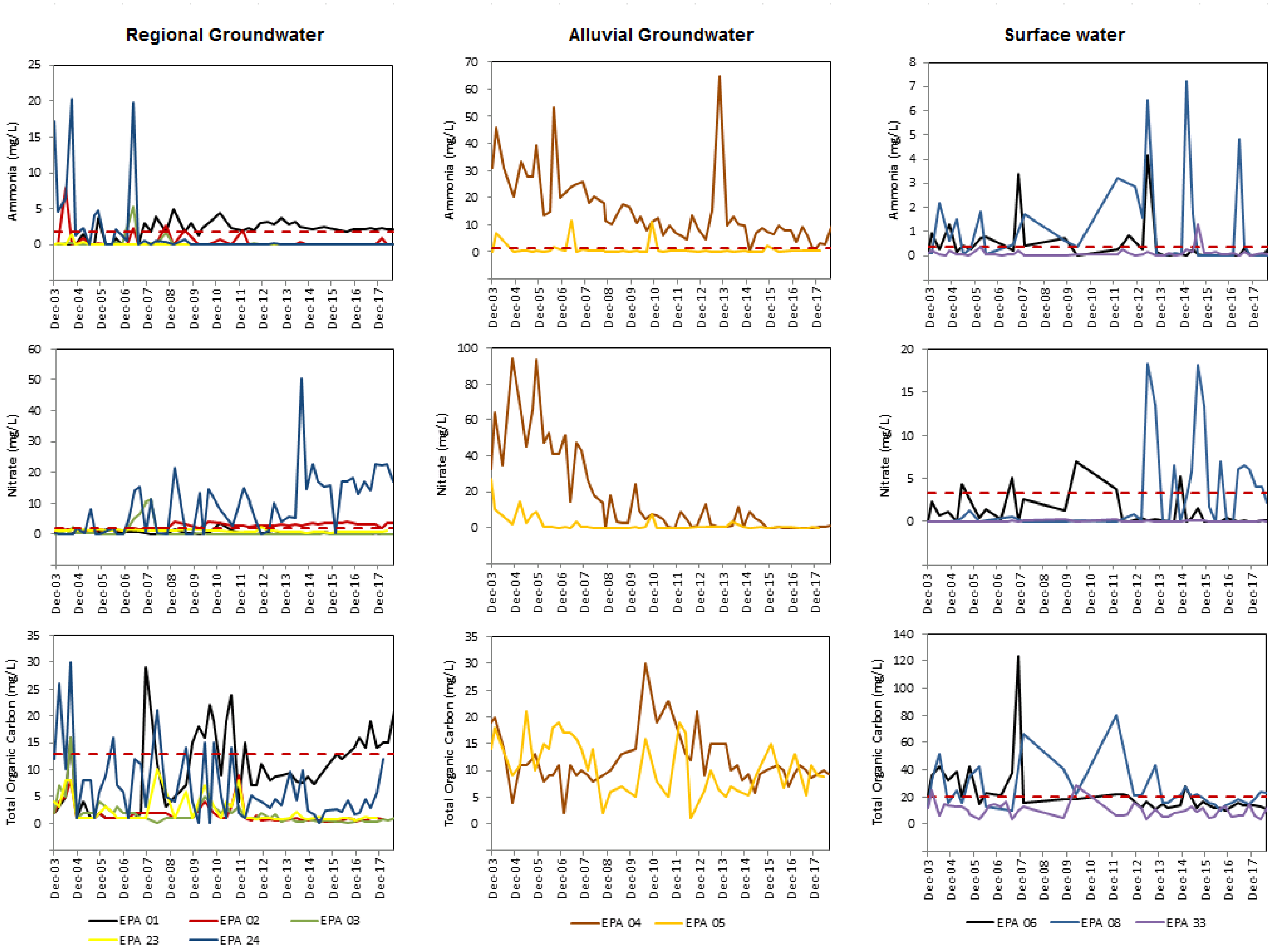


Figure 3-9: Regional Groundwater, Alluvial Groundwater and Surface water monitoring results between 2003 and 2018

