

# Appendix 3

## Final Assessment Report for the Pollution Reduction Program at the Teralba Quarry - September 2016

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METROMIX

**METROMIX PTY LTD**

ABN: 39 002 886 839

Environmental Protection Licence 536

# Final Assessment Report for the Pollution Reduction Program

at the

Teralba Quarry

*Prepared by:*



**R.W. CORKERY & CO. PTY. LIMITED**

September 2016

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ABN: 39 002 886 839

# Environmental Protection Licence 536

## Final Assessment Report for the Pollution Reduction Program

### at the

## Teralba Quarry

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**Prepared for:**

Metromix Pty Ltd  
ABN: 39 002 886 839  
PO Box 3016  
TERALBA NSW 2284

Telephone: (02) 4950 6640  
Facsimile: (02) 4958 7201  
Email: Bills@metromix.com.au

---

**Prepared by:**

R.W. Corkery & Co. Pty. Limited  
Geological & Environmental Consultants  
ABN: 31 002 033 712

**Brooklyn Office:**

1st Floor, 12 Dangar Road  
PO Box 239  
BROOKLYN NSW 2083

Telephone: (02) 9985 8511  
Facsimile: (02) 6361 3622  
Email: brooklyn@rwcorkery.com

**Orange Office:**

62 Hill Street  
ORANGE NSW 2800

Telephone: (02) 6362 5411  
Facsimile: (02) 6361 3622  
Email: orange@rwcorkery.com

**Brisbane Office:**

Suite 5, Building 3  
Pine Rivers Office Park  
205 Leitchs Road  
BRENDAL QLD 4500

Telephone: (07) 3205 5400  
Facsimile: (02) 6361 3622  
Email: brisbane@rwcorkery.com

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## 1. POLLUTION STUDIES AND REDUCTION PROGRAM

### 1.1 INTRODUCTION

In accordance with *Conditions U1.1 and U1.2* of Environment Protection Licence (EPL) 536 (updated 13 November 2015), the following information provides the consolidated results of surface water monitoring undertaken at monitoring locations EPL Points 4 and 5 (EPL 4 and EPL 5) within the Teralba Quarry between September 2013 and August 2016 (the “monitoring period”)<sup>1</sup>. This assessment report has been prepared for review by the Environment Protection Authority (EPA) to satisfy *Condition U1.3* of EPL 536 and presents an assessment of pollutants<sup>2</sup> detected in the discharges at EPL 4 and EPL 5 in accordance with ANZECC water quality guidelines. The monitoring results have been reviewed in order to establish which analytes nominated in *Condition U1.2* of EPL 536 remain appropriate for ongoing monitoring at EPL 4 and EPL 5.

This information expands upon the previously submitted “*Initial Report for Condition U1.1 and U1.2 for Environment Protection Licence 536*” and “*Second Report for Conditions U1.1, U1.2 and U1.3 for Environment Protection Licence 536*”, prepared by R.W. Corkery and Co Pty Limited (RWC) and supplied to the EPA in August 2014 and April 2015 respectively. The information provides an understanding of the surface water environment within the Teralba Quarry and an analysis of the potential impacts that the ongoing discharge of mine water<sup>3</sup> and Quarry is having on the quality and quantity of water flowing towards Lake Macquarie. **Figure 1** presents the water management structures at the Teralba Quarry including the unnamed watercourse from the Quarry towards Lake Macquarie. The watercourse then traverses the Teralba residential area through a concrete drain referred to as “Murphs Drain”.

### 1.2 ENVIRONMENT PROTECTION LICENCE 536 CONDITIONS

The following presents the conditions of EPL 536 relevant to this assessment report.

#### *Condition U1.1*

*“At Points 4 and 5, the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1 of the table below. The licensee must use the corresponding units of measure, sampling frequency, and sampling method specified opposite in Columns 2, 3, and 4 respectively.”*

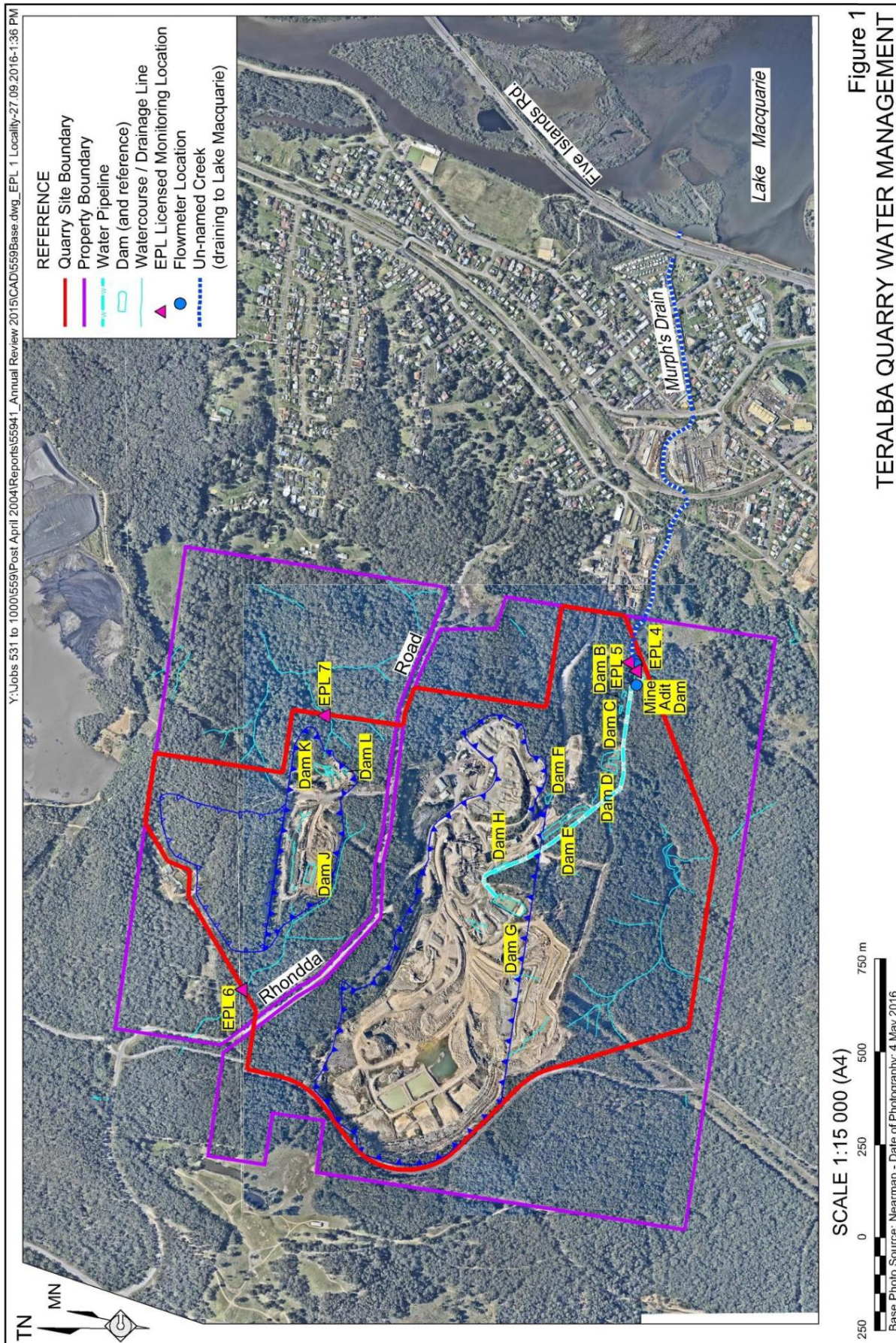
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<sup>1</sup> It is noted that *Condition U1.2* requires 24 months of data for comparison purposes, however, 38 months of data of data has been provided.

<sup>2</sup> It is noted that *Condition U1.2* refers to all analytes as pollutants, however it is noted that this includes parameters such as pH, electrical conductivity and elements such as calcium. For consistency, all analytes are referred to as pollutants in this report.

<sup>3</sup> The Mine Adit Dam essentially collects groundwater originating from a number of former underground coal mines together with small quantities of seepage from the Teralba Quarry.







<b>Pollutant</b>	<b>Unit of Measure</b>	<b>Frequency</b>	<b>Sample Method</b>
Aluminium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Antimony (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Arsenic (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Barium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Beryllium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Boron (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Cadmium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Chromium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Cobalt (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Copper (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Iron (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Lead (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Lithium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Magnesium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Manganese (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Mercury (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Molybdenum (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Nickel (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Selenium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Silver (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Silica (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Silver (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Tin (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Titanium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Vanadium (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Zinc (Total and dissolved)	micrograms per litre	monthly during discharge	grab sample
Calcium	milligrams per litre	monthly during discharge	grab sample
Conductivity	microsiemens per centimetre	Special Frequency 1	grab sample
Nitrogen (ammonia)	milligrams per litre	monthly during discharge	grab sample
Oil and grease	milligrams per litre	Special Frequency 1	grab sample
Phosphorus	milligrams per litre	monthly during discharge	grab sample
Potassium	milligrams per litre	monthly during discharge	grab sample
Sulfur	milligrams per litre	monthly during discharge	grab sample
Total Suspended Solids	milligrams per litre	Special Frequency 1	grab sample
pH		Special Frequency 1	grab sample

*Condition U1.2*

*"The monitoring program for the specified pollutants must be conducted for 24 months, commencing on the date of issue of this licence.*

*Upon completion of the first 6 months of monitoring, all results must be submitted for review to the EPA's Regional Manager-Hunter at PO Box 488G Newcastle 2300. All monitoring results must be submitted on the seventh monitoring month and no later than 30 January 2015.*

*Metals not detected during the first 6 months of monitoring may be removed from this PRP. The licensee may formally request the removal of non-detected metals by submitting an application to vary this licence. The licensee must provide appropriate documentation in support of this application.*

*To avoid any doubt, unless a variation been granted in writing by the EPA, all metals listed in this PRP must be monitored during the full two year period."*

*Condition U1.3*

*Upon completion of this 24 month monitoring program, the licensee must within two months conduct an assessment of metals detected in the discharges in accordance with ANZECC water quality guidelines. The licensee must provide this assessment report within one month following the completion of the assessment and include all sampling results from the study.*

