



Mount Isa Water Board

Drinking Water Quality Management Plan
(DWQMP) Annual Report 2017-2018

Drinking Water Quality Management Plan

Annual Report 2017-2018

Table 1: Service provider details:

DETAIL	INFORMATION
SPID	199
Name	Mount Isa Water Board
Address	PO Box 1712 Mount Isa QLD 4825
Telephone	07 4740 1000
Email	info@mountisawater.qld.gov.au
Website	www.mountisawater.qld.gov.au
Water Supply Schemes covered by this plan	Mount Isa

Glossary of terms

ADWG 2011	Australian Drinking Water Guidelines (2011) Published by the National Health and Medical Research Council of Australia
<i>E coli</i>	<i>Escherichia coli</i> , a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
MPN/100mL	Most probable number of microorganisms per 100 millilitres
CFU/100mL	Colony forming units per 100 millilitres
BGA	Blue Green Algae
THMs	Trihalomethanes
DBP's	Disinfection By-Products
DNRME	Department of Natural Resources, Mines and Energy, the agency administering the Water Supply (Safety and Reliability) Act 2008
<	Less than
>	Greater than
O&M	Operations and Maintenance
CWL	Clear Water Lagoon
AWQC	Australian Water Quality Centre
DWIERP	Drinking Water Incident and Emergency Response Plan
SW	Source Water
R	Reticulation
µg/l	Micrograms per litre
THAAs	Total Halo Acetic Acids

1. Introduction

This annual report documents the performance of the Mount Isa Water Board (MIWB) as a Category 1 water service provider with respect to its Drinking Water Quality Management Plan (DWQMP) as required under the *Water Supply (Safety and Reliability) Act 2008* (the Act) for the financial year 2017 - 2018

The goal of the DWQMP is the protection of public health through the identification and minimisation of any public health related risks associated with drinking water. An amended DWQMP for MIWB was approved by the Water Supply Regulation group with the then Department of Natural Resources, Mines and Energy (DNRME Water Supply Regulation) in January 2018.

This annual report assists the Regulator to determine whether the approved DWQMP, and any conditions of approval, have been complied with and provides a mechanism for providers to report publicly on their performance in managing drinking water quality.

Overview of 2017 – 2018 Outcomes

Drinking water treated by MIWB for Mount Isa continued to be improved in quality over the reporting period. In addition to exceeding a number of our progress targets in the implementation of the DWQMP improvement plan, MIWB continued to develop and implement strategies to reduce the occurrence of disinfection by-products including improving the efficiency and effectiveness of chlorine dosing arrangements.

