Cadia region groundwater testing report

Acknowledgement of Country

The NSW Environment Protection Authority acknowledges the Traditional Custodians of the land on which we live and work, honours the ancestors and the Elders both past and present and extends that respect to all Aboriginal people.

We recognise Aboriginal peoples' spiritual and cultural connection and inherent right to protect the land, waters, skies and natural resources of NSW. This connection goes deep and has since the Dreaming.

We also acknowledge our Aboriginal and Torres Strait Islander employees who are an integral part of our diverse workforce and recognise the knowledge embedded forever in Aboriginal and Torres Strait Islander custodianship of Country and culture.

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From 27 to 31 May 2024, the NSW Environment Protection Authority sampled groundwater monitoring bores at the Cadia Valley Operations in response to community concerns about mining impacts on water quality. This report summarises the results of the sampling.

Executive summary

This report summarises the results of a groundwater quality sampling conducted in May 2024 at the Cadia Valley Operations gold/copper mine. The sampling was initiated in response to community concerns about the potential impact of mining activities on local groundwater resources. The Environment Protection Authority (EPA) carried out the sampling to provide an overview of groundwater conditions around the mining site.

Key findings:

- **Water quality parameters:** In total, 14 samples were collected from 12 monitoring bores, including two duplicates. Physiochemical parameters such as electrical conductivity and pH were in the natural ranges for groundwaters.
- **Nutrient levels:** Nitrate, nitrite, and phosphorus concentrations were within acceptable limits according to relevant Australian guidelines for livestock drinking water and irrigation. The highest recorded nitrate level was well below the guideline value.
- **Sulfate and chloride:** Sulfate levels varied, with most bores showing concentrations within safe limits for livestock. Chloride concentrations were mostly within the irrigation guideline, with two samples slightly exceeding the recommended levels.
- **Metals:** Both dissolved and acid-extracted metal concentrations were largely compliant with ecological and agricultural guidelines. There were minor exceedances for arsenic and copper, but overall, metal levels did not pose a significant risk to the environment or agricultural uses.
- **PFAS and hydrocarbons:** Per- and polyfluoroalkyl substances (PFAS) were detected at levels well below the guidelines, indicating no significant contamination. Hydrocarbon and organic contaminant levels were also minimal, with most values below detection limits, further suggesting a low risk of hydrocarbon pollution.

Based on the results from this sampling, the groundwater quality near the Cadia Valley Operations mine site generally meets the required standards for livestock drinking water, irrigation, and ecological protection. The results appear to pose no significant risk to the surrounding environment.

Background

Cadia Holdings Pty Limited own and operate the gold/copper Cadia Valley Operations. Cadia Valley Operations comprises two underground mines, a completed open cut pit, and also water storage dams. The operations are located approximately 25 km southwest of the city of Orange in central west NSW and about 250 km west of Sydney.

The Newmont Cadia gold mine is in the eastern Lachlan Fold Belt, where volcanic and sedimentary formations have undergone several volcanic events. The area's surface geology mainly consists of Ordovician, Silurian, and Devonian sedimentary and volcanic rocks, overlain by Tertiary basalts to the north and Quaternary alluvium along drainage lines. The gold/copper deposit at Cadia is associated with monzonite intrusions in the Ordovician volcaniclastic rocks.

Community concerns arose regarding the potential impact of mining on groundwater quality. In response, the EPA conducted groundwater sampling from monitoring bores around Newmont's Cadia gold mine to evaluate the groundwater quality and assess any risks posed to the local environment and community. The sampling was taken in May 2024 by the EPA with access to the bores facilitated by Cadia. Samples were independently taken by both parties due to the time intensive nature of groundwater sampling and site accessibility.

This report summarises the results of this sampling. The primary aim of this report is to:

- offer a snapshot of groundwater quality
- guide future monitoring requirements for the site.

Approach taken

Between 27 and 31 May 2024, the EPA collected groundwater samples from 12 monitoring bores situated to the west, east, and south of the mining area. In total, 14 samples were collected, including two duplicates, to ensure the accuracy and reliability of the data.