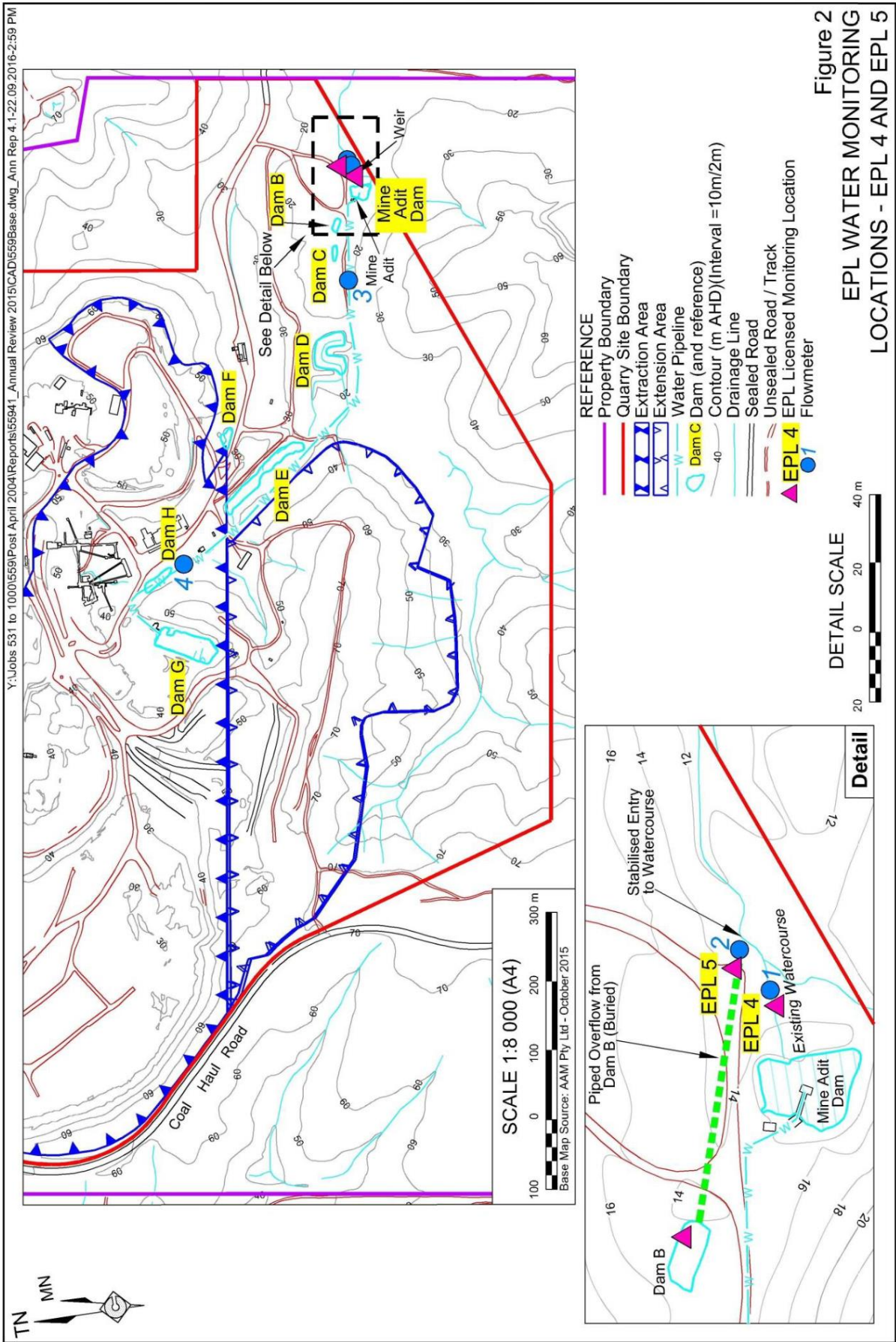
*The assessment report and the sampling results, including any recommendations and actions must be submitted to the EPA Regional Manager-Hunter at PO Box 48G Newcastle NSW 2300 no later than 30 October 2016.*

### **1.3 SURFACE WATER MONITORING LOCATION CONTEXT**

**Figure 2** presents an overview of the EPL 4 and EPL 5 and their interaction with other sediment dams and the water pipeline between the Mine Adit Dam and Dam G.

EPL 4 is located on the northern side of an historic and flooded Mine Adit Dam that was originally associated with the Oceanic Coal's Westside Colliery (Teralba and Northern Extended Collieries) and Coal and Allied's Northern Colliery (formerly known as Rhondda Colliery) that targeted the Fassifern Seam and Great Northern Coal Seam. The Westside Colliery is in fact connected underground with other nearby mines such as Rhondda Colliery, the owners of which (Coal and Allied) held an EPL 3139 that required the monitoring of the discharge from the Mine Adit Dam until early 2013.

The Mine Adit Dam continuously discharges water from the underground voids (groundwater) to the at-surface Mine Adit Dam that flows eastwards for a distance of approximately 40m along an unnamed watercourse to the eastern boundary of the Teralba Quarry and then towards Lake Macquarie. Groundwater from the underground coal workings is referred to as "surface water" once reaching the Mine Adit Dam. The water in the Mine Adit Dam is either pumped to Dam G for Metromix's use or allowed to flow off site (see **Figure 2**).



EPL 5 is located at the end of a pipe from Dam B (see **Figure 2**) which is the overflow point from the surface water management system within the Teralba Quarry on the southern side of Rhondda Road. No surface water from the Quarry is able to flow into the Mine Adit Dam although it is recognised that a very small proportion of the groundwater flow entering the Mine Adit Dam is seepage from the Southern Extraction Area and the current silt cells. All surface water within the catchment south of Rhondda Road is collected and directed through a series of on-site sediment dams (Dam F to Dam B) and is discharged into the unnamed drainage channel via an outlet pipe from Dam B, effectively mixing with the water overflowing from the Mine Adit Dam before flowing eastwards approximately 2km until its confluence with Lake Macquarie.

**Plates 1 to 4** display photographs of the Mine Adit Dam and Dam B and the locations of the discharge points at EPL 4 and EPL 5.

Further information regarding the context, background and interactions between the Teralba Quarry and Rhondda Colliery is available within the *Teralba Quarry Extensions Environmental Assessment* (RWC, 2011) along with their differing water catchments with no additional information provided further in this document.

The Teralba Quarry utilises water from the Mine Adit Dam (see **Figure 2**) as the main water source for washing purposes and other related activities such as wheel washing and dust control. The extraction of this water is licenced by DPI Water (Licence No. 20BL173206) with the maximum quantity of water extracted being 1 407ML per year for dewatering and “Industrial – Sand and Gravel” uses.





Plate 1: Mine Adit Dam  
(E559Z\_03)

Plate 2: Mine Adit Dam Overflow Point  
(E559AC\_025)



Plate 3: Dam B  
(E559Z\_05)

Plate 4: Overflow Point (EPL 5)  
(E559AC\_026)



## 2. POLLUTION REDUCTION PROGRAM RESULTS

### 2.1 INTRODUCTION

In August 2013, Metromix committed to undertaking a ‘pollution study’ of water from the Mine Adit, a proportion of which eventually enters Lake Macquarie, to determine the levels of suspended and dissolved metals. The results of monitoring undertaken between September 2013 and August 2016 at EPL 4 and EPL 5 as part of this ‘pollution study’ are provided in **Appendix 1**. The following section contains a statistical presentation and summary of the data presented in **Appendix 1**. The statistical methods employed for the presentation are consistent with an assessment under the Australian Guidelines for Water Quality Monitoring and Reporting (NWQMS, 2000) and ANZECC methodology for comparing test site data (e.g. EPA 4 and EPA 5) with trigger values. The trigger values utilised in this assessment were obtained from ANZECC and are for the protection of the aquatic ecosystem environmental value, as these trigger values offer the highest level of protection for the identified environmental values (aquatic ecosystem, visual amenity and secondary contact recreation), for the water type (waterway affected by urban development). This water type has previously been determined by the former Department of Environment, Climate Change and Water for the Lake Macquarie and Tuggerah Lakes catchments. The level of protection (95% of species), is that for a “slightly/moderately disturbed” system, in accordance with NSW policy.

The summary data is presented in terms of minimum, 20<sup>th</sup> percentile, median, 80<sup>th</sup> percentile and maximum values. For the purpose of assessment, this review follows guidance contained in ANZECC, whereby the median value from sample concentrations collected as part of the program is compared with the relevant guideline trigger value, published in Table 3.4.1 of ANZECC and applied at the 95% species protection level (NWQMS, 2000). There are several pollutants included within the Pollution Reduction Program that do not have guideline trigger levels available within Table 3.4.1 of ANZECC (NWQMS, 2000). The data available for these pollutants is presented in this assessment report, however it is noted that these pollutants are mostly ‘naturally occurring’ and are not generally considered as ‘pollutants’ in the common use of the term. Elements such as calcium and magnesium are vital in natural ecosystems and therefore value of any assessment of these ‘pollutants’ is limited.

It is noted that *Condition U1.1* was modified to remove requirements to monitor antimony, barium, beryllium, boron, molybdenum, silicon, sulfur, silver and titanium as of 1 June 2015. However, Metromix has continued to monitor these pollutants and the results presented in the following subsection include a summary of these.

The results for dissolved fractions of the assessed pollutants are the focus for the purpose of assessment of compliance in this assessment as the dissolved toxicant fraction is considered the most bio-available and significantly influences the toxicity effects on aquatic biota. This is consistent with the ANZECC guidelines (NWQMS, 2000).

### 2.2 PHYSICAL PARAMETERS

The monitoring results for the following physical parameters recorded at EPL 4 and EPL5 are presented in **Table 1** and **Table 2**, respectively.

- pH – the range of results for pH at EPL 4 was 6.84 to 8.20 while pH at EPL 5 ranged from 7.25 to 8.06.