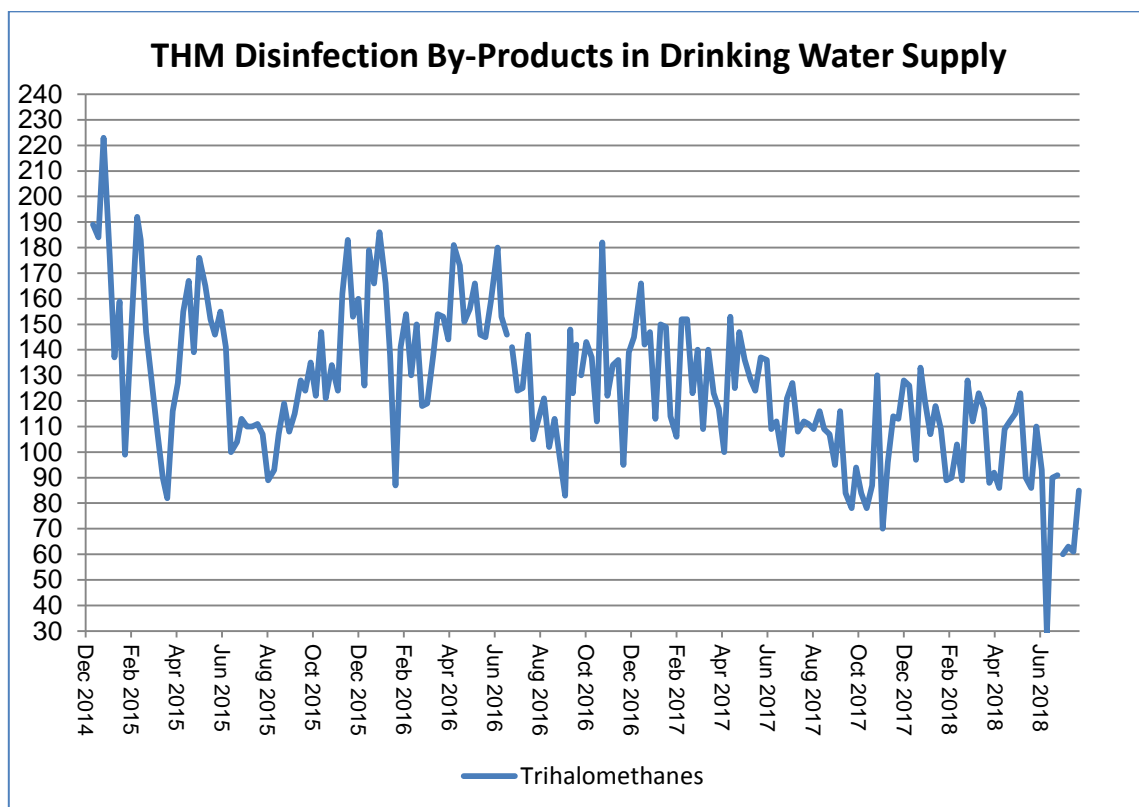


Figure 1 Total Halo-Methane (THM) concentrations drinking water supply

All drinking water test samples were free from E.coli; and despite the on-going blue-green algae bloom, cyanotoxins were controlled to well below the World Health Organisation limit.

The Drinking Water Management Plan was reviewed and updated, and was pending approval by the Regulator.

2. Overview of Operations

MIWB provides bulk water treatment services to the local council and industrial customers MIWB is a Category One Water Authority and Registered Service Provider (ID 199) established under the *Water Act 2000* The Board operates as a commercialised statutory authority.

There are two sources of raw water that can be utilised, Lake Moondarra and Lake Julius Water from either source is pumped via an aeration flume to oxygenate the water prior to entering a settling pond which utilises reed beds for natural filtration and sedimentation. Water follows from the Settling Pond into Clear Water Lagoon (CWL), a storage lagoon of approximately 2,300ML capacity. The CWL allows for residual suspended solids to be removed including any residual lead which has never been detected in product water. The Clear Water Lagoon is fenced to exclude cattle.

Water is pumped to the Mount Isa Terminal Reservoir (MITR) from the Col Popple pump station located at Clear Water Lagoon, or additionally via a booster station.

The water at MITR undergoes a microfiltration treatment stage and chlorination before delivery to MIWB's sole drinking water customer - Mount Isa City Council (MICC). The daily demand of MIWB's three major customers is approximately 40-55 ML/day depending on seasonal changes and industrial customer's operational requirements.

A schematic for the water supply is presented in Figure 2:

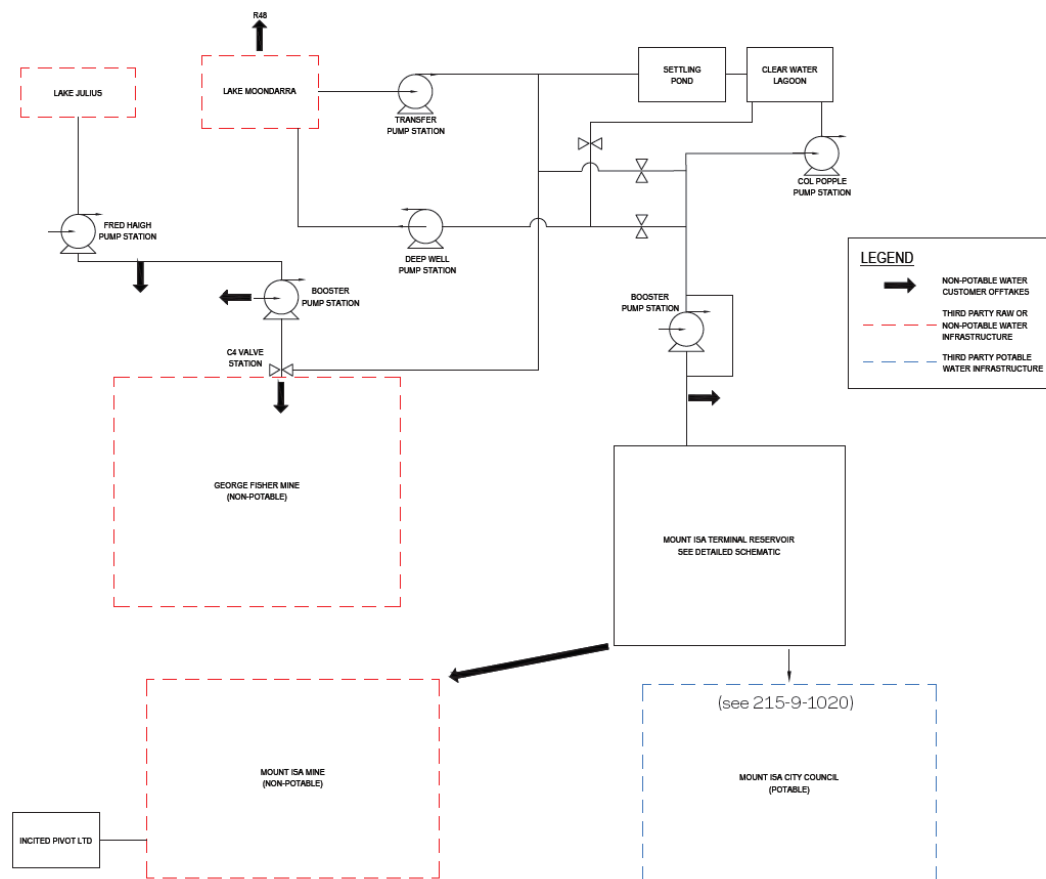


Figure 2 MIWB Drinking Water Supply Scheme

3. Actions taken to implement the DWQMP

A hazard identification and risk assessment approach has been undertaken which is consistent with the Australian Drinking Water Guidelines. (ADWG)

The methodology used to assess the water quality risks is a step based approach. Firstly, the inherent risk from the water sources is identified, secondly the maximum risk is calculated whereby no barriers or existing preventative measures are put in place, and thirdly the residual risk is calculated with all preventative measures in place for the customers at the supply point.

A number of critical control points (CCPs) were identified in the system which are monitored. These CCPs can be actioned to prevent process excursions leading to non-compliant product.

In the reporting period of 2017 - 2018 there were nine CCP events:

1. Microfiltration unit trips due to high turbidity

There were nine trips during the year due to a turbidity meter reading above the set point. Each microfiltration unit is programmed to cease operation if high turbidity is monitored for 600 seconds. This set point will meet the water quality guidelines by ensuring that each individual filter turbidity is ≤ 0.1 NTU for 95% of the month and not greater than 0.15 for ≥ 10 minutes (600 seconds). In collaboration with the equipment manufacturer, a control code error was discovered which was causing this timer sequence to fail to reset correctly. CCP Shutdowns that occurred are detailed below.

In July 2017 there was one trip due to no flow to the turbidity unit; which was attributed to operator error.

From July 2017 to April 2018 a further five trips were attributed to air bubbles in the product line. In all cases, the microfiltration units were checked, reset and brought back on line with no follow-up samples exceeding the set points

MIWB continues to investigate improvement opportunities and identified turbulent flow to the meters may be one cause of the spurious trips. Orifice plates designed to create laminar flow to the units were installed on units 5 and 6 in May 2018. During the installation and commissioning, one trip on each unit was reported as the locations for the orifice plates were optimized.

In all cases the CCP events showcased that all set points and response measures ensured no water breached the quality guidelines for turbidity during the year.

4. Compliance with water quality criteria for drinking water

During the 2017 - 2018 financial year verification monitoring was undertaken for a number of parameters.

4.1 *Escherichia coli*

In all cases, the water quality results met the Australian Drinking Water Guidelines for *Escherichia coli*. Fifty-four samples were tested for *E coli* in the product for reticulation, and no samples were

observed to contain any colony forming units. A 100% compliance was observed for this parameter. Full details on monthly verification results are shown in Appendix A – Table 3.

For source waters emanating from Lake Moondarra and Lake Julius, the maximum E coli counts are 21 and 68 MPN/100ml respectively. The minima equated to the limit of reporting (LOR) of 1MPN. Results are given in Appendix A – Table 2.

4.2 Cryptosporidium and Giardia

During the financial year, the source water quality results showed little evidence of Cryptosporidium and Giardia. Twenty-six samples each, from Lake Moondarra and Lake Julius, were collected and tested by the NATA certified laboratory ALS. One Lake Moondarra sample taken in September 2017 returned a positive detection of a Cryptosporidium cyst Full details are provided in Appendix A – Table 2.