A water quality meter was employed during the sampling process to measure key parameters such as pH, electrical conductivity, dissolved oxygen, temperature, and turbidity. Before collecting the samples, it is essential to make sure these parameters have stabilized to ensure that the data is accurate, reproducible, and representative of the groundwater quality at depth. Stabilization refers to the point at which the readings for each parameter become consistent over time, indicating that the water being measured is representative of the aquifer rather than being influenced by any residual effects from the well casing or the sampling process itself. All samples were collected once stabilization was confirmed.

Samples were sent to the NSW Environmental Forensics laboratory and analysed for metals, total dissolved solids, nutrients, hydrocarbons and per- and polyfluoroalkyl substances (PFAS).

This report evaluates the results against the relevant Australian guidelines for livestock, irrigation, and ecological water quality where applicable, including the ANZECC and ARMCANZ 2000 guidelines, the ANZG 2018 guidelines, and the PFAS NEMP 2.0 (2020).

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) suggest developing site-specific guideline values for physicochemical stressors based on data from reference sites. Therefore, site-specific guideline values were applied where available, tailored to individual monitoring bores to ensure the most accurate and relevant assessment. In the absence of appropriate long-term reference site data, the results were assessed against the default guideline values provided by the ANZECC (2000).

Figure 1. Photos of bore and groundwater samples collected (reference: sampling event details report, 2024).

Sampling locations

Table 1 details the groundwater monitoring bores from which samples were collected. Figure 2 presents a map showing the locations of these sampling points. As illustrated on the map, the sampling bores were strategically selected to ensure comprehensive coverage of areas potentially affected by the mining activities, as well as to address specific locations that had raised concerns within the community.

Table 1. Groundwater sampling bores (information provided by Newmont-Cadia Valley Operations).

Bore ID	Screen interval (mbgl)	Total Depth (m)	Lat	Long	Geological unit
MB103	34 to 40	41.19	-33.5481	149.0228	Ordovician Burnt Yards Basalt Member
MB107	21 to 30	30.69	-33.5405	148.9892	Ordovician Weemalla Formation
MB108	10.5 to16.5	17.17	-33.5562	148.9986	Ordovician Burnt Yards Basalt Member
MB111	30 to 36	36.66	-33.5373	149.0302	Forest Reef Volcanics
MB112	22 to 28	28.8	-33.541	149.0313	Tertiary Basalt
MB2A	11.65 to 17.65	17.6	-33.4676	148.9884	Ordovician Volcanics
MB4A	17.1 to 23.1	23.1	-33.472	148.9856	Ordovician Volcanics
MB74	6.6 to 24.6	26.6	-33.4382	149.0816	Tertiary Basalt
MB90	48 to 60	60	-33.5024	148.984	Tertiary Basalt
MB96	80 to 110	110	-33.456	148.9907	-
MB9A	10.5 to 16.5	16.5	-33.482	148.9862	Ordovician Volcanics
TWO5MB	30 to 60	60	-33.5211	149.0096	Tertiary Basalt