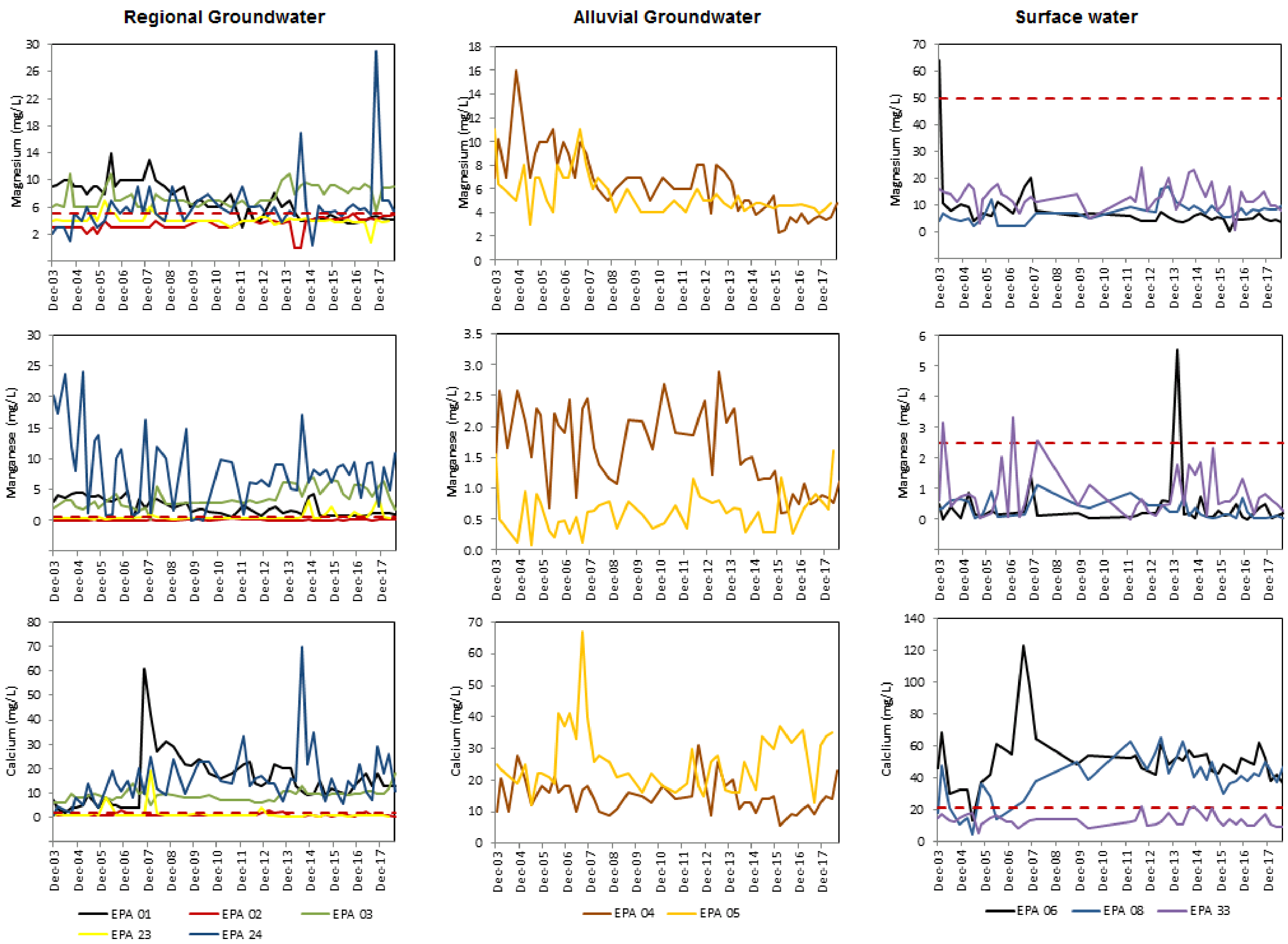


Figure 3-10: Regional Groundwater, Alluvial Groundwater and Surface water monitoring results between 2003 and 2018

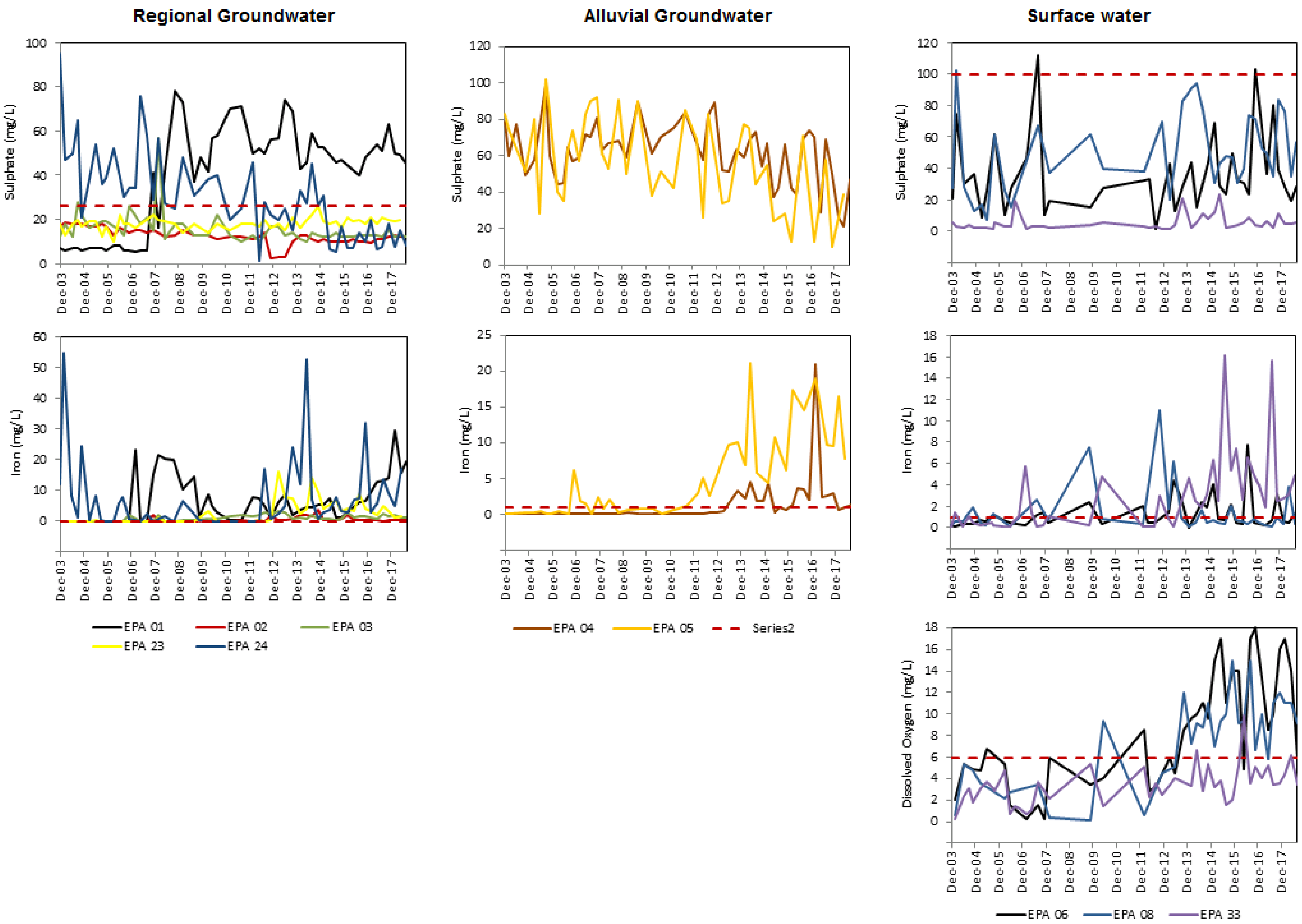


Figure 3-11: Regional Groundwater, Alluvial Groundwater and Surface water monitoring results between 2003 and 2018

4. Conclusion

Presented in this report is new ground and surface water data collected during the monitoring period between September 2017 and September 2018, along with all historical data collected since 2003. Water quality within both the alluvial and regional groundwater management units were investigated, along with surface water in the site sediment dams and one off-stream permanent creek system (Simpsons Creek).