Table 1  
Statistical Analysis - Water Quality at EPA Point 4 - Physical Parameters - September 2013 to August 2016

Analyte	Unit	Guideline * Trigger Value	LOR	Minimum Record	20th Percentile Record	Median Record	80th Percentile Record	Maximum Record	Total Records	Number Records Below LOR	Percentage of Records Below LOR
pH	pH Unit	6.5 to 8.5 units	<0.01	6.84	7.18	7.40	7.74	8.20	38	0	0%
Conductivity	µS/cm	125 - 2200 <sup>b</sup>	<1	1460	1784	1885	2124	2480	38	0	0%
TSS	mg/L	<50	<5	6.0	6	8	14.8	35	38	19	50%
Oil & Grease	mg/L	5	<5	NR	NR	NR	NR	NR	25	25	100%
NR = No Result - all results below Limit of Recording											

Table 2  
Statistical Analysis - Water Quality at EPA Point 5 - Physical Parameters - September 2013 to August 2016

Analyte	Unit	Guideline * Trigger Value	LOR	Minimum Record	20th Percentile Record	Median Record	80th Percentile Record	Maximum Record	Total Records	Number Records Below LOR	Percentage of Records Below LOR
pH	pH Unit	6.5 to 8.5 units	<0.01	7.25	7.49	7.73	7.94	8.06	19	0	0.0%
Conductivity	µS/cm	125 - 2200 <sup>b</sup>	<1	834	936	1120	1506	1910	19	0	0.0%
TSS	mg/L	<50	<5	6	6	10	18	25	19	12	63.2%
Oil & Grease	mg/L	5	<5	NR	NR	NR	NR	NR	12	12	100.0%
NR = No Result - all results below Limit of Recording											

- Electrical conductivity – the median result for electrical conductivity at EPL 4 was 1 875 $\mu$ S/cm while the median result at EPL 5 was 1 090 $\mu$ S/cm.
- Total Suspended Solids (TSS) - the median result for TSS at EPL 4 was 8mg/L while the median result for TSS at EPL 5 was 10mg/L.
- Oil and Grease – There has been no records of oil and grease at either location.

These results indicate that pH at EPL 5 does not vary as greatly as it does at monitoring location EPL 4 however all results remain within the guideline trigger levels. Electrical conductivity at EPL 5 is lower than that at EPL 4 with electrical conductivity at EPL 4 exceeding the guideline trigger value for some samples. This was not reflected at EPL 5 where all samples were within the guideline trigger levels for electrical conductivity. All results are below the guideline trigger levels for TSS. The median value for TSS is similar at both locations and slightly higher at EPL 5, however the 80<sup>th</sup> percentile and maximum value at EPL 4 is higher than at EPL 5.

### 2.3 EPL 4 MONITORING RESULTS

The monitoring results for dissolved pollutants sampled at EPL 4 are presented in **Table 3**, while the results for total pollutants sampled at EPL 4 are presented in **Table 4**.

It is noted that the monitoring results for the following pollutants were not recorded above the laboratory limit of recording for any monitored samples.

- Antimony
- Lead
- Mercury
- Tin
- Titanium

In addition, the monitoring results for the following pollutants were only recorded above the limit of recording for a limited number of samples.

- Aluminium (13.2% of samples)
- Beryllium (2.6% of samples)
- Cadmium (5.3% of samples)
- Chromium (5.3% of samples)
- Cobalt (23.7% of samples)
- Copper (10.5% of samples)
- Phosphorous (20.0% of samples)
- Selenium (2.7% of samples)
- Vanadium (5.4% of samples)
- Zinc (27.0% of samples)
- Iron (28.9 % of samples)

The calculated median value (excluding those below the limit of recording) was below the nominated guideline trigger value (where available) for each of these pollutants except for ammonia (recorded above the limit of recording for 15 of 38 samples), chromium (recorded above the limit of recording for 2 of 38 samples) and silver (recorded above the limit of recording for 3 of 37 samples). It is noted that the three results above the guideline trigger for silver were all at the limit of recording and recorded between September and November 2013. There were no records above the limit of recording during 2014, 2015 or 2016. Of the two records above the limit of recording for chromium, one was at the limit of recording and the second (0.022mg/L) is considered to be an outlier and not reflective of conditions at EPL 4. The median value for ammonia is only slightly above the guideline trigger value at EPL 4.

Table 3  
Statistical Analysis - Water Quality at EPA Point 4 - Dissolved (filtered) Samples - September 2013 to August 2016

Analyte	Unit	Guideline Trigger Value *	LOR	Minimum Record	20th Percentile Record	Median Record	80th Percentile Record	Maximum Record	Number Records Below LOR	Total Records	Percentage of Records Below LOR
Aluminium	mg/L	0.055	<0.01	0.01	0.01	0.02	0.04	0.04	33	38	86.8%
Ammonia as N	mg/L	0.02	<0.01	0.01	0.02	0.03	0.05	0.06	11	26	42.3%
Antimony	mg/L	ID	<0.001	NR	NR	NR	NR	NR	38	38	100.0%
Arsenic	mg/L	0.013	<0.001	0.001	0.001	0.001	0.002	0.008	17	38	44.7%
Barium	mg/L	NA	<0.001	0.022	0.026	0.029	0.034	0.046	1	38	2.6%
Beryllium	mg/L	ID	<0.001	0.001	0.001	0.001	0.001	0.001	37	38	97.4%
Boron	mg/L	0.37	<0.05	0.13	0.15	0.17	0.18	0.25	1	38	2.6%
Cadmium	mg/L	0.0002	<0.0001	0.00010	0.00012	0.00015	0.00018	0.00020	36	38	94.7%
Calcium	mg/L	NA	<1	34	40.6	45	53.4	60	0	34	0.0%
Chromium	mg/L	0.001	<0.001	0.001	0.0052	0.0115	0.0178	0.022	36	38	94.7%
Cobalt	mg/L	ID	<0.001	0.001	0.001	0.001	0.001	0.001	29	38	76.3%
Copper	mg/L	0.0014	<0.001	0.0010	0.0010	0.0010	0.0010	0.0010	34	38	89.5%
Iron	mg/L	ID	<0.05	0.05	0.06	0.08	0.11	0.25	27	38	71.1%
Lead	mg/L	0.0034	<0.001	NR	NR	NR	NR	NR	38	38	100.0%
Lithium	mg/L	NA	<0.001	0.03	0.036	0.0375	0.043	34	2	38	5.3%
Magnesium	mg/L	NA	<1	36	43	48	54	74	1	36	2.8%
Manganese	mg/L	1.9	<0.001	0.0164	0.0772	0.21	0.2456	0.376	1	38	2.6%
Mercury	mg/L	0.0006	<0.0001	NR	NR	NR	NR	NR	38	38	100.0%
Molybdenum	mg/L	ID	<0.001	0.001	0.002	0.002	0.003	0.004	2	37	5.4%
Nickel	mg/L	0.011	<0.001	0.002	0.003	0.005	0.005	0.027	0	37	0.0%
Phosphorous as P	mg/L	0.025	<0.01	0.02	0.02	0.02	0.02	0.02	4	5	80.0%
Potassium	mg/L	NA	<1	6	6	8	9	11	0	25	0.0%
Selenium	mg/L	0.011	<0.01	0.01	0.01	0.01	0.01	0.01	36	37	97.3%
Silicon as SiO <sub>2</sub>	mg/L	NA	<0.1	5.1	14.3	14.8	15.4	18.6	0	34	0.0%
Silver	mg/L	0.00005	<0.001	0.001	0.001	0.001	0.001	0.001	34	37	91.9%
Sulfur as S	mg/L	NA	<1	53	65.8	70.5	80	115	0	30	0.0%
Tin	mg/L	ID	<0.001	<0.001	NR	NR	NR	NR	37	37	100.0%
Titanium	mg/L	NA	<0.01	<0.01	NR	NR	NR	NR	37	37	100.0%
Vanadium	mg/L	ID	<0.01	0.01	0.01	0.01	0.01	0.01	35	37	94.6%
Zinc	mg/L	0.008	<0.005	0.005	0.005	0.0055	0.008	0.014	27	37	73.0%

NR = No Result - all results below Limit of Recording ID = Insufficient Data NA = Not Applicable

Table 4  
Statistical Analysis - Water Quality at EPA Point 4 - Total (unfiltered) Samples - September 2013 to August 2016

Analyte	Unit	Guideline Trigger Value *	LOR	Minimum Record	20th Percentile Record	Median Record	80th Percentile Record	Maximum Record	Total Records	Number Records Below LOR	Percentage of Records Below LOR
Aluminium	mg/L	0.055	<0.01	<0.01	0.01	0.022	0.06	0.108	38	1	2.6%
Ammonia as N	mg/L	0.02	<0.01	<0.01	0.01	0.02	0.04	0.06	31	10	32.3%
Antimony	mg/L	ID	<0.001	<0.001	0.002	0.002	0.002	0.002	38	37	97.4%
Arsenic	mg/L	0.013	<0.001	<0.001	0.001	0.001	0.002	0.002	38	14	36.8%
Barium	mg/L	NA	<0.001	<0.001	0.023	0.028	0.03	0.0358	38	1	2.6%
Beryllium	mg/L	ID	<0.001	<0.001	NR	NR	NR	NR	38	38	100.0%
Boron	mg/L	0.37	<0.05	<0.05	0.12	0.16	0.17	0.2	38	1	2.6%
Cadmium	mg/L	0.0002	<0.0001	<0.0001	0.0001	0.0001	0.0001	0.0001	38	37	97.4%
Calcium	mg/L	NA	<1	<1	36	40.2	44.5	51.2	22	0	0.0%
Chromium	mg/L	0.001	<0.001	<0.001	0.001	0.001	0.002	0.006	38	32	84.2%
Cobalt	mg/L	ID	<0.001	<0.001	0.001	0.001	0.001	0.001	38	25	65.8%
Copper	mg/L	0.0014	<0.001	<0.001	0.001	0.001	0.003	0.015	38	32	84.2%
Iron	mg/L	ID	<0.05	<0.05	0.028	0.11	0.27	0.424	36	1	2.8%
Lead	mg/L	0.0034	<0.001	<0.001	0.001	0.0056	0.0125	0.0194	38	36	94.7%
Lithium	mg/L	NA	<0.001	0.029	0.036	0.039	0.042	0.049	38	1	2.6%
Magnesium	mg/L	NA	<1	32	45	48	55	71	36	1	2.8%
Manganese	mg/L	1.9	<0.001	0.034	0.1184	0.223	0.2698	0.408	38	1	2.6%
Mercury	mg/L	0.0006	<0.0001	0	NR	NR	NR	NR	38	38	100.0%
Molybdenum	mg/L	ID	<0.001	0.002	0.002	0.003	0.003	0.004	36	1	2.8%
Nickel	mg/L	0.011	<0.001	0.002	0.004	0.004	0.005	0.032	37	0	0.0%
Phosphorous as P	mg/L	0.025	<0.01	0.01	0.016	0.02	0.028	0.06	34	20	58.8%
Potassium	mg/L	NA	<1	6	7.4	8	10	12	23	0	0.0%
Selenium	mg/L	0.011	<0.01	0.02	0.02	0.02	0.02	0.02	37	36	97.3%
Silicon as SiO <sub>2</sub>	mg/L	NA	<0.1	12	14.08	14.8	16.08	70.8	35	0	0.0%
Silver	mg/L	0.00005	<0.001	0.001	0.001	0.001	0.001	0.001	37	36	97.3%
Sulfur as S	mg/L	NA	<1	56	65	69	84.4	101	19	0	0.0%
Tin	mg/L	ID	<0.001	0.002	0.002	0.002	0.002	0.002	37	36	97.3%
Titanium	mg/L	NA	<0.01	0.01	0.014	0.02	0.02	0.02	37	34	91.9%
Vanadium	mg/L	ID	<0.01	0.01	0.014	0.02	0.02	0.02	37	34	91.9%
Zinc	mg/L	0.008	<0.005	0.006	0.006	0.006	0.009	0.261	36	25	69.4%

NR = No Result – all results below Limit of Recording

ID = Insufficient Data

NA = Not Applicable

The calculated median value (excluding those below the limit of recording) was either below the nominated guideline trigger value or there is no available trigger for comparison for each of the following pollutants.