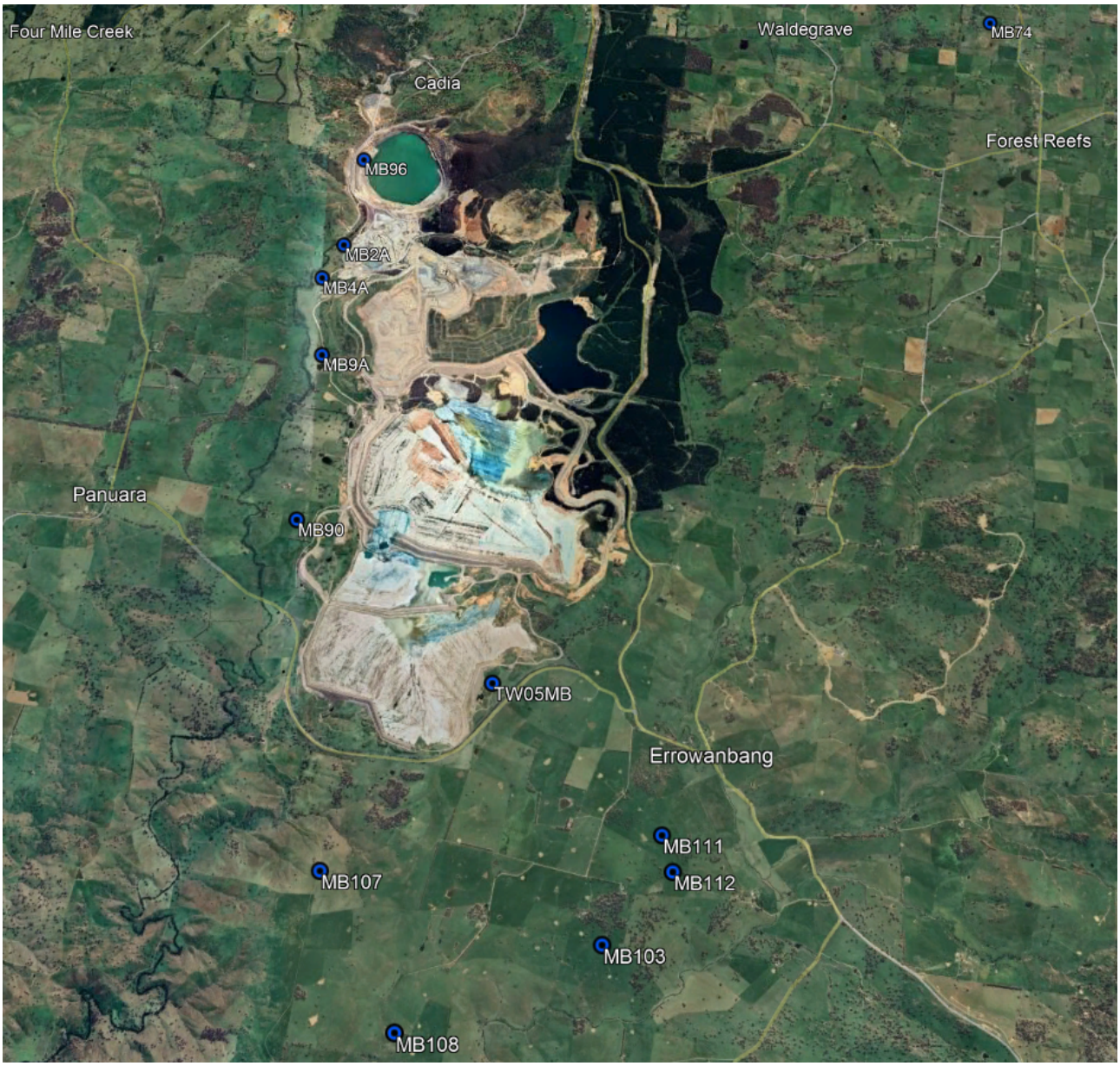

Figure 2. Groundwater sampling locations.

Results analysis

The following analysis provides an overview of the sampling results for various environmental parameters, including physicochemical stressors, metals, PFAS (per- and polyfluoroalkyl substances), and hydrocarbons. Data from these analyses are detailed in Tables 2 and 3. The results offer insights into the quality of water across site and assesses them against environmental and health guidelines.

Physicochemical

All of the samples had a total dissolved solids concentration within the livestock drinking water guideline value for beef cattle and pigs (0-4000 mg/L) and sheep (0-5000 mg/L) with no adverse effects on animals expected. Some of bores including MB112, MB2A, MB90 and MN9A exceed the livestock drinking water guideline value for poultry (0-2000 mg/L) (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000).

Field conductivity (EC, salinity) was assessed against range of default trigger values of upland rivers in south-east Australia (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000). EC values range between 534 µs/cm to a maximum of 3512 µs/cm which is natural range for groundwaters.

pH values were mostly within the guideline range of 6.5 to 7.5 values for upland rivers for south-east Australia, with only one sample with pH of 7.98.

Anions

Nutrient concentrations, including nitrate, nitrite, and total phosphorus, largely follow the guidelines values. Nitrate levels are consistently below the guideline of 400 mg/L for livestock drinking water, with the highest recorded concentration at MB103 (7.3 mg/L). Nitrite levels are uniformly low and total phosphorus values are below the irrigation guideline range of 0.8-12 mg/L across all samples.

Sulfate concentrations vary significantly, with values ranging from 4 mg/L to 2100 mg/L. The guideline for livestock drinking water is 1000 mg/L. Majority of bores show a sulfate level of less than 1000 mg/l, No adverse effects to stock are expected if the concentration of sulfate in drinking water does not exceed 1000 mg/L. Elevated sulfate were observed in three samples including MB9A, MB90, and MB2A. Based on guidelines, adverse effects may happen at sulfate concentrations between 1000 and 2000 mg/L. However, these effects may be temporary and may stop once stock become accustomed to the water (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000).