4.3 Cyanobacteria Counts

A total of 43 samples were collected during the year for cyanobacteria identification and counting. Of the 43 samples, 20 were from Lake Julius and 19 from Lake Moondarra; and 4 samples from Mount Isa Terminal Reservoir. None of the samples showed evidence of *Nodularia spumigena* with all having levels below the LOR of 1cell/ml. All samples taken from Lake Julius and Lake Moondarra had varying amounts of *Cylindrospermopsis raciborskii* present. At Lake Julius, counts varied from zero, to over 530,000 cells/ml. Lake Moondarra counts were less; between zero and 50,000 cells/ml. *Microcystis aeruginosa* was evident in four samples from Lake Julius with a maximum of 1,692 cells/ml, whilst the species was evident in three samples from Lake Moondarra to a maximum count of 372 cells/ml.

MITR product water had no evidence of any cyanobacteria contamination and all samples were compliant with the ADWG. Full results are indicated in Appendix A – Table 2.

4.4 Cyanotoxins

A total of 57 samples were collected during the year for cyanotoxin testing; specifically cylindrospermopsin. Of the 57 samples, 3 were from Lake Julius, 2 from Lake Moondarra and 52 from MITR. In all samples, not one reported a toxin level above 10 µg/l. As scientific data is insufficient to establish a guideline value, the WHO health alert level of 1 µg/l has been adopted for reticulated samples.

Of the samples collected at MITR, 42 were sent for verification analysis at a NATA accredited laboratory for cylindrospermopsin and de-oxycylindrospermopsin. No results for the combined cyanotoxin levels exceeded the WHO health alert level of 1 µg/l. Full results are indicated in Appendix A – Table 2.

4.5 Disinfection By-products

As a consequence of chlorination of the water, organic material can react with the chlorine and form disinfection by-products. Disinfection byproducts, for which regulations have been established, have been identified in drinking water including Trihalomethanes and Haloacetic acids. As part of the verification monitoring program, these groups of compounds are monitored.

For the 2017-2018 financial year, 52 samples for Trihalomethanes (THMs) and 52 samples for Total Haloacetic Acids (THAAs) were collected from MITR. All samples were tested at the NATA accredited laboratory ALS. The THM results ranged from 29 to 133µg/l. No sample exceeded the ADWG of 250µg/l for the year.

Of the samples collected for THAAs, none exceeded the ADWG for trichloroacetic acid of 100µg/l. The results ranged from 11 to 82µg/l. The results are shown in Appendix A – Table 2, and further detail is given in section 5. In November 2017 Queensland Health published a new guideline limit for Total Haloacetic Acids of 0.1mg/L, ADWG defined limits for specific species but does not define a limit for this group. One sample exceeded the Queensland Health defined Total Haloacetic Acid limit of 0.1mg/l, ranging from <0.1 to 0.2mg/l. No sample exceeded the speciated ADWG limits.

4.6 Chlorine, physical parameters and Metals

Free and total chlorine was monitored throughout the financial year at the MITR. A total of 51 samples were tested, and none exceeded the ADWG limit of 5mg/l. Physical parameters such as pH and turbidity was also monitored as well as metals. There were no exceedances of any metals throughout the system. All results are shown in Appendix A – Table 2.

5. Notifications to the Regulator under sections 102 and 102A of the Act

- There was one water quality incident/event reported as a result of breach of the health guideline limits during the 2017-2018 year
- The notification was caused by the detection of Total Haloacetic Acids (THAAs), which is the sum of a group of disinfection by-products (DBPs) of organic acids. It is worth noting, that during these incident, no halomethane (another form of disinfection by-products) exceeded the guideline limits.

This incident did not require the Mount Isa Water Board to issue a boil or do not drink notice to our customers.

Non-compliant drinking water quality criteria and corrective actions

Exceedance of total Haloacetic acids

Incident Description: On June 25, 2018 the result for Total Haloacetic Acid (THAA) at sampling location MICC Town High (S29) was 0.2mg/l (178 µg/l) which exceeded the Queensland Health advised guideline limit of 0.1mg/l. The result was reported to Water Supply Regulation and recorded as incident DWI-7-199-0048.

Corrective and preventative actions: MIWB informed the DNRME Water Supply Regulation of the incident within the incident notification timeframe. The MIWB's operations and maintenance contractor was informed of the incident. Chlorine contact times were calculated for the entire system; and was found to be high for that day only. Further investigations found that at the time of the incident, a repair had been undertaken to a primary chlorinator.

Preventative measures include: Secondary dosing of chlorine to the 50ML tank was ceased. Chlorine is now added only at the primary chlorination site. This ensures adequate mixing during inflow into the tank, and minimises “hot-spot” areas during chlorine addition.. Also the maintenance contractor has been instructed to contact the Water Board if there are any leaks to the chlorine system before changes are made.