- |             |             |              |
|-------------|-------------|--------------|
| • Boron     | • Arsenic   | • Barium     |
| • Magnesium | • Calcium   | • Lithium    |
| • Nickel    | • Manganese | • Molybdenum |
| • Sulfur    | • Potassium | • Silicon    |

The results for total pollutants (**Table 4**) are generally consistent with those presented in **Table 2** for dissolved pollutants including records of chromium and silver which were above the guideline trigger value for the few samples that were above the limit of recording. These results are not statistically significant and are not representative of conditions at EPL 4.

It is noted that the median values for total aluminium and copper exceed the guideline trigger values at EPL 4. However, this is not a bio-available fraction and possibly absorbed onto particulate matter in the sample.

## 2.4 EPL 5 MONITORING RESULTS

Monitoring at EPL 5 was less frequent over the period of the Pollution Reduction Program as occurrences of water discharged at this location was not as frequent as that at the EPL 4 (Mine Adit Dam). In total, 19 samples were available for analysis, however a result for each pollutant is not available for each sample. The monitoring results for dissolved pollutants sampled at EPL 5 are presented in **Table 5**, while the results for total pollutants sampled at EPL 5 are presented in **Table 6**.

It is noted that the monitoring results for the following pollutants were not recorded above the laboratory limit of recording for any monitored samples.

- |             |           |               |            |
|-------------|-----------|---------------|------------|
| • Beryllium | • Lead    | • Phosphorous | • Silver   |
| • Chromium  | • Mercury | • Selenium    | • Titanium |

In addition, the monitoring results for the following pollutants were only recorded above the limit of recording for a limited number of samples.

- |                                |                               |
|--------------------------------|-------------------------------|
| • Aluminium (31.6% of samples) | • Cobalt (5.3% of samples)    |
| • Ammonia (27.3% of samples)   | • Tin (5.6% of samples)       |
| • Antimony (16.7% of samples)  | • Vanadium (11.1% of samples) |
| • Cadmium (5.3% of samples)    | • Zinc (30.8% of samples)     |

The calculated median value (excluding those below the limit of recording) was below the nominated guideline trigger value or there is no available trigger for comparison for each of the following pollutants.

- |           |             |              |             |
|-----------|-------------|--------------|-------------|
| • Arsenic | • Copper    | • Manganese  | • Potassium |
| • Barium  | • Iron      | • Molybdenum | • Silicon   |
| • Boron   | • Lithium   | • Nickel     | • Sulfur    |
| • Calcium | • Magnesium |              |             |

The median value did not exceed the guideline trigger values at EPL 5 for all assessed dissolved pollutants, where a trigger value is available, except for ammonia for which the median record is at the guideline trigger level. The results for ammonia at EPL 5 are consistent with the results recorded at EPL 4 and indicate that elevated levels of ammonia are not a result of quarrying activities.

The results for total pollutants (**Table 6**) are generally consistent with those presented in **Table 5** for dissolved pollutants excluding single samples of lead and silver that exceeded the guideline triggers but are not representative of conditions at monitoring location EPL 5 given that all remaining samples were below the limit of recording.

It is noted that the median values for total chromium and zinc are equal to the guideline trigger values, while median results for total aluminium, copper and phosphorous exceed the guideline trigger values at EPL 5. However, this is not a bio-available fraction and possibly absorbed onto particulate matter in the sample. It is assumed that the high level of phosphorous suspended in samples is a result of fertiliser application within the Quarry. The dissolved fraction is below the limit of recording for all available samples. This exceedance is not considered significant given that the marine environment would contain relatively high levels of this element.

Table 5  
Statistical Analysis - Water Quality at EPA Point 5 - Dissolved (filtered) Samples - September 2013 to August 2016

Analyte	Unit	Guideline Trigger Value	LOR	Minimum Record	20th Percentile Record	Median Record	80th Percentile Record	Maximum Record	Total Records	Number Records Below LOR	Percentage of Records Below LOR
Aluminium	mg/L	0.055	<0.01	0.01	0.01	0.02	0.02	0.96	19	13	68.4%
Ammonia as N	mg/L	0.02	<0.01	0.01	0.014	0.02	0.026	0.03	11	8	72.7%
Antimony	mg/L	ID	<0.001	0.001	0.0014	0.002	0.002	0.002	18	15	83.3%
Arsenic	mg/L	0.013	<0.001	0.001	0.002	0.002	0.0046	2	19	6	31.6%
Barium	mg/L	NA	<0.001	0.017	0.0212	0.026	0.0284	0.035	19	0	0.0%
Beryllium	mg/L	ID	<0.001	NR	NR	NR	NR	NR	19	19	100.0%
Boron	mg/L	0.37	<0.05	0.06	0.07	0.09	0.106	0.18	19	1	5.3%
Cadmium	mg/L	0.0002	<0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	19	18	94.7%
Calcium	mg/L	NA	<1	21	26.2	31	33.8	42	12	0	0.0%
Chromium	mg/L	0.001	<0.001	NR	NR	NR	NR	NR	19	19	100.0%
Cobalt	mg/L	ID	<0.001	0.009	0.009	0.009	0.009	0.009	19	18	94.7%
Copper	mg/L	0.0014	<0.001	0.001	0.001	0.001	0.001	0.002	19	11	57.9%
Iron	mg/L	ID	<0.05	0.06	0.06	0.09	0.12	1.06	19	11	57.9%
Lead	mg/L	0.0034	<0.001	NR	NR	NR	NR	NR	19	19	100.0%
Lithium	mg/L	NA	<0.001	0.011	0.0114	0.0135	0.0194	0.028	19	1	5.3%
Magnesium	mg/L	NA	<1	23	27.2	32	43.2	49	18	0	0.0%
Manganese	mg/L	1.9	<0.001	0.008	0.0252	0.0915	0.2018	1.67	19	1	5.3%
Mercury	mg/L	0.0006	<0.0001	NR	NR	NR	NR	NR	18	18	100.0%
Molybdenum	mg/L	ID	<0.001	0.001	0.002	0.002	0.0036	0.009	19	1	5.3%
Nickel	mg/L	0.011	<0.001	0.002	0.003	0.0035	0.004	0.006	18	0	0.0%
Phosphorous as P	mg/L	0.025	<0.01	NR	NR	NR	NR	NR	2	2	100.0%
Potassium	mg/L	NA	<1	5	5.2	6.5	7	11	12	0	0.0%
Selenium	mg/L	0.011	<0.01	NR	NR	NR	NR	NR	18	18	100.0%
Silicon as SiO <sub>2</sub>	mg/L	NA	<0.1	6.5	7.8	12.1	15.2	20.4	17	1	5.9%
Silver	mg/L	0.00005	<0.001	NR	NR	NR	NR	NR	18	18	100.0%
Sulfur as S	mg/L	NA	<1	34	41.4	47	68.2	71	15	0	0.0%
Tin	mg/L	ID	<0.001	0.02	0.02	0.02	0.02	0.02	18	17	94.4%
Titanium	mg/L	NA	<0.01	NR	NR	NR	NR	NR	18	18	100.0%
Vanadium	mg/L	ID	<0.01	0.007	0.0082	0.01	0.0118	0.013	18	16	88.9%
Zinc	mg/L	0.008	<0.005	0.005	0.0056	0.006	0.008	0.011	13	9	69.2%
NR = No Result - all results below Limit of Recording											NA = Not Applicable
ID = Insufficient Data											

Table 6  
Statistical Analysis - Water Quality at EPA Point 5 - Total (unfiltered) Samples - September 2013 to August 2016

Analyte	Unit	Guideline Trigger Value	LOR	Minimum Record	20th Percentile Record	Median Record	80th Percentile Record	Maximum Record	Total Records	Number Records Below LOR	Percentage of Records Below LOR
Aluminium	mg/L	0.055	<0.01	0.02	0.076	0.36	0.768	6.46	19	2	11%
Ammonia as N	mg/L	0.02	<0.01	0.01	0.016	0.02	0.03	0.08	18	9	50%
Antimony	mg/L	ID	<0.001	0.001	0.001	0.001	0.0012	0.002	18	13	72%
Arsenic	mg/L	0.013	<0.001	0.001	0.002	0.003	0.004	2	19	3	16%
Barium	mg/L	NA	<0.001	0.025	0.0266	0.03	0.033	0.066	19	0	0%
Beryllium	mg/L	ID	<0.001	NR	NR	NR	NR	NR	18	18	100%
Boron	mg/L	0.37	<0.05	0.06	0.07	0.1	0.116	0.15	19	1	5%
Cadmium	mg/L	0.0002	<0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	19	18	95%
Calcium	mg/L	NA	<1	22	24	31.5	35.4	44	14	0	0%
Chromium	mg/L	0.001	<0.001	0.001	0.001	0.001	0.0028	0.007	18	10	56%
Cobalt	mg/L	ID	<0.001	0.001	0.0016	0.002	0.0052	0.01	19	15	79%
Copper	mg/L	0.0014	<0.001	0.001	0.001	0.002	0.002	0.005	19	3	16%
Iron	mg/L	ID	<0.05	0.14	0.24	0.48	0.82	7.28	19	0	0%
Lead	mg/L	0.0034	<0.001	0.005	0.005	0.005	0.005	0.005	19	18	95%
Lithium	mg/L	NA	<0.001	0.002	0.012	0.014	0.02	0.031	19	0	0%
Magnesium	mg/L	NA	<1	24	28	34	45.6	51	18	0	0%
Manganese	mg/L	1.9	<0.001	0.029	0.0588	0.097	0.2184	1.8	19	0	0%
Mercury	mg/L	0.0006	<0.0001	NR	NR	NR	NR	NR	18	18	100%
Molybdenum	mg/L	ID	<0.001	0.001	0.002	0.003	0.004	0.009	19	1	5%
Nickel	mg/L	0.011	<0.001	0.003	0.0034	0.004	0.0056	0.008	18	0	0%
Phosphorous as P	mg/L	0.025	<0.01	0.02	0.02	0.03	0.05	0.07	18	7	39%
Potassium	mg/L	NA	<1	5	6	6.5	8	11	14	0	0%
Selenium	mg/L	0.011	<0.01	NR	NR	NR	NR	NR	18	18	100%
Silicon as SiO <sub>2</sub>	mg/L	NA	<0.1	8.6	10.2	12.8	14.16	22.8	17	0	0%
Silver	mg/L	0.00005	<0.001	0.001	0.001	0.001	0.001	0.001	18	17	94%
Sulfur as S	mg/L	NA	<1	32	42.6	52	59	76	12	0	0%
Tin	mg/L	ID	<0.001	0.01	0.012	0.015	0.018	0.02	18	16	89%
Titanium	mg/L	NA	<0.01	0.01	0.01	0.01	0.01	0.01	18	17	94%
Vanadium	mg/L	ID	<0.01	0.006	0.0066	0.0085	0.0172	0.028	18	14	78%
Zinc	mg/L	0.008	<0.005	0.006	0.006	0.008	0.0096	0.012	13	8	62%

ID = Insufficient Data

NR = No Result - all results below Limit of Recording

NA = Not Applicable



### 3. CONCLUSION

Water testing at Metromix's Teralba Quarry has demonstrated that the Quarry operations have not adversely impacted the water quality in the surrounding and downstream areas of the Quarry.