Chloride levels also show variability, with concentrations ranging from 4 mg/L to 1200 mg/L. The guideline for irrigation water is up to 750 mg/L, and some samples shows slight exceedance of this limit, MB112 (1100 mg/L).

Fluoride concentrations, with a guideline of 1 mg/L, are below this limit in most samples, with the higher value of 0.7 mg/L at MB96 (Pit).

Metals

For the purpose of this analysis, acid extracted metals have been compared to the Australian livestock drinking and irrigation water guidelines and dissolved metals have been compared to ecological water quality guidelines (ANZECC & ARMCANZ 2000). Total metals provide a more conservative estimate of exposure to livestock, whereas dissolved metals are used for ecological assessments as this is the bioavailable fraction of the metal (the part that is toxic to organisms).

Dissolved metals including aluminium, arsenic, copper, lead, manganese, mercury, nickel and zinc levels are consistently below the guideline values for ecological water quality guidelines for 95% protection for

slightly–moderately disturbed systems. One sample for arsenic and one sample for copper had results that slightly exceed guideline values.

Acid extracted total metals were constantly below both agricultural irrigation water short-term and long-term trigger value (mg/l).

Per- and polyfluoroalkyl substances (PFAS)

In the majority of the bores, PFAS concentrations, including PFOA and PFOS, are below the detection limits. However, MB2A have detected level of PFOA and PFOS of 0.02 µg/L which is above the respective guidelines of 19 µg/L and 0.00023 µg/L. This suggests contaminants are not present at levels that would typically pose a risk based on current results across the majority of the bores that have been sampled.

Hydrocarbons

Based on the hydrocarbon analysis results provided, it is evident that the water samples generally show low concentrations of hydrocarbons. All values are less than the detection limits. This indicates that there is minimal presence of larger hydrocarbons in the samples, suggesting a low level of hydrocarbon contamination across the site.

Organics

The results for compounds such as benzene, ethylbenzene, m+p-xylene, MTBE, and naphthalene are consistently below the detection limits of 1 µg/L, identifying an absence of these specific volatile organic compounds.

Historical data

The results of the EPA sampling were compared with common parameters as those used historically by Cadia, offering a straightforward comparison of groundwater quality behaviour and trends over a three-year period. The comparison involved data from Cadia's Annual Groundwater Monitoring Review (2021 to 2023) and the EPA's sampling from May 2024.

The time series graph revealed that most parameters remained stable or within acceptable ranges, although some results indicated a recent increase, such as Nitrate as N in MB103, and Sulfate and Manganese in MB111. However, due to a 14-month gap between the last Cadia samples and the EPA samples conclusive trends could not be identified and are not included in this report.

Conclusion

The groundwater quality data generally indicates compliance with established guidelines, with no significant presence of hydrocarbons or PFAS. The current data suggests stability in most parameters. However, to fully understand the potential impacts of mining activities on groundwater systems, a more in-depth analysis of historical time-series graphs is required.

Table 2 - TDS, nutrient and metal (total acid-extractable) concentrations compared to the Australian Livestock Drinking Water Guidelines and the Australian Irrigation Guidelines (ANZECC & ARMCANZ 2000). Exceedances are bold.