4.1 Alluvial Groundwater

Groundwater data collected from the alluvial aquifer indicate historical landfilling activities are impacting on water quality. Ammonia concentration in monitoring point EPA 04 routinely exceeds the trigger value. This contamination is, however, not apparent in the downslope monitoring point EPA 05, indicating rapid attenuation within the alluvial aquifer system. This environmental impact has improved considerably since 2003, with compliant results likely to be achieved in coming years, based on the trajectory of the monitoring data.

No contaminants have been recorded within any of the alluvial monitoring bores that would pose human health risks.

No augmentation is recommended for assessing potential impacts of the Myocum Landfill on the alluvial aquifer.

4.2 Regional Groundwater

Monitoring points EPA 02 and 23 represent upslope monitoring points that provide a good reference point to review the potential impact of the landfill on the regional groundwater aquifer. The regional aquifer downslope of the landfill has an elevated range of contaminants compared with the upslope aquifer, mainly restricted to salts.

A substantial change occurred in water quality results sourced from EPA 01 in 2008. Concentrations of Ammonia, Alkalinity, Calcium and Sulphate increased markedly. Annual median values have remained high for Ammonia and Sulphate while calcium and Alkalinity have reduced to nearly pre 2008 ranges.

Council will continue to investigate the integrity of EPA 01 and EPA 03 in sampling the regional aquifer, and will continue to liaise with the EPA regarding the installation of a new regional aquifer bore in place of EPA 01 north of Sediment Dam B, and also relocating EPA 03.

No contaminants have been recorded within any of the regional monitoring bores that would pose human health risks.

4.3 Surface water

Sampling results from monitoring sites EPA 06 and 08 presented in this report represent water within the respective sediment basins, rather than the actual flow of water entering the receiving environment. Numerous salts within the sediment basins exceed their nominated trigger values, however the risk to the environment is considered low due to the presumed dilution of these salts with increased stormwater flow that would result in a discharge event.

No contaminants have been recorded that would pose human health risks within any of the surface water monitoring sites.

5. References

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AWA (2006), Myocum Landfill - Water Quality Assessment (Addressing Groundwater, Surface Water and Leachate), prepared on behalf of Byron Shire Council, Ref: 0109-bsc-003 (r009-d).

AWA (2006a), Myocum Solid Waste Landfill – Southern Expansion, Design Report for Landfill Development, prepared on behalf of Byron Shire Council, Ref: 0185-bsc - 001(r001-d).

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Byron Shire Council (2016), 2016 Annual Water Contamination Report – Myocum Landfill.

Earth2Water (E2W) (2012), Annual Technical Review: The Groundwater Monitoring Network and Data for Myocum Landfill (Lic No: 6057), prepared on behalf of Byron Shire Council.

Maunsell (2002), Myocum Landfill Remediation Project – Landfill Environmental Management Plan, prepared on behalf of Byron Shire Council.