With respect to dissolved pollutants, the results collected from 38 months of sampling and analysis indicate virtually no exceedances of guideline trigger values. The dissolved pollutant fraction is considered the most bioavailable and significantly influences the toxicity effects on aquatic biota arising from concentrations in waters (NWQMS, 2000). There were generally no exceedances of the guideline trigger values for dissolved pollutants at monitoring location EPL 5, from where water discharged from the Quarry flows to Lake Macquarie. The only exceedance noted was the result for dissolved chromium and silver at EPL 4 on one occasion. However, these records are considered outliers and not representative given that the majority of samples were below the limit of recording for these pollutants.

The results of sampling and analyses for the total or suspended fraction of pollutants indicates some exceedances of guideline trigger values. However, it should be noted that these results are derived from analyses of unfiltered samples and may be due to the presence of colloidal material. In addition, TSS concentrations for all samples are well below the guideline values suggesting that, despite some exceedance of trigger values, it is doubtful that discharge from EPA 4 and EPA 5 significantly contribute to the total load of metals in the receiving system.

### 4. ONGOING MONITORING

The analysis of 38 months of sampling data at monitoring locations EPL 4 and EPL 5 indicate that the majority of pollutants included in the monitoring undertaken for the Pollution Reduction Program are either not present in significant concentrations or were below the limit of recording. The assessment has concluded that the water flowing from the underground mine network (monitored at EPL 4) and from the southern side of Teralba Quarry (EPL 5) has not adversely impacted the water quality at these locations or within Lake Macquarie.

It is therefore recommended that monitoring of all pollutants included in the current program ceases from November 2016. The surface water monitoring program for Teralba Quarry will be modified to be consistent with the requirements of *Condition M2.3* of EPL 536 which requires monthly monitoring at EPL 4 and monitoring daily during discharge at EPL 5. The following pollutants will be monitored, consistent with *Condition M2.3*.

- pH
- Electrical Conductivity
- Oil and grease
- Total suspended solids

Upon confirmation that the EPA is satisfied with the assessment presented above and the ongoing monitoring program, an application to vary EPL 536 would be prepared and submitted to the EPA to remove or suitably vary *Condition U1.1*, *Condition U1.2* and *Condition U1.3*.

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# Appendix 1

## Monitoring Data EPL 4 and EPL 5

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Table A1 Water Quality - EPL Point No. 4 (Adit) - Physical Parameters

Sample	Guideline Trigger Value	Unit	2013				2014													
			September	October	November	December	January	February	March	April	May	June	July	August - 1	August - 2	August - 3	September	October	November	December
9	pH	ph Unit	7.7	7.8	7.3	7.1	7.7	7.48	7.32	7.34	7.54	7.79	7.41	7.56	7.54	7.59	7.4	7.6	7.13	7.63
125 - 2200°	Conductivity	µS/cm	2180	2410	2210	1890	1940	2170	2100	2010	1850	1860	1910	2000	1890	1840	1640	1780	1820	1870
<50	TSS	mg/L	<5	<5	<5	26	6	<5	6	<5	10	6	<5	35	6	<5	8	<5	<5	6
5	Oil & Grease	mg/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<5	<5	<5	<5	<5

NR = No Result  
ND = No Discharge

NR = No Result  
ND = No Discharge

Table A1 - Water Quality - EPL Point No. 4 (Adit) - Physical Parameters (Cont'd)

Sample	Guideline Trigger Value	Unit	2015												2016							
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August
6.5 to 8.5 units	pH	ph Unit	7.34	7.34	7.35	7.39	7.12	7.15	7.28	7.23	7.37	7.37	7.03	7.03	6.92	6.84	8.16	8.09	8.04	8.13	8.08	8.2
125 - 2200°	Conductivity	µS/cm	1840	1820	1850	1900	1460	1770	1780	2200	2400	2480	2140	2030	1710	1790	1880	1760	1900	1880	1700	2060
<50	TSS	mg/L	11	<5	19	<5	11	<5	6	<5	<5	<5	12	8	12	35	<5	<5	<5	7	6	<5
5	Oil & Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

NR = No Result  
ND = No Discharge

NR = No Result  
ND = No Discharge

Table A2 - Water Quality - EPA Point No. 5 (Dam B) - Physical Parameters

Sample	Guideline Trigger Value	Unit	2013				2014													
			September	October	November	December	January	February	March	April	May	June	July	August - 1	August - 2	August - 3	September	October	November	December
6.5 to 8.5 units	pH	ph Unit	ND	ND	8.0	7.7	ND	ND	7.5	7.9	7.5	8.01	8.06	8.0	7.8	7.6	7.25	7.7	ND	ND
125 - 2200 <sup>b</sup>	Conductivity	µS/cm	ND	ND	1600	1660	ND	ND	1490	834	1150	1120	1910	1530	1090	1280	1090	991	ND	ND
<50	TSS	mg/L	ND	ND	25	6	ND	ND	<5	19	10	<5	<5	<5	<5	<5	14	6	ND	ND
5	Oil & Grease	mg/L	ND	ND	NR	NR	ND	ND	NR	NR	NR	NR	NR	<5	<5	<5	<5	<5	ND	ND

NR = No Result  
ND = No Discharge

NR = No Result  
ND = No Discharge

Table A2 - Water Quality - EPA Point No. 5 (Dam B) - Physical Parameters (Cont'd)

Sample	Guideline Trigger Value	Unit	2015				2016				2017			
			January	February	March	April	May	June	July	August	September	October	November	December
6.5 to 8.5 units	pH	ph Unit	ND	7.73	7.9	7.74	7.44	7.89	7.33	ND	ND	ND	ND	ND
125 - 2200 <sup>b</sup>	Conductivity	µS/cm	ND	839	1130	874	929	1390	1050	ND	ND	ND	ND	ND
<50	TSS	mg/L	ND	<5	<5	<5	6	<5	<5	ND	ND	ND	ND	ND
5	Oil & Grease	mg/L	ND	<5	<5	<5	<5	<5	<5	ND	ND	ND	ND	ND

NR = No Result  
ND = No Discharge



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Table A3 - Water Quality - EPA Point No. 4 (Addit) - Dissolved (Filtered) Samples

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Sample	Guideline Trigger Value	Unit	2013				2014													
			September	October	November	December	January	February	March	April	May	June	July	August - 1	August - 2	August - 3	September	October	November	December
Aluminium	0.055	mg/L	NR	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia as N	0.02 <sup>a</sup>	mg/L	0.03	NR	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	NR	<0.01	0.03	0.05	<0.01	<0.01	<0.01	<0.01	NR	0.02
Antimony	ID	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	0.013	mg/L	NR	0.001	0.001	0.001	0.001	0.001	0.001	<0.001	0.002	<0.001	0.002	<0.001	<0.001	<0.001	0.001	0.001	0.002	<0.001
Barium	NA	mg/L	NR	0.024	0.030	0.029	0.028	0.029	0.029	0.026	0.028	0.026	0.031	0.025	0.025	0.028	0.027	0.029	0.027	0.029
Beryllium	ID	mg/L	NR	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.37	mg/L	NR	0.22	0.18	0.17	0.17	0.18	0.23	0.18	0.15	0.13	0.17	0.14	0.15	0.14	0.13	0.14	0.16	0.18
Cadmium	0.0002	mg/L	NR	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NA	mg/L	55	60	53	43	46	46	45	46	41	41	45	40	41	38	34	NR	41	NR
Chromium	0.001	mg/L	NR	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	ID	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	0.001	0.001	0.001	<0.001
Copper	0.0014	mg/L	NR	0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	ID	mg/L	NR	0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	0.08	<0.05	0.08	<0.05
Lead	0.0034	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	NA	mg/L	NR	0.037	0.039	0.045	0.037	0.044	0.036	0.036	0.038	<0.012	0.039	0.031	0.033	0.036	0.036	0.036	0.036	0.040
Magnesium	NA	mg/L	NR	74	62	46	54	51	55	54	43	45	48	49	48	42	36	44	40	NR
Manganese	1.9	mg/L	NR	0.038	0.086	0.316	0.217	0.237	0.203	0.159	0.244	0.090	0.274	0.21	0.0164	0.207	0.229	0.159	0.223	0.215
Mercury	0.0006	mg/L	NR	<0.0001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	ID	mg/L	NR	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	<0.001	0.002	0.002	NR	0.003	0.003
Nickel	0.011	mg/L	0.006	0.004	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.004	0.007	0.005	0.004	0.004	0.005	NR	0.004	0.005
Phosphorous as P	0.025 <sup>c</sup>	mg/L	<0.01	ND	<0.01	<0.01	0.02	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Potassium	NA	mg/L	9	9	8	6	9	8	9	11	7	7	7	8	8	6	6	NR	NR	NR
Selenium	0.011	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon as SiO2	NA	mg/L	14.3	14.8	14.7	14.2	14.8	14.8	15.4	15	14.9	15.1	15.7	14.3	15.3	14.3	14	NR	14.3	NR
Silver	0.00005	mg/L	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur as S	NA	mg/L	85	113	79	68	85	80	75	72	62	65	68	70	69	54	53	NR	67	NR
Tin	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	NA	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	ID	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.008	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NR	<0.005	<0.005