Additionally the Mount Isa Water Board is improving the monitoring program within the treatment plant and is integrating more online processes. Operations staff have commenced with the business in July 2018 to provide an enhanced level of accountability which can be achieved by direct staffing of the task.

6. Customer Complaints

MIWB did not receive any formal water quality complaints from its drinking water customer for the 2017 - 2018 financial year.

Table 1 - complaints about water quality, (including per 1000 customers)

	Suspected Illness	Discoloured water	Taste and odour	Total
Scheme 1	0	0	0	0
Total	0	0	0	0

7. Findings and recommendations of the DWQMP auditor

No audits were completed during the 2017-18 reporting period

8. Outcome of the review of the DWQMP and how issues raised have been addressed.

A minor amendment to the DWQMP was agreed with the Regulator in January 2018, which was to include a new pumping strategy utilising existing infrastructure.

A revised draft of the DWQMP was also prepared in June 2018 and submitted to the Department of Natural Resources, Mines and Energy in August 2018 for review.

Appendix A – Details of compliance with water quality criteria

The results from the verification monitoring program have been compared against the levels of the water quality criteria specified by the Regulator in the *Water Quality and Reporting Guideline for a Drinking Water Service*.

The reported statistics do not include results derived from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result.

Verification monitoring has been carried out as per the monitoring program stated in the DWQMP. In some cases, increased frequencies for some parameters have been undertaken for seasonal variation and for data-gathering. The validation program is appropriate as both source waters and treated water is monitored routinely. Validation analyses are also carried out by a NATA accredited laboratory to ensure inter-laboratory correlations are maintained.

Table 2 - Verification monitoring results

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Lake Julius and Lake Moondarra	Lake Julius	Escherichia Coli and Thermotolerant Coliforms	MPN/100mL	Fortnightly /Weekly	40	17	N/A	<1	68.3	2.7	1 MPN/100mL	ALS/MIWB
	Lake Julius	Cryptosporidium	Oocysts/10L	Fortnightly	26	0	0	<0.1	<0.2	<0.1	0.1 oocyst/10L	ALS
	Lake Julius	Giardia	Cysts/10L	Fortnightly	26	0	0	<0.1	<0.2	<0.1	0.1 cyst/10L	ALS
	Lake Julius	<i>Anabaena Circinalis/ Anabaena coiled or straight</i>	cells/ml	In use	20	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Julius	<i>Chrysochlorum</i>	cells/ml	In use	20	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Julius	<i>Chrysochlorum c.f. bergii</i>	cells/ml	In use	20	1	N/A	<1	14	<1	1 Cell/mL	ALS
	Lake Julius	<i>Chrysochlorum c.f. ovalisporum</i>	cells/ml	In use	20	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Julius	<i>Cylindrospermopsis Raciborskii</i>	cells/ml	In use	20	20	N/A	249	530876	122323	1 Cell/mL	ALS
	Lake Julius	<i>Cylindrospermum</i>	cells/ml	In use	20	0	N/A	0	0	0	1 Cell/mL	ALS
	Lake Julius	<i>Microcystis</i>	cells/ml	In use	20	14	N/A	20	797	325	1 Cell/mL	ALS
	Lake Julius	<i>Microcystis c.f. aeruginosa</i>	cells/ml	In use	20	4	N/A	24	1692	447	1 Cell/mL	ALS
	Lake Julius	<i>Nodularia spumigena</i>	cells/ml	In use	20	0	N/A	0	0	0	1 Cell/mL	ALS
	Lake Julius	Cylindrospermopsin	µg/L	Random	4	4	N/A	0.59	1.22	0.92	0.05 µg/L	MIWB
	Lake Julius	pH	Standard	Weekly	49	49	N/A	6.99	8.47	7.60	0.1	Field
	Lake Julius	Turbidity	NTU	Weekly	49	49	N/A	2.0	10.0	4.9	0.1 NTU	Field

Table 3 - Verification monitoring results continued...