Parameter	ANZECC & ARMCANZ (2000)		Bore ID													
	Guideline for livestock drinking water	Guideline for irrigation water (short-term use)	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5 MB
	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	mg/L
Total dissolved solids (1.2 µm filtered)	0-2000 *	-	610	780	370	1800	1800	**2500**	**2700**	1500	1500	170	**3100**	780	**3800**	400
Nitrate	400	-	7.3	<0.9	1.4	<0.9	<0.9	36	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	5.6	<0.9
Nitrite	30	-	<0.25	<0.25	<0.25	0.59	0.49	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Total Phosphorus		0.8-12	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Sulfate	1000	-	64	78	17	880	880	52	**1300**	720	720	4	**1100**	290	**2100**	13
Chloride		0-750	160	190	16	120	120	**1100**	81	36	36	4	530	14	65	36
Fluoride		1	<0.3	0.3	<0.3	0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.7	<0.3	<0.3
Total Nitrogen	-	25-125	4.4	0.6	0.4	0.6	0.7	8.6	0.1	<0.1	<0.1	0.2	<0.1	<0.1	1.4	<0.1
Ammonia as N in water	-	-	3.7	0.33	<0.005	0.46	0.44	0.027	0.021	<0.005	<0.005	0.2	<0.005	0.057	<0.005	0.007
NOx as N in water	-	-	0.007	0.02	0.3	0.2	0.2	7.6	<0.005	<0.005	0.005	<0.005	<0.005	0.01	1.3	<0.005
Total Phosphorus	-	0.8–12	0.5	0.1	<0.05	0.1	0.1	0.3	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05
Metals (dissolved)																
Aluminium	5	20	<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
Arsenic	0.5	2	<0.001	0.024	<0.001	0.007	0.008	<0.001	0.008	0.003	0.003	0.001	<0.001	<0.001	0.002	0.002
Copper	0.5**	5	<0.0005	0.0009	0.0023	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005
Lead	0.1	5	<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
Manganese	No value	10	0.045	0.22	0.061	1	1	0.02	0.026	0.37	0.37	0.17	0.44	0.25	1.4	0.18
Mercury	0.002	0.002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel	1	2	0.0009	0.001	0.0009	0.0065	0.0064	0.0048	0.0029	0.0017	0.0017	0.0041	0.0006	<0.0005	0.0079	<0.0005

Parameter	ANZECC & ARMCANZ (2000)		Bore ID													
	Guideline for livestock drinking water	Guideline for irrigation water (short-term use)	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5 MB
	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	mg/L
Zinc	20	5	<0.001	0.003	0.005	0.005	0.005	0.007	<0.001	0.002	0.003	0.002	0.003	<0.001	0.004	0.005
Acid extractable trace metals mg/L																
Aluminium (acid extractable)	5	20	<0.01	0.48	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.18	<0.01	<0.01	<0.01	0.01
Arsenic (acid extractable)	0.5	2	<0.001	0.025	<0.001	0.008	0.009	<0.001	0.009	0.003	0.003	0.002	<0.001	<0.001	0.003	0.003
Copper (acid extractable)	0.5**	5	<0.0005	0.02	0.0025	<0.0005	0.0005	0.001	0.0007	0.0028	0.0028	0.0015	<0.0005	<0.0005	0.0011	0.0006
Lead (acid extractable)	0.1	5	<0.0001	0.0005	<0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0041	<0.0001	<0.0001	<0.0001	<0.0001
Manganese (acid extractable)	-	10	0.042	0.27	0.067	1.1	1.1	0.023	0.025	0.39	0.38	0.24	0.44	0.26	1.4	0.17
Mercury (acid extractable)	0.002	0.002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (acid extractable)	1	2	0.0017	0.0022	0.0008	0.0067	0.0067	0.0049	0.0029	0.0017	0.0017	0.0052	0.0006	<0.0005	0.0081	<0.0005
Zinc (acid extractable)	20	5	0.004	0.048	0.004	0.02	0.024	0.006	<0.001	0.001	0.001	0.004	0.003	<0.001	0.003	0.37

* Value for poultry, other livestock tolerate higher total dissolved solids concentrations to 5000 mg/L. Draft revised livestock drinking guidelines have total dissolved solids set to <500 mg/L.

**Guideline value for sheep. Value is higher for other typical types of livestock.

Table 3 - Physicochemical water quality, nutrient and metal concentrations compared to ecological water quality guidelines (ANZG 2018, ANZECC & ARMCANZ 2000 and PFAS NEMP 2.0 2020). Exceedances are bold.