Appendix A: Yearly median water quality results

Regional groundwater yearly medians

BSC Point	EPA Point	Year	No	pH	Temperature	Conductivity	Alkalinity	Sulphate	Chloride	Calcium	Magnesium	Sodium	Potassium	Arsenic	Iron	Manganese Total	Manganese Filtered	Fluoride	Ammonia as N	Nitrate as N	Total Organic Carbon	Total Phenols
					°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L
Trigger Value				2.9 - 6.7	No trigger	3,800	13.5	26	118	2	5	65	1.0		0.08		0.63		1.74	1.87	13.0	No trigger
MW1	EPA 01	2003	1	5.68	19.80	470.00	7.00	7.00	105.00	7.00	9.00	47.00	5.00	0.01	0.02	3.06		0.10	0.06	0.53	2.00	0.05
		2004	4	4.80	18.20	426.00	6.00	6.50	116.00	3.70	9.60	56.00	3.60	0.01	0.02	4.11		0.10	0.10	0.27	4.00	0.05
		2005	4	4.56	19.25	405.50	3.50	7.00	115.50	5.50	9.00	54.00	4.50	0.00	0.00	4.00		0.00	0.74	0.84	1.50	0.00
		2006	4	5.12	18.95	471.00	15.50	7.00	117.00	5.00	9.50	52.00	4.00	0.00	0.00	3.50		0.00	0.00	1.00	1.00	0.00
		2007	4	5.03	19.85	414.00	3.00	6.00	115.50	4.00	10.00	54.50	3.00	0.00	7.50	2.50		0.00	0.00	1.00	1.50	0.00
		2008	1	6.00	20.00	1000.00	108.50	29.00	99.00	34.50	11.50	49.00	15.00	0.00	21.00	3.00		0.00	3.00	0.00	7.00	0.00
		2009	3	6.38	21.00	751.00	85.00	73.00	88.00	29.00	9.00	55.00	16.00	0.00	14.60	2.87		0.00	2.00	0.14	7.00	0.00
		2010	4	5.46	20.20	389.50	58.00	52.50	58.00	22.00	6.50	40.00	17.50	0.00	3.99	1.66		0.10	2.68	0.20	18.50	0.05
		2011	4	5.81	18.85	239.00	49.50	61.00	56.00	20.00	6.00	39.00	16.50	0.00	4.00	1.48		0.10	2.32	0.55	14.00	0.05
		2012	4	5.32	17.65	459.50	33.50	56.50	55.00	14.50	5.00	39.50	14.00	0.00	5.63	1.50		0.10	2.90	0.09	9.00	0.05
		2013	3	5.50	20.30	432.00	34.00	46.00	63.00	20.00	6.00	37.00	15.00		3.59	1.32			3.14	0.06	8.80	
		2014	3	5.30	21.60	329.00	18.00	53.00	48.00	9.80	4.00	31.00	12.00		5.34	3.90			2.30	0.06	7.70	
		2015	3	5.00	21.30	345.00	11.00	47.00	52.00	12.00	4.60	35.00	12.00		1.39	0.81			2.31	0.17	8.60	
		2016	3	5.40	23.00	290.00	25.50	44.00	34.50	11.00	3.55	23.00	10.00		6.55	0.72			1.98	0.10	12.50	
		2017	4	5.25	21.23	326.75	33.25	54.50	37.25	15.50	4.40	22.00	10.00		17.43	1.03			2.23	0.12	15.75	
		2018	4	5.48	21.1	293.00	37.25	44.75	34.25	14.00	4.28	18.50	8.40		15.55	1.07			1.98	0.13	16.25	
MW2	EPA 02	2003	1	6.09	19.80	135.00	4.00	17.00	17.00	2.00	3.00	17.00	1.00	0.01	0.01	0.03		0.10	0.04	0.85	2.00	0.05
		2004	4	4.33	19.50	134.50	1.00	18.00	20.50	1.00	3.00	19.70	1.00	0.01	0.01	0.04		0.10	0.06	1.27	4.50	0.06
		2005	4	4.86	22.05	133.00	3.00	17.00	20.00	1.00	2.50	17.00	1.00	0.00	0.00	0.00		0.00	0.00	1.00	1.00	0.00
		2006	3	5.38	18.70	194.00	21.00	14.00	22.00	1.00	3.00	18.00	1.00	0.00	0.00	0.00		0.00	0.00	1.00	1.00	0.00
		2007	4	5.44	21.20	68.50	2.50	15.00	22.50	1.00	3.00	18.00	1.00	0.00	0.00	0.00		0.00	0.00	2.00	2.00	0.00
		2008	2	4.50	21.00	0.00	6.00	13.00	26.00	1.00	3.00	16.00	1.00	0.00	0.00	0.00		0.00	0.00	2.00	2.00	0.00
		2009	2	6.00	21.50	0.00	1.50	14.00	11.50	1.00	3.00	15.50	1.00	0.00	0.00	0.00		0.00	1.00	3.50	1.00	0.00
		2010	2	5.44	21.50	218.50	1.00	12.00	26.00	1.00	4.00	19.00	1.00	0.00	0.18	0.05		0.10	0.04	2.86	3.00	0.05
		2011	2	4.76	22.40	108.00	1.00	12.00	27.00	1.00	3.00	16.50	1.00	0.00	0.12	0.20		0.10	0.39	2.98	1.00	0.05
		2012	4	4.80	19.40	191.50	1.00	11.50	25.00	1.00	4.00	16.50	1.00	0.00	0.12	0.06		0.10	0.05	2.65	2.00	0.05
		2013	3	5.00	22.20	169.00	2.00	2.84	28.00	2.30	4.00	17.00	0.00		0.26	0.02			0.02	2.84	0.70	
		2014	3	4.30	21.40	169.00	1.00	13.00	28.00	0.50	0.04	19.00	5.00		2.07	0.03			0.10	2.87	0.60	
		2015	4	4.35	22.10	175.50	1.00	10.00	31.50	0.80	4.35	20.00	5.00		0.41	0.03			0.06	3.39	0.65	
		2016	4	4.35	22.50	180.50	1.00	10.00	30.00	0.80	4.25	18.50	5.00		0.59	0.05			0.02	3.63	0.40	
		2017	4	4.18	22.30	177.75	1.25	10.30	32.25	1.28	4.43	18.50	5.00		0.27	0.05			0.02	3.31	0.70	
		2018	4	4.48	22.6	182.25	2.50	12.25	32.00	1.00	4.63	19.75	2.95		0.33	0.07			0.26	3.00	0.80	
MW3	EPA 03	2003	1	5.29	23.40	390.00	22.00	12.00	88.00	6.00	6.00	53.00	2.00	0.01	0.02	2.08		0.10	0.03	0.07	2.00	0.05
		2004	4	5.14	18.40	405.00	18.50	19.85	96.00	7.15	6.20	57.60	2.00	0.01	0.03	2.75		0.10	0.10	0.49	6.00	0.05
		2005	3	5.39	20.40	383.00	29.00	19.00	99.00	9.00	6.00	58.00	2.00	0.00	0.06	2.06		0.10	0.09	0.11	2.00	0.05
		2006	3	5.58	19.20	412.00	26.00	15.00	100.00	8.00	7.00	59.00	2.00	0.00	0.10	3.80		0.10	0.11	0.03	2.00	0.05
		2007	3	5.57	21.70	388.00	5.00	18.00	86.00	11.00	6.00	44.00	2.00	0.00	0.00	2.00		0.00	0.00	6.00	1.00	0.00
		2008	2	5.50	20.50	0.00	21.00	18.00	111.00	9.00	7.00	58.00	1.00	0.00	0.00	3.00		0.00	0.00	0.00	1.00	0.00
		2009	2	6.00	20.50	0.00	12.50	15.50	114.00	8.50	7.00	60.50	2.00	0.00	0.50	3.00		0.00	0.00	0.00	1.00	0.00
		2010	2	6.51	19.80	398.00	19.00	17.50	99.00	8.50	6.50	58.50	2.00	0.00	0.88	2.88		0.10	0.06	0.08	4.00	0.05
		2011	4	5.19	19.75	255.50	12.50	11.50	116.00	7.00	6.50	56.00	1.50	0.00	1.99	3.03		0.10	0.06	0.06	2.50	0.05
		2012	4	5.87	19.00	322.00	17.50	15.00	99.00	6.25	7.00	54.50	1.00	0.00	2.74	3.12		0.10	0.11	0.01	1.00	0.05
		2013	3	5.80	20.50	514.50	26.00	11.00	123.00	11.00	10.00	67.00	0.00	0.01	0.96	6.16		0.06	0.04	0.04	1.00	0.00
		2014	3	5.90	22.15	498.00	25.00	13.00	120.00	10.00	9.20	64.00	5.00	0.01	0.76	6.60		0.06	0.03	0.06	0.30	0.00
		2015	4	5.75	20.80	487.00	23.00	12.00	120.00	9.95	9.25	61.50	5.00		0.80	5.84			0.03	0.03	0.55	
		2016	4	5.60	21.20	473.00	22.15	13.00	120.00	9.60	8.70	58.00	5.00		1.33	4.99			0.02	0.02	0.30	
		2017	4	5.50	21.03	490.25	23.75	13.00	122.50	10.48	9.03	60.25	5.00		1.75	5.16			0.02	0.05	0.45	
		2018	4	5.70	21.0	493.75	29.75	12.75	117.50	12.75	9.18	60.25	3.28		1.67	4.45			0.02	0.03	0.70	