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Lake Julius and Lake Moondarra	Lake Moondarra	Escherichia Coli and Thermotolerant Coliforms	MPN/100mL	Fortnightly	20	10	N/A	<1	21.3	4.1	1 MPN/100mL	ALS/MIWB
	Lake Moondarra	Cryptosporidium	Oocysts/10L	Fortnightly	26	1	0	<0.1	0.1	<0.1	0.1 oocyst/10L	ALS
	Lake Moondarra	Giardia	Cysts/10L	Fortnightly	26	0	0	<0.1	<0.1	<0.1	0.1 cyst/10L	ALS
	Lake Moondarra	<i>Anabaena Circinalis/ Anabaena coiled or straight</i>	cells/ml	Fortnightly	19	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Moondarra	<i>Chrysochlorum</i>	cells/ml	Fortnightly	19	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Moondarra	<i>Chrysochlorum c.f. bergii</i>	cells/ml	Fortnightly	19	3	N/A	50	945	363	1 Cell/mL	ALS
	Lake Moondarra	<i>Chrysochlorum c.f. ovalisporum</i>	cells/ml	Fortnightly	19	2	N/A	159	355	257	1 Cell/mL	ALS
	Lake Moondarra	<i>Cylindrospermopsis Raciborskii</i>	cells/ml	Fortnightly	19	19	N/A	84	50000	19682	1 Cell/mL	ALS
	Lake Moondarra	<i>Cylindrospermum</i>	cells/ml	Fortnightly	19	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Moondarra	<i>Microcystis</i>	cells/ml	Fortnightly	19	11	N/A	67	1442	660	1 Cell/mL	ALS
	Lake Moondarra	<i>Microcystis c.f. aeruginosa</i>	cells/ml	Fortnightly	19	3	N/A	96	372	199	1 Cell/mL	ALS
	Lake Moondarra	<i>Nodularia spumigena</i>	cells/ml	Fortnightly	19	0	N/A	<1	<1	<1	1 Cell/mL	ALS
	Lake Moondarra	Cylindrospermopsin	µg/L	Random	2	2	N/A	0.21	0.97	0.59	0.05 µg/L	MIWB
	Lake Moondarra	pH	Standard	Weekly	55	55	N/A	7.26	8.80	8.16	0.1	Field
	Lake Moondarra	Turbidity	NTU	Weekly	55	55	N/A	1.49	147	9.48	0.1 NTU	Field
	Lake Moondarra	Aluminium	mg/L	Weekly	52	44	0	<0.005	0.327	0.024	0.005 mg/L	ALS
	Lake Moondarra	Boron	mg/L	Quarterly	7	0	0	<0.05	<0.05	<0.05	0.05 mg/L	ALS
	Lake Moondarra	Iron	mg/L	Weekly	52	51	0	<0.05	4.66	0.323	0.05 mg/L	ALS
	Lake Moondarra	Lead	mg/L	Weekly	52	34	0	<0.001	0.027	0.003	0.001 mg/L	ALS
	Lake Moondarra	Manganese - Total	mg/L	Weekly	52	52	0	0.024	0.188	0.077	0.001 mg/L	ALS
	Lake Moondarra	Selenium	mg/L	Quarterly	7	0	0	<0.01	<0.01	<0.01	0.01 mg/L	ALS

Table 4 - Verification monitoring results continued...

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Lake Julius and Lake Moondarra	Drinking Water Supply	Escherichia Coli and Thermotolerant Coliforms	MPN/100mL	Weekly	54	0	0	<1	<1	<1	1 MPN/100mL	ALS/MIWB
	Drinking Water Supply	<i>Anabaena Circinalis/ Anabaena coiled or straight</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	<i>Chrysoosporum</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	<i>Chrysoosporum c.f. ovalisporum</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	<i>Cylindrospermopsis Raciborskii</i>	cells/ml	Random	4	2	0	<1	652	200	1 Cell/mL	ALS
	Drinking Water Supply	<i>Cylindrospermum</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	<i>Microcystis</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	<i>Microcystis c.f. aeruginosa</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	<i>Nodularia spumigena</i>	cells/ml	Random	4	0	0	<1	<1	<1	1 Cell/mL	ALS
	Drinking Water Supply	Cylindrospermopsin	µg/L	Weekly	42	0	0	0.08	<0.05	<0.05	0.05 µg/L	ALS
	Drinking Water Supply	Trihalomethanes (THMs)	µg/L	Weekly	52	52	0	29	133	103	5 µg/L	ALS
	Drinking Water Supply	Chloroacetic acid (HAA)	µg/L	Fortnightly/ Weekly	52	50	0	1	4	2	1 µg/L	ALS
	Drinking Water Supply	Dichloroacetic acid (HAA)	µg/L	Fortnightly/ Weekly	52	52	0	18	74	37	10 µg/L	ALS
	Drinking Water Supply	Trichloroacetic acid (HAA)	µg/L	Fortnightly/ Weekly	52	52	0	11	82	30	10 µg/L	ALS
	Drinking Water Supply	Free Chlorine	mg/L	Weekly	51	51	0	0.84	2.31	1.496	0.01 mg/L	Field
	Drinking Water Supply	Total Chlorine	mg/L	Weekly	51	51	0	1.24	2.71	1.91	0.01 mg/L	Field
	Drinking Water Supply	Nitrate + Nitrite	mg/L	Quarterly	7	7	0	0.01	0.04	0.024	0.01mg/L	ALS
	Drinking Water Supply	Fluoride	mg/L	Quarterly	7	7	0	0.2	0.4	0.286	0.1 mg/L	ALS
	Drinking Water Supply	pH	Standard	Weekly	51	51	N/A	7.07	8.31	7.662	0.1	Field