**Key**

\*All values sourced from Table 3.4.1 ANZECC except where indicated

ID = Insufficient Data

NA = Not Applicable

ND = No Discharge

NR = No Result

a Environment Protection Licence 536

b Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

c Sourced from <http://www.environment.nsw.gov.au/leof/LakeMacquarie/report-03.htm#support11> (doi 20161404)



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Table A3 - Water Quality - EPA Point No. 4 (Adit) - Dissolved (Filtered) Samples (Cont'd)

Page 2 of 2

Sample	Guideline Trigger Value	Unit	2015												2016											
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August				
Aluminium	0.055	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Ammonia as N	0.02 <sup>a</sup>	mg/L	NR	0.03	0.02	0.06	0.06	0.01	0.01	0.04	NR	0.03	0.06	0.04	NR	NR	NR	NR	NR	NR	NR					
Antimony	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Arsenic	0.013	mg/L	<0.001	0.001	<0.001	0.008	<0.001	0.002	0.001	<0.001	0.001	<0.001	0.003	0.002	<0.001	0.001	<0.001	<0.001	<0.001	0.001	0.002					
Barium	NA	mg/L	0.032	0.033	0.030	0.029	0.022	0.031	0.030	0.029	0.026	0.027	0.034	0.036	0.026	0.034	0.041	0.045	0.046	0.038	0.039					
Beryllium	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Boron	0.37	mg/L	0.15	0.16	0.17	0.18	0.14	0.16	0.16	0.21	0.25	0.24	0.18	0.17	0.2	0.15	0.17	0.17	0.14	0.17	0.15					
Cadmium	0.0002	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0002					
Calcium	NA	mg/L	NR	43	40	40	36	45	40	54	54	57	49	59	44	42	NR	57	50	47	44					
Chromium	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Cobalt	ID	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Copper	0.0014	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Iron	ID	mg/L	<0.05	0.07	0.06	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	0.11	0.25	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05					
Lead	0.0034	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Lithium	NA	mg/L	0.034	0.038	0.038	0.042	0.033	0.038	0.042	0.043	0.048	0.048	0.048	0.047	0.036	0.037	0.037	0.031	0.03	0.036	0.031					
Magnesium	NA	mg/L	NR	46	42	45	38	46	39	57	65	65	51	54	43	50	46	52	49	46	45					
Manganese	1.9	mg/L	0.25	0.277	0.219	0.218	0.189	0.244	0.260	0.246	0.184	0.129	0.376	0.212	0.2	0.361	0.023	0.030	0.043	0.027	0.032					
Mercury	0.0006	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
Molybdenum	ID	mg/L	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.004	0.001	0.003	0.003	0.002	0.003	0.002					
Nickel	0.011	mg/L	0.005	0.005	0.004	0.004	0.003	0.003	0.005	0.005	0.005	0.027	0.005	0.006	0.003	0.007	0.003	0.003	0.002	0.002	0.003					
Phosphorous as P	0.025 <sup>c</sup>	mg/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Potassium	NA	mg/L	NR	NR	NR	NR	6	NR	NR	NR	NR	NR	8	8	NR	9	7	9	6	6	6					
Selenium	0.011	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Silicon as SiO2	NA	mg/L	NR	13.9	14.3	15.4	NR	14.4	5.1	14.6	13.8	14.5	15.4	15.3	16.4	14.4	16.5	18.2	18.6	14.9	16.3					
Silver	0.00005	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Sulfur as S	NA	mg/L	NR	70	NR	NR	53	71	NR	NR	115	NR	84	71	78	72	77	70	65	68	66					
Tin	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Titanium	NA	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Vanadium	ID	mg/L	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Zinc	0.008	mg/L	<0.005	<0.005	0.006	<0.005	0.014	<0.005	<0.005	0.005	0.005	<0.005	<0.005	0.007	<0.005	<0.005	0.007	0.008	0.008	<0.005	<0.005					

**Key**

\*All values sourced from Table 3.4.1 ANZECC except where indicated

ID = Insufficient Data

NA = Not Applicable

NR = No Result

a Environment Protection License 536

b Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

c Sourced from <http://www.environment.nsw.gov.au/teol/LakeMacquarie/report-03.htm#support11> (do 20161404)



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Table A4 - Water Quality - EPA Point No. 4 (ADIT) - Total (Filtered) Samples

Page 1 of 2

Sample	Guideline Trigger Value*	Unit	2013				2014													
			September	October	November	December	January	February	March	April	May	June	July	August - 1	August - 2	August - 3	September	October	November	December
Aluminium	0.055	mg/L	NR	0.04	0.05	0.11	0.14	0.04	0.08	0.07	0.07	0.07	0.01	0.27	0.10	0.03	0.15	0.02	0.04	0.14
Ammonia as N	0.02 <sup>b</sup>	mg/L	0.03	NR	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	NR	<0.01	0.03	0.05	<0.01	<0.01	NR	NR	0.02	NR
Antimony	ID	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	0.013	mg/L	NR	0.002	0.001	0.002	0.003	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001	0.002	0.001
Barium	NA	mg/L	NR	0.025	0.029	0.030	0.031	0.029	0.027	0.028	0.032	0.028	0.034	0.029	0.025	0.028	0.027	0.030	0.028	0.030
Beryllium	ID	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.37	mg/L	NR	0.21	0.23	0.17	0.18	0.22	0.19	0.2	0.17	0.14	0.17	0.16	0.16	0.15	0.13	0.12	0.17	0.17
Cadmium	0.0002	mg/L	NR	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NA	mg/L	52	60	56	43	47	48	45	46	44	40	46	44	44	NR	36	NR	41	NR
Chromium	0.001	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.002	0.002
Cobalt	ID	mg/L	NR	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.001	0.001	0.001	0.001
Copper	0.0014	mg/L	NR	0.003	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	ID	mg/L	NR	0.06	0.07	0.45	0.33	0.32	0.29		0.42	0.26	0.16	0.73	0.27	0.14	0.5	0.11	0.29	0.29
Lead	0.0034	mg/L	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	NA	mg/L	NR	0.044	0.042	0.048	0.038	0.042	0.036	0.04	0.039	0.035	0.036	0.034	0.034	0.039	0.038	0.038	0.037	0.036
Magnesium	NA	mg/L	NR	7.1	66	46	46	55	56	52	45	46	47	50	51	45	39	45	46	NR
Manganese	1.9	mg/L	NR	0.054	0.12	0.303	0.223	0.234	0.194	0.161	0.269	0.252	0.273	0.285	0.177	0.214	0.231	0.162	0.229	0.221
Mercury	0.0006	mg/L	NR	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	ID	mg/L	NR	0.003	0.002	0.003	0.002	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.002	0.003	0.003	NR	0.003	0.003
Nickel	0.011	mg/L	0.006	0.005	0.004	0.004	0.005	0.004	0.005	0.005	0.005	0.004	0.002	0.006	0.004	0.005	0.004	NR	0.004	0.005
Phosphorous as P	0.025 <sup>c</sup>	mg/L	<0.01	NR	<0.01	<0.01	0.02	NR	<0.01	0.02	<0.01	<0.01	<0.01	0.06	0.02	<0.01	<0.01	NR	0.05	<0.01
Potassium	NA	mg/L	9	11	10	7	8	9	10	9	8	7	8	8	8		6	NR	8	NR
Selenium	0.011	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NR	<0.01	<0.01
Silicon as SiO2	NA	mg/L	14.1	14.4	15.3	14.5	16.7	14.5	15	16	15.7	15	15.5	16.4	12.0	14.6	14.7	NR	14.8	NR
Silver	0.00005	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NR	<0.001	<0.001
Sulfur as S	NA	mg/L	82	101	94	65	75	80	84	85	66	68	65	69	68	61	56	NR	68	NR
Tin	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NR	<0.001	<0.001
Titanium	NA	mg/L	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NR	<0.01	<0.01
Vanadium	ID	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NR	<0.01	<0.01
Zinc	0.008	mg/L	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	0.006	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	NR	<0.005	<0.005

Key

NR = No Discharge  
NA = Not Applicable  
NR = No Result

a Based on ANZECC Guidelines for Fresh and Marine Water Quality - Recreational Water Quality (ANZECC 2000) except where indicated

b Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

c Based on ANZECC Guidelines for Fresh and Marine Water Quality - Livestock Water Quality (ANZECC 2000)

d Based on ANZECC Guidelines for Fresh and Marine Water Quality - Irrigation Water Quality (ANZECC 2000)



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Table A4 - Water Quality - EPA Point No. 4 (ADIT) - Total (Filtered) Samples (Cont'd)