BSC Point	EPA Point	Year	No	pH	Temperature	Conductivity	Alkalinity	Sulphate	Chloride	Calcium	Magnesium	Sodium	Potassium	Arsenic	Iron	Manganese Total	Manganese Filtered	Fluoride	Ammonia as N	Nitrate as N	Total Organic Carbon	Total Phenols
					°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L
Trigger Value				2.9 - 5.7	No trigger	3,800	13.5	26	118	2	5	65	1.0		0.08		0.63		1.74	1.87	13.0	No trigger
MW6	EPA 23	2003	1	4.81	20.80	325.00	1.00	18.00	72.00	1.00	4.00	46.00	1.00	0.01	0.02	0.41		0.10	0.06	0.98	4.00	0.05
		2004	4	4.13	19.35	316.00	1.00	17.50	74.50	1.00	4.00	48.50	1.00	0.01	0.01	0.36		0.10	0.16	1.25	5.50	0.05
		2005	4	4.58	20.10	279.00	1.50	18.00	77.50	1.00	4.00	49.00	1.00	0.00	0.00	0.00		0.00	0.00	1.00	1.00	0.00
		2006	4	4.79	19.75	332.00	1.50	18.00	86.00	2.50	5.00	51.50	1.00	0.00	0.00	0.00		0.00	0.00	1.00	1.50	0.00
		2007	2	6.00	21.00	0.00	2.00	19.00	80.00	1.00	4.00	52.50	1.00	0.00	0.00	0.00		0.00	0.00	1.00	1.00	0.00
		2008	2	5.50	20.50	0.00	5.00	19.00	86.00	2.00	5.00	51.00	1.00	0.00	0.00	0.00		0.00	0.00	1.00	6.00	0.00
		2009	2	5.50	21.50	0.00	1.00	16.00	63.50	1.00	4.00	37.50	1.00	0.00	0.00	0.00		0.00	0.00	1.00	3.50	0.00
		2010	2	6.05	20.00	430.00	1.50	16.00	65.00	1.50	4.00	39.00	1.00	0.00	1.57	0.33		0.10	0.02	1.18	5.00	0.05
		2011	2	5.70	20.55	265.00	1.00	16.50	58.50	1.00	3.50	36.00	1.00	0.00	0.09	0.32		0.10	0.06	0.84	2.50	0.10
		2012	3	4.58	17.80	220.00	1.00	18.00	58.00	1.00	4.00	38.00	1.00	0.00	0.05	0.29		0.10	0.04	0.54	3.00	0.05
		2013	3	4.20	21.70	273.00	0.00	16.00	56.00	1.10	4.60	34.00	0.00		7.88	0.35			0.03	1.04	0.90	
		2014	3	4.20	20.80	270.00	1.00	20.00	58.00	0.40	4.20	40.00	5.00		4.04	0.37			0.04	0.87	0.80	
		2015	4	4.25	20.75	298.00	1.00	20.50	65.50	0.75	4.05	41.00	5.00		7.34	0.46		0.04	0.82	1.05		
		2016	4	4.35	21.00	284.50	1.00	19.00	63.00	0.95	3.85	38.50	5.00		3.60	0.84			0.02	0.78	0.70	
		2017	4	4.08	21.13	295.75	1.00	19.25	65.75	0.78	3.88	40.25	5.00		4.53	0.78			0.02	0.83	0.90	
		2018	4	4.18	21.1	285.00	1.00	20.00	63.50	0.73	3.85	37.75	2.90		2.65	1.55			0.03	0.79	1.08	
MW7	EPA 24	2003	1	5.52	20.80	480.00	20.00	95.00	73.00	1.00	2.00	25.00	7.00		20.20	20.20			17.20	0.14	12.00	0.05
		2004	4	5.18	19.40	349.50	21.00	48.55	53.50	3.70	3.00	29.30	10.00	0.01	10.21	14.65		0.10	5.57	0.01	18.00	0.05
		2005	4	5.36	21.40	347.00	31.00	38.50	58.50	5.50	4.00	29.00	11.00	0.00	4.35	13.40		0.10	3.17	0.11	7.00	0.05
		2006	4	5.36	19.65	324.00	33.50	36.50	68.00	13.00	5.50	35.00	16.00	0.00	2.83	5.51		0.10	0.69	0.66	8.00	0.05
		2007	4	5.10	21.60	378.00	18.00	46.00	77.00	12.50	5.50	37.00	22.00	0.00	0.46	2.86		0.10	0.57	9.10	7.00	0.10
		2008	2	5.44	21.25	495.50	38.00	27.00	62.00	12.00	5.00	35.00	11.00	0.00	0.63	10.10		0.10	0.34	0.12	5.00	0.05
		2009	2	6.31	22.25	420.50	39.00	39.50	43.00	17.00	6.50	34.50	22.50	0.00	3.37	8.23		0.10	0.38	10.84	9.00	0.05
		2010	2	5.70	22.15	259.00	41.00	39.00	22.00	23.00	7.50	19.50	21.50	0.00	0.13	1.83		0.10	0.06	13.90	15.00	0.05
		2011	2	5.36	22.10	215.20	37.00	22.50	46.50	14.50	5.50	28.00	9.00		0.05	9.63			0.07	5.38	3.00	
		2012	4	6.19	19.95	314.50	31.50	25.00	38.50	16.50	6.10	23.00	9.50	0.00	0.05	6.12		0.10	0.05	11.40	3.65	0.05
		2013	3	5.40	23.30	287.00	32.00	20.00	41.00	14.00	4.70	26.00	8.00	0.00	2.43	8.93		0.04	0.02	3.94	4.10	0.00
		2014	3	5.50	22.70	310.00	21.00	33.00	46.00	16.00	5.50	26.00	10.00	0.01	24.00	5.09		0.02	0.03	5.46	4.40	
		2015	4	5.30	22.70	314.00	16.00	16.10	29.00	18.00	5.70	19.50	9.50		3.22	7.82		0.05	0.05	3.40		
		2016	4	5.15	23.10	269.50	14.50	10.50	28.50	13.00	5.35	18.50	6.50		5.13	7.97			0.02	16.20	2.50	
		2017	4	4.98	23.23	283.75	13.75	10.93	27.50	13.10	5.73	16.25	7.75		12.03	7.92			0.04	15.70	2.60	
		2018	4	5.20	23.0	323.50	15.75	12.18	22.00	21.00	6.58	14.50	9.10		11.27	6.68			0.02	21.13	6.25	