Parameter	Ecological water quality guideline	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5MB
Field parameters															
Temperature (°C)	-	16.8	17.5	17.2	16.6	16.6	16.9	16.4	16.3	16.3	14.8	17.1	17.7	16.4	16.1
Dissolved Oxygen (mg/L)	-	0.13	0.43	0.18	1.12	1.12	0.49	0.29	0.36	0.36	4.53	0.89	0.92	0.12	4.9
Conductivity (µS/cm)	30-350*	**829**	**534**	**1011**	**1673**	**1673**	**3512**	**2443**	**1427**	**1427**	**202**	**3200**	**954**	**3098**	**569**
pH	6.5-7.5*	**7.98**	7.23	**7.73**	6.59	6.59	6.68	6.73	6.93	6.93	6.96	6.62	7.38	6.70	7.41
Laboratory results															
Nutrients															
Total Nitrogen (mg/L)	0.25	**4.4**	**0.6**	**0.4**	**0.6**	**0.7**	**8.6**	0.1	<0.1	<0.1	0.2	<0.1	<0.1	**1.4**	<0.1
Ammonia (mg/L)	0.013	**3.7**	**0.33**	<0.005	**0.46**	**0.44**	**0.027**	**0.021**	<0.005	<0.005	**0.2**	<0.005	0.057	<0.005	0.007
NOx as N (mg/L)	0.015	0.007	**0.02**	**0.3**	**0.2**	**0.2**	**7.6**	<0.005	<0.005	0.005	<0.005	<0.005	0.01	**1.3**	<0.005
Total Phosphorus (mg/L)	0.02	**0.5**	**0.1**	<0.05	**0.1**	**0.1**	**0.3**	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05	<0.05
Metals															
Aluminium (mg/L)	0.055	<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
Arsenic (mg/L)	0.013	<0.001	**0.024**	<0.001	0.007	0.008	<0.001	0.008	0.003	0.003	0.001	<0.001	<0.001	0.002	0.002
Copper (mg/L)	0.0014	<0.0005	0.0009	**0.0023**	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005
Lead (mg/L)	0.0034	<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
Manganese (mg/L)	1.9	0.045	0.22	0.061	1	1	0.02	0.026	0.37	0.37	0.17	0.44	0.25	1.4	0.18
Mercury (mg/L)	0.00006	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (mg/L)	0.011	0.0009	0.001	0.0009	0.0065	0.0064	0.0048	0.0029	0.0017	0.0017	0.0041	0.0006	<0.0005	0.0079	<0.0005
Zinc (mg/L)	0.008	<0.001	0.003	0.005	0.005	0.005	0.007	<0.001	0.002	0.003	0.002	0.003	<0.001	0.004	0.005
PFAS															
PFOA (µg/L)	19	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PFOS (µg/L)	0.00023	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

*Range of default trigger values conductivity (EC, salinity), of upland river in south-east Australia (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000).

*Range of default trigger values pH of upland rivers in south-east Australia, trigger values pH of freshwater lakes & reservoirs is 6.5 to 8 in south-east Australia (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000).

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Appendix A: Groundwater sampling results

Row labels	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5MB
Acid extractable trace metals/ mg/L														
Aluminium (acid extractable)	<0.01	0.48	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.18	<0.01	<0.01	<0.01	0.01
Arsenic (acid extractable)	<0.001	0.025	<0.001	0.008	0.009	<0.001	0.009	0.003	0.003	0.002	<0.001	<0.001	0.003	0.003
Copper (acid extractable)	<0.0005	0.02	0.0025	<0.0005	0.0005	0.001	0.0007	0.0028	0.0028	0.0015	<0.0005	<0.0005	0.0011	0.0006
Lead (acid extractable)	<0.0001	0.0005	<0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0041	<0.0001	<0.0001	<0.0001	<0.0001
Manganese (acid extractable)	0.042	0.27	0.067	1.1	1.1	0.023	0.025	0.39	0.38	0.24	0.44	0.26	1.4	0.17
Mercury (acid extractable)	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (acid extractable)	0.0017	0.0022	0.0008	0.0067	0.0067	0.0049	0.0029	0.0017	0.0017	0.0052	0.0006	<0.0005	0.0081	<0.0005
Zinc (acid extractable)	0.004	0.048	0.004	0.02	0.024	0.006	<0.001	0.001	0.001	0.004	0.003	<0.001	0.003	0.37
Anions by IC/ mg/L														
Bromide	0.7	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	160	190	16	120	120	1100	81	36	36	4	530	14	65	36
Fluoride	<0.3	0.3	<0.3	0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.7	<0.3	<0.3
Nitrate	7.3	<0.9	1.4	<0.9	<0.9	36	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	5.6	<0.9
Nitrite	<0.25	<0.25	<0.25	0.59	0.49	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Phosphate	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Sulfate	64	78	17	880	880	52	1300	720	720	4	1100	290	2100	13
Dissolved trace metals/ mg/L														
Aluminium (dissolved)	<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
Arsenic (dissolved)	<0.001	0.024	<0.001	0.007	0.008	<0.001	0.008	0.003	0.003	0.001	<0.001	<0.001	0.002	0.002
Copper (dissolved)	<0.0005	0.0009	0.0023	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005
Lead (dissolved)	<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
Manganese (dissolved)	0.045	0.22	0.061	1	1	0.02	0.026	0.37	0.37	0.17	0.44	0.25	1.4	0.18