Sample	Guideline Trigger Value	Unit	2015												2016											
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August				
Aluminium	0.055	mg/L	0.14	0.04	0.08	0.07	0.07	0.07	0.01	0.03	0.05	0.10	0.03	0.15	0.02	0.42	1.28	0.06	0.05	0.01	4.88	0.05	0.06			
Ammonia as N	0.02 <sup>b</sup>	mg/L	<0.01	<0.01	0.03	<0.01	NR	<0.01	0.03	<0.01	0.05	<0.01	<0.01	NR	NR	<0.01	0.04	NR	0.07	0.06	0.04	0.12	0.02			
Antimony	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001			
Arsenic	0.013	mg/L	0.003	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001	0.002	0.004	0.001	<0.001	<0.001	0.002	<0.001	0.002			
Barium	NA	mg/L	0.031	0.029	0.027	0.028	0.032	0.028	0.034	0.029	0.025	0.028	0.027	0.030	0.031	0.054	0.054	0.041	0.048	0.051	0.157	0.041	0.044			
Beryllium	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
Boron	0.37	mg/L	0.18	0.22	0.19	0.2	0.17	0.14	0.17	0.16	0.16	0.16	0.15	0.13	0.12	0.18	0.22	0.17	0.22	0.16	0.19	0.15	0.18			
Cadmium	0.0002	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			
Calcium	NA	mg/L	47	48	45	46	44	40	46	44	44	44	NR	36	NR	NR	NR	NR	NR	NR	NR	NR	NR			
Chromium	0.001	mg/L	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.006	0.001	<0.001	<0.001			
Cobalt	ID	mg/L	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
Copper	0.0014	mg/L	<0.001	0.001	0.001	<0.001	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	0.047	<0.001	<0.001	<0.001			
Iron	ID	mg/L	0.33	0.32	0.29		0.42	0.26	0.16	0.73	0.27	0.14	0.5	0.11	0.49	2.84	0.11	0.11	0.11	0.13	0.11	0.23	0.14			
Lead	0.0034	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	0.024	<0.001	<0.001	<0.001			
Lithium	NA	mg/L	0.038	0.042	0.036	0.04	0.039	0.035	0.036	0.034	0.034	0.034	0.039	0.038	0.036	0.04	0.039	0.032	0.031	0.042	0.029	0.041	0.041			
Magnesium	NA	mg/L	46	55	56	52	45	46	47	50	51	45	39	45	50	44	48	53	52	47	46	55	55			
Manganese	1.9	mg/L	0.223	0.234	0.194	0.161	0.269	0.252	0.273	0.285	0.177	0.214	0.231	0.162	0.228	0.408	0.035	0.046	0.052	0.034	0.068	0.092	0.092			
Mercury	0.0006	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			
Molybdenum	ID	mg/L	0.002	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.002	0.003	0.003	NR	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003			
Nickel	0.011	mg/L	0.005	0.004	0.005	0.005	0.005	0.004	0.002	0.006	0.004	0.005	0.005	0.004	NR	0.004	0.01	0.004	0.002	0.003	0.032	0.002	0.004			
Phosphorous as P	0.025 <sup>c</sup>	mg/L	0.02	NR	<0.01	0.02	<0.01	<0.01	<0.01	0.06	0.02	<0.01	<0.01	<0.01	NR	<0.01	0.04	0.02	0.02	0.02	<0.01	<0.01	NR			
Potassium	NA	mg/L	8	9	10	9	8	7	8	8	8	8	NR	6	NR	8	NR	NR	NR	NR	NR	NR	NR			
Selenium	0.011	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Silicon as SiO2	NA	mg/L	16.7	14.5	15	16	15.7	15	15.5	16.4	12.0	14.6	14.7	NR	16.4	19.2	16	18.5	18.6	70.8	13.9	13.7	13.7			
Silver	0.00005	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
Sulfur as S	NA	mg/L	75	80	84	85	66	68	65	69	68	61	56	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			
Tin	ID	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001			
Titanium	NA	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NR	0.02	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01			
Vanadium	ID	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NR	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01			
Zinc	0.008	mg/L	0.006	<0.005	<0.005	0.006	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NR	0.006	0.014	0.007	0.006	0.261	0.006	<0.005	<0.005			

Key

ND = No Discharge

NA = Not Applicable

NR = No Result

a Based on ANZECC Guidelines for Fresh and Marine Water Quality - Recreational Water Quality (ANZECC 2000) except where indicated

b Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

c Based on ANZECC Guidelines for Fresh and Marine Water Quality - Livestock Water Quality (ANZECC 2000)

d Based on ANZECC Guidelines for Fresh and Marine Water Quality - Irrigation Water Quality (ANZECC 2000)



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Table A5 - Water Quality - EPA Point No. 5 (Dam B) - Dissolved (Filtered) Samples

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Sample	Guideline Trigger Value*	Unit	2013				2014												
			September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	
Aluminium	0.055	mg/L	ND	ND	0.02	<0.01	ND	<0.01	0.01	<0.01	<0.01	<0.01	0.96	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Ammonia as N	0.02b	mg/L	ND	ND	<0.01	<0.01	ND	<0.001	<0.01	0.02	<0.01	<0.001	<0.01	<0.01	0.03	<0.01	<0.01	0.01	NR
Antimony	ID	mg/L	ND	ND	0.002	0.002	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	0.013	mg/L	ND	ND	0.005	0.005	ND	0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001	0.002	0.003
Barium	NA	mg/L	ND	ND	0.023	0.032	ND	0.031	0.020	0.028	0.028	0.028	0.017	0.026	0.025	0.025	0.019	0.022	0.022
Beryllium	ID	mg/L	ND	ND	<0.001	<0.001	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.37	mg/L	ND	ND	0.10	0.12	ND	0.18	0.07	0.10	0.10	0.06	<0.05	0.09	0.07	0.11	0.07	0.10	0.10
Cadmium	0.0002	mg/L	ND	ND	<0.0001	<0.0001	ND	0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NA	mg/L	ND	ND	27	34	ND	NR	21	26	30	42	34	29	32	NR	NR	NR	NR
Chromium	0.001	mg/L	ND	ND	<0.001	<0.001	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	ID	mg/L	ND	ND	<0.001	<0.001	ND	0.009	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.0014	mg/L	ND	ND	<0.001	0.001	ND	0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	ID	mg/L	ND	ND	<0.05	0.06	ND	0.06	<0.05	<0.05	<0.05	<0.05	1.06	<0.05	<0.05	<0.05	<0.05	0.09	0.09
Lead	0.0034	mg/L	ND	ND	<0.001	<0.001	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	NA	mg/L	ND	ND	0.026	0.028	ND	0.026	0.012	0.013	0.011	0.011	<0.001	0.016	0.013	0.013	0.014	0.015	0.015
Magnesium	NA	mg/L	ND	ND	41	46	ND	48	23	29	32	49	42	32	39	23	NR	NR	NR
Manganese	1.9	mg/L	ND	ND	<0.001	0.151	ND	1.67	0.024	0.231	0.090	0.008	0.008	0.019	0.111	0.326	0.027	0.171	0.171
Mercury	0.0006	mg/L	ND	ND	<0.001	<0.001	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	ID	mg/L	ND	ND	0.009	0.006	ND	0.002	0.005	0.002	0.002	<0.001	<0.001	0.002	0.003	0.002	0.004	0.004	0.001
Nickel	0.011	mg/L	ND	ND	0.006	0.004	ND	NR	0.003	0.004	0.002	0.005	0.005	0.004	0.004	0.003	0.004	0.003	0.003
Phosphorous as P	0.025c	mg/L	ND	ND	<0.01	<0.01	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Potassium	NA	mg/L	ND	ND	10	7	ND	NR	7	6	6	11	7	5	7	NR	NR	NR	NR
Selenium	0.011	mg/L	ND	ND	<0.01	<0.01	ND	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon as SiO2	NA	mg/L	ND	ND	6.5	8.2	ND	NR	7.4	15.2	15.2	13.0	9.8	12.5	14.3	7.1	NR	NR	NR
Silver	0.00005	mg/L	ND	ND	<0.001	<0.001	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur as S	NA	mg/L	ND	ND	71	68	ND	NR	39	47	46	71	58	44	58	48	NR	NR	NR
Tin	ID	mg/L	ND	ND	ND	ND	ND	NR	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001
Titanium	NA	mg/L	ND	ND	<0.001	<0.001	ND	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	ID	mg/L	ND	ND	<0.01	<0.01	ND	NR	<0.005	<0.005	<0.005	0.013	<0.005	<0.005	0.007	<0.01	<0.01	<0.01	<0.01
Zinc	0.008	mg/L	ND	ND	<0.01	<0.01	ND	NR	0.006	0.005	NR	NR	NR	NR	NR	NR	<0.005	<0.005	<0.005

Key

ND = No Discharge

NA = Not Applicable

NR = No Result

a Based on ANZECC Guidelines for Fresh and Marine Water Quality - Recreational Water Quality (ANZECC 2000) except where indicated

b Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

c Based on ANZECC Guidelines for Fresh and Marine Water Quality - Livestock Water Quality (ANZECC 2000)

d Based on ANZECC Guidelines for Fresh and Marine Water Quality - Irrigation Water Quality (ANZECC 2000)



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Table A5 - Water Quality - EPA Point No. 5 (Dam B) - Dissolved (Filtered) Samples (Cont'd)

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Sample	Guideline Trigger Value	Unit	2015												2016							
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August
Aluminium	0.055	mg/L	ND	ND	<0.01	0.01	<0.01	<0.01	0.96	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	ND
Ammonia as N	0.02 <sup>b</sup>	mg/L	ND	ND	<0.001	<0.01	0.02	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.01	NR	NR	ND	ND	ND	ND	ND	ND
Antimony	ID	mg/L	ND	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND
Arsenic	0.013	mg/L	ND	ND	0.002	0.002	<0.001	<0.001	<0.001	<0.001	0.002	0.001	0.002	0.002	0.003	<0.001	ND	ND	ND	ND	ND	ND
Barium	NA	mg/L	ND	ND	0.031	0.020	0.028	0.028	0.017	0.026	0.025	0.025	0.019	0.022	0.035	ND	ND	ND	ND	ND	ND	ND
Beryllium	ID	mg/L	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND	ND
Boron	0.37	mg/L	ND	ND	0.18	0.07	0.10	0.06	<0.05	0.09	0.07	0.11	0.07	0.10	0.08	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.0002	mg/L	ND	ND	0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	ND	ND	ND	ND	ND	ND
Calcium	NA	mg/L	ND	ND	NR	21	26	30	42	34	29	32	NR	NR	33	ND	ND	ND	ND	ND	ND	ND
Chromium	0.001	mg/L	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND	ND
Cobalt	ID	mg/L	ND	ND	0.009	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND	ND
Copper	0.0014	mg/L	ND	ND	0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	ND	ND	ND	ND	ND	ND	ND
Iron	ID	mg/L	ND	ND	0.06	<0.05	<0.05	<0.05	1.06	<0.05	<0.05	0.09	<0.05	0.09	<0.05	ND	ND	ND	ND	ND	ND	ND
Lead	0.0034	mg/L	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND	ND
Lithium	NA	mg/L	ND	ND	0.026	0.012	0.013	0.011	<0.001	0.016	0.013	0.015	0.014	0.015	0.013	ND	ND	ND	ND	ND	ND	ND
Magnesium	NA	mg/L	ND	ND	48	23	29	32	49	42	32	39	23	NR	35	ND	ND	ND	ND	ND	ND	ND
Manganese	1.9	mg/L	ND	ND	1.67	0.024	0.231	0.090	0.008	0.019	0.111	0.326	0.027	0.171	0.078	ND	ND	ND	ND	ND	ND	ND
Mercury	0.0006	mg/L	ND	ND	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	ND	ND	ND	ND	ND	ND
Molybdenum	ID	mg/L	ND	ND	0.002	0.005	0.002	0.002	<0.001	0.002	0.003	0.002	0.004	0.001	0.001	ND	ND	ND	ND	ND	ND	ND
Nickel	0.011	mg/L	ND	ND	NR	0.003	0.004	0.002	0.005	0.004	0.004	0.003	0.004	0.003	0.004	ND	ND	ND	ND	ND	ND	ND
Phosphorous as P	0.025 <sup>c</sup>	mg/L	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND
Potassium	NA	mg/L	ND	ND	NR	7	6	6	11	7	5	7	NR	NR	5	ND	ND	ND	ND	ND	ND	ND
Selenium	0.011	mg/L	ND	ND	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	ND	ND
Silicon as SiO2	NA	mg/L	ND	ND	NR	7.4	15.2	15.2	13.0	9.8	12.5	14.3	7.1	NR	15.8	ND	ND	ND	ND	ND	ND	ND
Silver	0.00005	mg/L	ND	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND	ND
Sulfur as S	NA	mg/L	ND	ND	NR	39	47	46	71	58	44	58	48	NR	44	ND	ND	ND	ND	ND	ND	ND
Tin	ID	mg/L	ND	ND	NR	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	ND	ND
Titanium	NA	mg/L	ND	ND	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	ND	ND
Vanadium	ID	mg/L	ND	ND	NR	<0.005	<0.005	<0.005	0.013	<0.005	<0.005	0.007	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	ND	ND
Zinc	0.008	mg/L	ND	ND	NR	0.006	0.005	NR	NR	NR	NR	NR	<0.005	<0.005	0.006	ND	ND	ND	ND	ND	ND	ND
Key																						
			ND = No Discharge																			
			NA = Not Applicable																			
			NR = No Result																			
			a Based on ANZECC Guidelines for Fresh and Marine Water Quality - Recreational Water Quality (ANZECC 2000) except where indicated																			
			b Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)																			
			c Based on ANZECC Guidelines for Fresh and Marine Water Quality -Livestock Water Quality (ANZECC 2000)																			
			d Based on ANZECC Guidelines for Fresh and Marine Water Quality -Irrigation Water Quality (ANZECC 2000)																			