Alluvial groundwater yearly medians

BSC Point	EPA Point	Year	No	pH	Temperature	Conductivity	Alkalinity	Sulphate	Chloride	Calcium	Magnesium	Sodium	Potassium	Arsenic	Iron	Manganese Filtered	Fluoride	Ammonia as N	Nitrate as N	Total Organic Carbon	Total Phenols
					°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L
Trigger Value				6.5-8.5	No trigger	2,200	No trigger								1.00	2.50	No trigger	1.43	No trigger		
MW4	EPA 04	2003	1	5.00	20.40	1070.00	20.00	79.00	164.00	10.00	7.00	107.00	31.00	0.01	0.04	1.46	0.10	30.80	32.70	19.00	0.05
		2004	3	5.06	19.90	1075.00	26.00	59.80	113.00	20.60	10.20	104.00	42.60	0.01	0.05	2.57	0.10	31.10	64.20	14.00	0.05
		2005	4	5.25	19.40	1006.50	20.00	68.00	123.50	17.00	9.50	92.50	41.50	0.00	0.00	2.00	0.00	30.70	67.20	11.50	0.00
		2006	4	5.23	19.10	850.00	31.00	51.00	111.00	17.00	10.00	70.50	35.00	0.00	0.00	2.00	0.00	17.50	44.00	9.00	0.00
		2007	4	5.59	20.15	1000.00	21.00	71.00	116.50	17.50	9.00	84.50	35.00	0.00	0.00	2.00	0.00	24.50	45.00	9.50	0.00
		2008	3	5.00	19.10	1000.00	25.00	67.00	105.00	10.00	6.00	66.00	27.00	0.00	0.00	1.00	0.00	18.00	16.00	9.00	0.00
		2009	4	5.95	21.00	840.50	43.50	74.00	110.50	13.50	6.50	69.00	28.50	0.00	0.00	1.50	0.00	15.25	3.00	11.50	0.00
		2010	4	5.73	20.15	469.00	23.00	65.50	108.50	14.00	6.00	73.50	26.00	0.00	0.08	1.86	0.10	10.85	8.38	22.00	0.05
		2011	4	5.42	19.15	283.00	42.00	79.50	145.00	16.00	6.50	83.50	25.00	0.00	0.10	2.29	0.10	8.50	2.40	21.00	0.05
		2012	4	5.39	18.30	516.50	49.50	70.00	115.50	18.50	7.00	72.50	21.00	0.00	0.29	2.02	0.10	7.00	2.97	12.50	0.05
		2013	3	5.60	21.10	774.00	65.00	59.00	134.00	20.00	7.50	79.00	21.00		2.18	2.30		15.00	1.75	15.00	
		2014	3	5.60	21.10	562.00	38.00	68.00	83.00	13.00	5.00	60.00	20.00		1.94	1.47		10.00	1.48	9.90	
		2015	4	5.55	20.60	490.00	26.50	54.00	40.00	14.00	4.40	51.50	17.50		0.78	1.16		7.75	4.03	9.35	
		2016	4	5.70	21.05	360.00	35.50	55.50	44.50	8.05	2.85	32.00	15.00		2.78	0.68		7.56	0.06	10.00	
		2017	4	5.55	21.15	379.00	39.75	54.50	35.50	11.35	3.55	32.75	16.00		7.23	0.87		6.79	0.06	9.80	
		2018	4	5.83	21.7	340.00	42.75	42.25	44.00	15.50	3.85	28.50	14.25		1.54	0.90		3.94	0.36	10.38	
MW5	EPA 05	2003	1	4.47	21.00	740.00	1.00	83.00	97.00	25.00	11.00	77.00	25.00	0.01	0.05	1.54	0.10	0.01	26.90	14.00	0.05
		2004	2	5.05	21.45	516.50	16.00	62.70	82.50	21.15	5.70	52.60	26.80	0.01	0.18	0.31	0.10	3.44	5.84	13.50	0.05
		2005	4	5.34	18.85	486.50	14.50	82.00	73.00	22.00	7.00	50.00	25.50	0.00	0.12	0.97	0.00	0.00	8.00	12.50	0.00
		2006	4	5.89	19.40	403.00	76.50	51.50	47.00	29.00	6.00	34.00	16.00	0.00	0.00	0.00	0.00	0.50	0.00	16.50	0.00
		2007	4	6.00	19.55	698.00	78.00	86.50	80.50	40.50	8.50	48.50	20.50	0.00	1.50	0.50	0.00	1.00	0.50	16.50	0.00
		2008	3	5.00	19.35	460.00	42.00	61.00	72.00	26.00	6.00	46.00	20.00	0.00	1.00	1.00	0.00	0.00	0.01	10.00	0.00
		2009	4	5.99	21.00	0.00	25.50	70.00	59.50	21.50	5.00	38.50	20.00	0.00	1.00	0.50	0.00	0.08	0.00	6.50	0.00
		2010	4	5.40	19.40	285.50	33.00	44.50	53.50	19.00	4.00	32.00	16.50	0.00	0.42	0.47	0.10	0.35	0.13	10.50	0.05
		2011	3	5.95	19.40	209.00	20.50	63.50	41.50	17.00	4.50	32.00	14.00	0.00	0.87	0.58	0.10	0.23	0.02	6.50	0.05
		2012	4	5.86	16.85	345.50	21.00	65.00	43.50	18.50	5.00	30.50	14.00	0.00	2.95	0.87	0.10	0.52	0.01	17.00	0.05
		2013	3	5.80	20.90	370.50	58.00	35.00	40.00	26.00	5.00	26.00	15.00		9.76	0.77		0.20	0.14	6.40	
		2014	3	5.20	20.70	362.00	14.00	75.00	49.00	16.00	4.40	32.00	15.00		6.88	0.65		0.15	0.61	6.20	
		2015	4	5.85	21.35	336.50	46.50	39.50	40.00	25.50	4.80	24.50	14.50		7.62	0.46		0.37	0.32	7.05	
		2016	3	6.20	20.10	342.00	50.00	28.00	32.00	32.00	4.60	17.00	13.00		14.50	0.29		0.18	0.10	10.90	
		2017	2	5.35	21.50	334.50	59.00	35.50	38.00	24.50	4.55	20.50	13.00		14.28	0.79		0.53	0.15	9.20	
		2018	3	6.17	21.5	339.00	89.00	25.00	33.67	33.33	4.37	16.67	12.67		11.23	1.02		0.46	0.07	9.63	