Scheme name	Scheme component	Parameter	Units	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Limit of reporting	Laboratory name
Lake Julius and Lake Moondarra	Drinking Water Supply	Turbidity	NTU	Weekly	51	51	N/A	0.01	0.46	0.14	0.1 NTU	Field
	Drinking Water Supply	Aluminium	mg/L	Weekly	52	1	0	<0.005	0.024	<0.005	0.005 mg/L	ALS
	Drinking Water Supply	Antimony	mg/L	Quarterly	7	1	0	<0.001	0.001	<0.001	0.001 mg/L	ALS
	Drinking Water Supply	Cadmium	mg/L	Quarterly	7	0	0	<0.0001	<0.0001	<0.0001	0.0001 mg/L	ALS
	Drinking Water Supply	Chromium	mg/L	Quarterly	7	1	0	<0.001	0.002	<0.001	0.001 mg/L	ALS
	Drinking Water Supply	Arsenic	mg/L	Quarterly	7	6	0	<0.001	0.002	0.001	0.001 mg/L	ALS
	Drinking Water Supply	Copper	mg/L	Monthly	14	13	0	0.001	0.004	0.002	0.001 mg/L	ALS
	Drinking Water Supply	Iron	mg/L	Weekly	52	2	0	<0.05	0.11	0.05	0.05 mg/L	ALS
	Drinking Water Supply	Lead	mg/L	Weekly	52	0	0	<0.001	<0.001	<0.001	0.001 mg/L	ALS
	Drinking Water Supply	Manganese - Total	mg/L	Weekly	52	39	0	<0.001	0.013	0.004	0.001 mg/L	ALS
	Drinking Water Supply	Nickel	mg/L	Quarterly	7	1	0	<0.001	0.003	<0.001	0.001 mg/L	ALS
	Drinking Water Supply	Zinc	mg/L	Monthly	14	0	0	<0.001	<0.001	<0.001	0.001 mg/L	ALS

Table 3A – Reticulation *E coli* verification monitoring 2016-2017

Drinking water scheme:

Mount Isa Water Board - Lake Moondarra and Lake Julius

Year	2016-2017											
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No of samples collected	4	5	4	4	5	5	5	4	4	4	4	4
No of samples collected in which <i>E coli</i> is detected (ie a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No of samples collected in previous 12 month period	94	87	77	69	62	57	54	54	53	53	53	52
No of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 3B – Reticulation *E coli* verification monitoring 2017 - 2018

Drinking water scheme:

Mount Isa Water Board - Lake Moondarra and Lake Julius

Year	2017 - 2018											
Month	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No of samples collected	4	4	4	5	4	4	5	5	6	4	5	4
No of samples collected in which <i>E coli</i> is detected (ie a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No of samples collected in previous 12 month period	52	51	51	52	51	50	50	51	53	53	54	54
No of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Appendix B – Implementation of the DWQMP Risk Management Improvement Program

Progress against the risk management improvement program in the approved DWQMP is listed in this section and summarised in Table 4.

Identification of Alternate Oxygenation Options

MIWB completed an options study on a number of different aeration/destratification units.

Upon completion of the options study, MIWB engineered and installed a floating pontoon mounted aeration system at Clear Water Lagoon. The new unit supplies three times the volume of air when compared to the previous system and ensures good mixing at the Col Popple Pump Station. It has been designed to be easily maintainable, and has a duty/standby blower arrangement to ensure reliable system operation. A small portable solar powered unit has also been installed to target individual zones in the Clear Water Lagoon, as an augmentation to the main unit.

Investigate options to reconfigure tanks to roofed clean water storage

MIWB are now in the final stages of design and tendering a fully enclosed potable water storage tank. Installation is scheduled for 2019. Until the new covered tank is installed, chlorination is maintained in two locations within the open-topped tanks. Residual chlorine is monitored daily within the tanks, and an on-line chlorine analyser was installed for real-time monitoring also.