Row labels	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5MB
Mercury (dissolved)	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (dissolved)	0.0009	0.001	0.0009	0.0065	0.0064	0.0048	0.0029	0.0017	0.0017	0.0041	0.0006	<0.0005	0.0079	<0.0005
Zinc (dissolved)	<0.001	0.003	0.005	0.005	0.005	0.007	<0.001	0.002	0.003	0.002	0.003	<0.001	0.004	0.005
External Nutrients*/ µg/L														
10:2 FTS	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
4:2 FTS	<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
6:2 FTS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
8:2 FTS	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
EtPerfluorooctanesulf- amid oacetic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MePerfluorooctanesulf- amid oacetic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Et perfluorooctanesulfonamid oethanol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-Ethyl perfluorooctanesulfon amide	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide,	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorobutanesulfonic acid	<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
Perfluorobutanoic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanesulfonic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluoroheptanesulfonic acid	<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
Perfluoroheptanoic acid	<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
Perfluorohexanesulfonic acid - PFHxS	<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
Perfluorohexanoic acid	<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
Perfluorononanoic acid	<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
Perfluorooctane sulfonamide	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Row labels	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5MB
Perfluorooctanesulfonic acid PFOS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoic acid PFOA	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanesulfonic acid	<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
Perfluoropentanoic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroundecanoic acid	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Positive PFAS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.09	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Total Positive PFHxS & PFOS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Positive PFOA & PFOS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
External nutrients*/ mg/L														
Ammonia as N in water	3.7	0.33	<0.005	0.46	0.44	0.027	0.021	<0.005	<0.005	0.2	<0.005	0.057	<0.005	0.007
NOx as N in water	0.007	0.02	0.3	0.2	0.2	7.6	<0.005	<0.005	0.005	<0.005	<0.005	0.01	1.3	<0.005
Phosphate as P in water	0.47	0.086	0.008	0.008	0.006	0.29	<0.005	0.03	0.03	0.03	<0.005	<0.005	<0.005	<0.005
Phosphorus - Dissolved	0.52	0.09	<0.05	<0.05	<0.05	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phosphorus - Total	0.5	0.1	<0.05	0.1	0.1	0.3	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05
Total Dissolved Nitrogen in water	4	0.5	0.4	0.5	0.6	8.3	0.1	<0.1	<0.1	0.2	<0.1	<0.1	1.3	<0.1
Total Nitrogen in water	4.4	0.6	0.4	0.6	0.7	8.6	0.1	<0.1	<0.1	0.2	<0.1	<0.1	1.4	<0.1
External organic*/ µg/L														
Benzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
MTBE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-xylene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	12	<1	<1	<1	<1
TRH C6 - C10	<10	<10	<10	<10	<10	<10	<10	<10	<10	40	<10	19	<10	<10
TRH C6 - C10 less BTEX (F1)	<10	<10	<10	<10	<10	<10	<10	<10	<10	27	<10	19	<10	<10
TRH C6 - C9	<10	<10	<10	<10	<10	<10	<10	<10	<10	36	<10	19	<10	<10

Row labels	MB103	MB107	MB108	MB111	MB111 DUP	MB112	MB2A	MB4A	MB4A DUP	MB74	MB90	MB96 (Pit)	MB9A	TWO5MB
Total dissolved solids/ mg/L														
Total dissolved solids (1.2 µm filtered)	610	780	370	1800	1800	2500	2700	1500	1500	170	3100	780	3800	400
Total recoverable hydrocarbons/ mg/L														
>C10 - C16	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C16 - C34	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
>C34 - C40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5