Surface water yearly medians

BSC Point	EPA Point	Year	No	pH	Temperature	Conductivity	Alkalinity	Sulphate	Chloride	Calcium	Magnesium	Sodium	Potassium	Arsenic	Iron	Manganese Filtered	Fluoride	Ammonia as N	Nitrate as N	Total Organic Carbon	Total Phenols	DO	TSS
					°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L
Trigger Value				6.5 - 9.0	No trigger	610	116	100	150	20.7	50	70	11.8		1.0	2.50		0.36	3.40	20.30		>6.0	No Trigger
		2003	1	7.10	27.30	520.00	154.00	21.00	54.00	46.00	64.00	28.00	26.00	0.01	0.19	0.49	0.10	0.09	0.01	21.00	0.05		131
		2004	3	7.68	22.40	619.00	114.00	36.00	86.00	32.00	10.00	57.00	34.80	0.01	0.30	0.04	0.10	0.96	1.17	36.00	0.05	4.90	59
		2005	3	7.10	21.90	450.00	70.00	26.00	69.00	32.00	7.00	39.00	26.00	0.00	0.70	0.18	0.10	0.26	2.67	39.00	0.05	5.80	148
		2006	2	7.20	17.95	468.00	187.00	18.50	31.50	51.50	8.50	30.00	14.00	0.00	0.55	0.23	0.10	0.74	0.95	19.00	0.08	3.45	61
		2007	2	7.68	17.25	823.00	183.50	79.00	99.00	89.00	12.00	55.50	24.00	0.00	0.67	0.22	0.10	0.34	2.70	29.50	0.06	0.90	151
		2008	2	7.32	22.30	801.00	231.00	14.50	94.00	80.50	14.00	47.00	45.50	0.01	0.93	0.78	0.10	1.89	1.31	70.00	0.42	3.13	47
		2009	2	7.04	20.50	213.00	127.20	21.00	59.00	51.00	6.50	30.00	22.50	0.00	1.33	0.12	0.10	0.37	4.10	18.00	0.05	3.75	49
SDP1	EPA 06	2010	1	7.70		517.00	131.80	32.00	43.00	52.00	6.00	34.00	22.00		2.00	0.10		0.27	3.82	22.00		8.60	27
		2012	3	7.03	19.40	319.00	147.00	33.00	30.00	46.00	4.00	18.00	15.00	0.00	0.46	0.19	0.10	0.47	0.09	21.00	0.05	3.20	32
		2013	3	7.95	24.65	466.00	130.00	36.00	37.00	53.00	4.70	17.50	11.50		1.37	3.08		0.10	0.11	15.00		9.05	34
		2014	4	8.30	23.45	424.50	130.00	23.00	35.00	52.00	4.00	18.00	11.50		1.53	0.18		0.03	0.03	12.50		10.00	30
		2015	4	9.00	21.05	425.00	99.00	39.00	35.50	49.00	5.45	20.00	17.50		1.50	0.19		0.04	0.21	18.00		14.50	58
		2016	4	9.05	23.20	371.50	115.00	31.50	31.00	47.00	4.45	16.00	12.50		0.43	0.13		0.02	0.02	12.00		15.50	30
		2017	3	8.37	22.87	451.67	120.00	51.67	41.33	54.00	5.57	19.33	15.33		1.34	0.35		0.12	0.07	14.67		11.50	51
		2018	4	8.38	22.1	339.25	97.25	25.25	33.50	40.50	4.08	16.25	11.25		1.41	0.19		0.09	0.05	16.50		11.15	42
		2003	1	7.65	26.20	220.00	42.00	27.00	21.00	18.00	4.00	15.00	8.00	0.01	0.20	0.35	0.10	0.11	0.01	13.00	0.05		27
		2004	3	6.84	19.90	273.00	46.00	28.00	39.00	21.00	5.00	26.00	13.00	0.01	0.58	0.61	0.10	0.60	0.01	32.00	0.05	4.80	100
		2005	3	6.72	23.20	312.50	63.00	17.00	49.00	15.00	5.00	30.00	18.00	0.00	0.43	0.17	0.10	0.29	0.43	25.00	0.05	3.40	27
		2006	2	6.65	22.20	340.50	89.00	20.50	31.50	21.00	7.00	25.50	14.00	0.00	0.34	0.49	0.10	0.94	0.08	27.50	0.05	2.40	108
		2007	2	7.37	19.60	387.00	88.00	67.00	13.00	25.00	2.00	49.00	2.00	0.00	2.65	0.18	0.20	0.49	0.60	10.00	0.05	3.40	197
		2008	2	5.58	23.90	517.00	138.00	37.00	32.00	38.00	7.00	40.00	7.00	0.00	0.65	1.14	0.10	1.74	0.01	66.00	0.14	0.40	57