Calculate chlorine contact time and investigate the hard shutdown of treated water delivery in the event of a Critical Control Point breach

Chlorination is undertaken at four points within MITR. Primary chlorination is completed by a flow-paced system monitored daily to ensure residual chlorine levels and contact times are within set ranges. Contact times are also calculated to ensure adequate residual chlorine remains for effective disinfection. Additional chlorine is added to filtered water to ensure sufficient residual chlorine mitigates potential recontamination of the supply. Finally, water supplied to the reticulation system is controlled to set-points with CCP triggers defined for action. Daily checks are completed by operators on the chlorination system to ensure system compliance to the set points. Chlorine decay curves have also been completed to understand decay rates within the reticulation system, as another means of ensuring under chlorination does not occur.

Investigate options for the reduction in formation of Disinfection By-Products

Completion of a chlorine dosing strategy review indicated a strong correlation between residual chlorine concentration, contact time and THAA exceedances. By using contact times as a lead indicator, the operational range for the residual chlorine has been tightened and contact times reduced in the pre-filtration storage tank. Overall, all disinfection by-products have reduced throughout the system. Daily monitoring of the chlorination system continues and feedback is providing better management of the system. Dissolved organics in the source water also

contribute to the formation of these by-products; so a trial of low organics source water selection is planned during winter-spring period.

Demonstrable reductions in disinfection by-products have been achieved over the reporting period with further improvement investigations continuing.

Installation of Backflow Prevention Devices from Customer Lines

A capital project for the installation of nine back flow prevention valves commenced during the 2017-18 financial year

Comprehensive Review of Operational Procedures

A comprehensive review of operational procedures has commenced however progress slowed due to low staffing during the period. The work has been rescheduled for completion during 2019.

Other Improvement Opportunities

- Pre-feasibility investigations continue into options for implementation for activated carbon treatment as a contingency against cyanotoxins which cannot be managed by oxidation.

Table 5 – Progress against the risk management improvement program in the approved DWQMP

Item No.	Scheme Component / Sub-component	Action(s)	Target date/s	Status as at 10/12/2018	(If implementing these actions will take longer than anticipated, please provide detail, as it may affect the approved DWQMP)
1	Lake Moondarra - Clear Water Lagoon	Identify alternate oxygenation options (duty/ standby or alternate location) due to failure of destratification, which will impact Mn/ iron removal process in the Clear Water Lagoon. Could severely impact on the membrane filtration plants production capacity and therefore impact of clean water supply	July 2018	Options study - COMPLETE Additional Actions 1. A new solar powered system has been installed in the low DO zone of the CWL. 2. A new blower/diffuser array has installed and commissioned. The new system delivers 3x air flow compared to the previous system	
2		Identify alternate oxygenation options (duty/ standby or alternate location) due to failure of destratification, which will impact dissolved Oxygen in the Clear Water Lagoon and therefore impact clean water supply	September 2018		
3	MITR – Storage Tanks	Investigate options to reconfigure tanks to roofed clean water storage to prevent re-contamination of treated water, or installation of downstream UV barrier.	December 2018	Options study - COMPLETE Additional Actions 1. A project for the procurement and installation of new fully enclosed tanks during 2019 is underway	

Item No.	Scheme Component / Sub-component	Action(s)	Target date/s	Status as at 10/12/2018	(If implementing these actions will take longer than anticipated, please provide detail, as it may affect the approved DWQMP)
4	MITR	Calculate CT and investigate hard shutdown of treated water delivery, updating CCP	FY 2017-2018	COMPLETE <i>Additional Actions</i> 1. CT's calculated daily and residual chlorine ranges have been set to ensure adequate CT's 2. Chlorine decay curve has been completed for hydrodynamic modelling	
5	MITR	Reduction in formation of DBP's by completion of a chlorine dosing strategy review.	FY 2017-2018	Chlorine Dosing Strategy Review – COMPLETE <i>Additional Actions</i> 1. DBP's tend to form in winter, so a trial with low DOC water is planned for 2018 Winter period 2. Online chlorine analyser installed on the feed line to the filtration plants	
6	Whole of System	Installation of backflow prevention devices on customer lines	December 2018	ONGOING Board approval for capital expenditure, project is underway	

Item No.	Scheme Component / Sub-component	Action(s)	Target date/s	Status as at 10/12/2018	(If implementing these actions will take longer than anticipated, please provide detail, as it may affect the approved DWQMP)
7	Whole of System	Comprehensive review of operational procedures	June 2018	<p>Consultancy Review of Operational Procedures - COMPLETE</p> <p>Additional Actions</p> <ol style="list-style-type: none"> 1. MIWB has commenced the review 	