ND = No Discharge  
NA = Not Applicable  
NR = No Result

<sup>a</sup> Based on ANZECC Guidelines for Fresh and Marine Water Quality - Recreational Water Quality (ANZECC 2000) except where indicated

<sup>b</sup> Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

<sup>c</sup> Based on ANZECC Guidelines for Fresh and Marine Water Quality - Livestock Water Quality (ANZECC 2000)

<sup>d</sup> Based on ANZECC Guidelines for Fresh and Marine Water Quality - Irrigation Water Quality (ANZECC 2000)



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Table A6 - Water Quality - EPA Point No. 5 (Dam B) - Total (Filtered) Samples

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2014																		
Sample	Guideline Trigger Value*	Unit	2013				2014											
			September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Aluminium	0.055	mg/L	ND	ND	0.67	0.10	ND	ND	<0.01	0.86	0.48	0.19	6.46	0.05	0.22	0.07	0.72	0.36
Ammonia as N	0.02 <sup>b</sup>	mg/L	ND	ND	<0.01	<0.01	ND	ND	<0.001	<0.01	0.02	<0.01	<0.01	0.03	<0.01	<0.01	0.01	NR
Antimony	ID	mg/L	ND	ND	0.002	0.001	ND	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Arsenic	0.013	mg/L	ND	ND	0.006	0.004	ND	ND	0.002	0.003	0.001	<0.001	0.003	<0.001	0.003	0.002	0.003	0.004
Barium	NA	mg/L	ND	ND	0.027	0.034	ND	ND	0.033	0.025	0.032	0.030	0.066	0.029	0.028	0.025	0.026	0.026
Beryllium	ID	mg/L	ND	ND	<0.001	<0.001	ND	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.37	mg/L	ND	ND	0.15	0.13	ND	ND	0.14	0.06	0.11	0.06	<0.05	0.1	0.08	0.12	0.08	0.10
Cadmium	0.0002	mg/L	ND	ND	<0.0001	<0.0001	ND	ND	0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NA	mg/L	ND	ND	33	35	ND	ND	NR	24	31	34	44	37	31	32	22	NR
Chromium	0.001	mg/L	ND	ND	<0.001	<0.001	ND	ND	<0.001	0.004	0.001	0.001	0.007	0.001		<0.001	0.001	0.001
Cobalt	ID	mg/L	ND	ND	0.001	<0.001	ND	ND	0.010	<0.001	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.0014	mg/L	ND	ND	0.002	0.002	ND	ND	0.001	0.002	0.002	0.001	0.005	<0.001	0.002	<0.001	0.002	0.001
Iron	ID	mg/L	ND	ND	0.76	0.21	ND	ND	0.29	0.92	0.78	0.26	7.28	0.19	0.34	0.48	0.76	0.63
Lead	0.0034	mg/L	ND	ND	<0.001	<0.001	ND	ND	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	NA	mg/L	ND	ND	0.026	0.031	ND	ND	0.028	0.013	0.014	0.012	0.002	0.016	0.016	0.013	0.016	0.014
Magnesium	NA	mg/L	ND	ND	47	45	ND	ND	48	25	32	35	51	41	33	37	25	NR
Manganese	1.9	mg/L	ND	ND	0.079	0.184	ND	ND	1.80	0.051	0.255	0.097	0.094	0.029	0.116	0.341	0.064	0.228
Mercury	0.0006	mg/L	ND	ND	<0.001	<0.001	ND	ND	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	ID	mg/L	ND	ND	0.009	0.006	ND	ND	0.003	0.006	0.002	0.002	<0.001	0.004	0.004	0.002	0.004	0.002
Nickel	0.011	mg/L	ND	ND	0.008	0.004	ND	ND	NR	0.004	0.006	0.003	0.006	0.005	0.005	0.004	0.005	0.004
Phosphorous as P	0.025 <sup>c</sup>	mg/L	ND	ND	<0.01	<0.01	ND	ND	NR	0.05	0.07	0.03	<0.01	0.05	<0.01	0.02	0.04	0.02
Potassium	NA	mg/L	ND	ND	10	8	ND	ND	NR	6	6	6	11	6	5	7	6	NR
Selenium	0.011	mg/L	ND	ND	<0.01	<0.01	ND	ND	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon as SiO2	NA	mg/L	ND	ND	10.1	8.6	ND	ND	NR	11.4	18.5	11.4	14.0	10.2	12.8	14	10.2	NR
Silver	0.00005	mg/L	ND	ND	<0.001	<0.001	ND	ND	NR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur as S	NA	mg/L	ND	ND	76	60	ND	ND	NR	49	54	50	73	55	42	54	45	NR
Tin	ID	mg/L	ND	ND	ND	ND	ND	ND	NR	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.001	<0.001
Titanium	NA	mg/L	ND	ND	<0.001	<0.001	ND	ND	NR	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	ID	mg/L	ND	ND	0.01	<0.01	ND	ND	NR	0.006	0.007	<0.005	0.028	<0.005	<0.005	<0.005	<0.01	<0.01
Zinc	0.008	mg/L	ND	ND	<0.01	<0.01	ND	ND	NR	0.006	0.009	NR	NR	NR	NR	NR	<0.005	<0.005

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Table A6 - Water Quality - EPA Point No. 5 (Dam B) - Total (Filtered) Samples (Cont'd)

Sample	Guideline Trigger Value	Unit	2015												2016							
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August
Aluminium	0.055	mg/L	ND	0.79	0.4	0.78	0.48	0.12	0.02	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND
Ammonia as N	0.02 <sup>b</sup>	mg/L	ND	0.01	<0.01	0.02	0.08	0.02	0.02	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND
Antimony	ID	mg/L	ND	<0.001	0.001	<0.001	<0.001	0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Arsenic	0.013	mg/L	ND	0.004	0.002	0.006	0.002	0.001	0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Barium	NA	mg/L	ND	0.033	0.029	0.030	0.032	0.030	0.028	ND	ND	ND	ND	ND	0.037	ND	ND	ND	ND	ND	ND	ND
Beryllium	ID	mg/L	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Boron	0.37	mg/L	ND	0.07	0.09	0.07	0.06	0.10	0.10	ND	ND	ND	ND	ND	0.11	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.0002	mg/L	ND	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ND	ND	ND	ND	ND	<0.0001	ND	ND	ND	ND	ND	ND	ND
Calcium	NA	mg/L	ND	23	24	NR	NR	36	30	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND
Chromium	0.001	mg/L	ND	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Cobalt	ID	mg/L	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Copper	0.0014	mg/L	ND	0.002	0.002	0.002	0.002	0.001	<0.001	ND	ND	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND
Iron	ID	mg/L	ND	1.00	0.43	0.88	0.71	0.14	0.34	ND	ND	ND	ND	ND	0.15	ND	ND	ND	ND	ND	ND	ND
Lead	0.0034	mg/L	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Lithium	NA	mg/L	ND	0.011	0.018	0.012	0.012	0.023	0.012	ND	ND	ND	ND	ND	0.014	ND	ND	ND	ND	ND	ND	ND
Magnesium	NA	mg/L	ND	24	28	31	28	46	33	ND	ND	ND	ND	ND	35	ND	ND	ND	ND	ND	ND	ND
Manganese	1.9	mg/L	ND	0.110	0.05	0.074	0.209	0.029	0.212	ND	ND	ND	ND	ND	0.086	ND	ND	ND	ND	ND	ND	ND
Mercury	0.0006	mg/L	ND	<0.0001	<0.0001	<0.0001	<0.0001	NR	<0.0001	ND	ND	ND	ND	ND	<0.0001	ND	ND	ND	ND	ND	ND	ND
Molybdenum	ID	mg/L	ND	0.003	0.004	0.002	0.002	0.003	0.001	ND	ND	ND	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND
Nickel	0.011	mg/L	ND	0.004	0.006	0.003	0.003	0.004	0.003	ND	ND	ND	ND	ND	0.004	ND	ND	ND	ND	ND	ND	ND
Phosphorous as P	0.025 <sup>c</sup>	mg/L	ND	0.03	0.02	0.02	0.03	<0.01	<0.01	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND
Potassium	NA	mg/L	ND	7	7	NR	NR	8	5	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND
Selenium	0.011	mg/L	ND	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND
Silicon as SiO2	NA	mg/L	ND	22.8	10.4	13.9	14.0	9.3	19.2	ND	ND	ND	ND	ND	14.2	ND	ND	ND	ND	ND	ND	ND
Silver	0.00005	mg/L	ND	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Sulfur as S	NA	mg/L	ND	32	NR	32	NR	NR	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND
Tin	ID	mg/L	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	ND	ND	<0.001	ND	ND	ND	ND	ND	ND	ND
Titanium	NA	mg/L	ND	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND
Vanadium	ID	mg/L	ND	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND
Zinc	0.008	mg/L	ND	0.008	<0.01	<0.005	0.006	0.012	<0.005	ND	ND	ND	ND	ND	<0.005	ND	ND	ND	ND	ND	ND	ND

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