		2009	2	7.50		117.00	117.40	62.00	66.00	50.00	7.00	43.00	34.00		7.53	0.45		0.61	0.02	41.00		0.10	676
SDP2	EPA 08	2010	1	8.40		396.00	92.20	40.00	31.00	39.00	5.00	26.00	14.00		0.80	0.36		0.35	0.10	22.00		9.40	40
		2012	3	7.67	23.10	365.00	123.00	54.00	47.00	54.00	8.45	27.50	13.50	0.01	5.67	0.68	0.10	3.04	0.47	50.50	0.05	2.55	182
		2013	3	7.70	21.05	1233.00	120.00	43.00	190.00	56.00	16.00	96.00	63.00	0.00	1.72	0.44	0.07	1.54	13.54	29.00	0.00	8.55	46
		2014	4	7.20	19.70	607.00	86.00	91.00	96.00	54.00	9.90	52.00	20.00		0.50	0.25		0.06	0.12	16.00		8.80	16
		2015	4	7.95	17.90	595.00	91.00	45.50	79.00	43.50	8.85	48.50	23.00		0.45	0.13		0.88	4.31	21.50		9.70	18
		2016	4	8.90	22.55	422.50	74.50	43.50	47.00	37.00	5.95	29.00	16.00		0.67	0.12		0.02	4.34	15.50		12.20	31
		2017	4	8.05	24.35	546.50	103.50	52.00	92.75	40.75	7.73	41.00	19.75		0.40	0.26		1.32	3.15	16.25		8.38	16
		2018	4	8.50	23.7	569.75	101.50	63.00	77.50	44.50	8.65	44.75	24.00		1.37	0.06		0.02	4.10	20.00		10.78	29
		2003	1	6.95	27.40	520.00	70.00	5.00	104.00	15.00	16.00	49.00	9.00	0.01	0.15	0.61	0.20	0.11	0.01	12.00	0.05		10
		2004	3	6.75	20.90	404.00	65.00	2.70	65.00	13.00	14.00	41.00	3.40	0.01	1.10	0.68	0.10	0.07	0.01	15.00	0.05	2.40	31
		2005	3	7.12	21.30	459.00	90.00	2.00	106.00	17.00	16.00	50.00	4.00	0.00	0.29	0.76	0.10	0.07	0.01	13.00	0.13	3.10	20
		2006	2	7.02	18.20	459.00	55.50	3.00	93.50	13.00	14.00	46.50	1.00	0.00	0.16	0.14	0.10	0.06	0.03	8.50	0.05	2.95	5
		2007	2	6.61	19.00	520.00	33.00	11.00	113.00	12.00	13.00	54.00	4.00	0.00	1.05	2.03	0.10	0.07	0.01	14.00	0.05	1.20	17
		2008	2	6.37	18.35	268.00	46.00	3.00	69.00	11.00	11.00	42.00	2.00	0.00	0.19	0.52	0.05	0.07	0.03	10.00	0.03	2.40	21
		2009	2	6.67	20.15	301.50	71.00	3.00	76.00	14.00	12.50	41.50	1.50	0.00	0.64	1.51	0.10	0.01	0.16	9.00	0.05	3.70	12
SW1	EPA 33	2010	1	6.65	20.10	202.00	48.00	4.00	60.00	10.00	9.00	34.50	2.00	0.00	2.45	0.56	0.10	0.06	0.14	17.50	0.05	3.25	101
		2011	3	6.38	20.35	221.50	63.50	2.50	130.00	17.50	17.50	61.50	2.00	0.00	0.08	0.56	0.10	0.18	0.06	6.50	0.05	2.95	14
		2012	3	6.91	17.20	195.00	47.00	2.50	95.50	11.50	12.50	46.50	1.50	0.00	1.64	0.35	0.10	0.05	0.03	11.50	0.05	3.30	13
		2013	4	6.50	21.80	689.50	70.00	5.20	100.00	11.00	13.00	39.00	0.00		2.50	1.79		0.03	0.03	5.80		3.30	18
		2014	4	7.00	17.50	446.00	78.00	12.00	110.00	18.00	17.00	56.00	5.00		3.12	1.46		0.14	0.07	10.00		3.80	20
		2015	4	7.25	19.30	382.50	53.00	3.40	94.00	13.50	13.50	38.50	5.00		6.39	0.59		0.14	0.06	7.10		3.60	27
		2016	4	6.95	20.30	410.50	49.00	4.65	89.50	12.50	13.00	45.00	5.00		4.39	0.82		0.08	0.03	8.70		4.60	30
		2017	4	6.85	20.33	401.00	53.75	5.63	110.25	12.55	11.85	42.00	5.00		6.03	0.65		0.08	0.04	7.78		4.40	56
		2018	4	6.80	17.6	344.50	44.50	4.70	74.25	10.78	9.80	40.25	3.50		2.92	0.36		0.03	0.02	8.75		4.75	17