Water Quality Annual Report

2023/2024

GWMWater

2023/2024 Annual Report for Water Quality

GWMWater has a water quality management system that follows the principles in the Australian Drinking Water Guidelines to ensure safe drinking water in accordance with the requirements of the *Safe Drinking Water Act 2003*. This involves the analysis and assessment of risks from catchment to customer tap. The water quality management system is supported by implementation of appropriate control and prevention measures. These measures are reinforced through proactive maintenance and operation carried out by trained staff, with further verification and reporting steps undertaken to ensure water quality targets are being met. GWMWater has a water quality improvement program that aims to improve reliability and quality of water delivered to the community as well as expanding the number of customers to receive a drinking water supply.

In the 2023/2024 year, GWMWater commenced delivery of drinking water to Ultima having constructed a pipeline to connect the town supply to fully treated water from Swan Hill. GWMWater also completed construction and commissioning of a water treatment plant at Elmhurst to upgrade the water supply from regulated to drinking water. The declaration of Elmhurst as a drinking water locality is expected in the second half of 2024. The Dimboola WTP capacity has been expanded during the year to allow for treated water supply to Kaniva via pipeline, with the construction phase to extend the Dimboola-Nhill treated water pipeline to Kaniva underway. The upgrade of the water supply to the towns of Berriwillock, Culgoa, and Moyston to drinking water is nearing completion of the planning phase. Upgrades for these town will be achieved by supplying treated water through pipelines from existing water treatment plants.

Towns on the Northern Mallee pipeline that are serviced from the Wemen pump station via Ouyen are receiving water of inherently better quality since the membrane water treatment plant was supplemented by the construction of a dissolved air flotation (DAF) plant to provide 'clean water' in the pipeline as well as contributing towards pathogen log reduction for Ouyen to meet health-based targets.

At the beginning of 2024, bushfires impacted water supply to the town of Pomonal, leading to a 'do not drink' advisory being issued. GWMWater worked rapidly to re-establish the drinking water supply. The water in the reticulation system was turned over and extensive water quality testing was conducted. Water quality impacts from bushfires in the

Bayindeen catchment area have been closely monitored and managed by GWMWater, with no reportable incidents for the relevant water supplies.
GWMWater will continue to maintain its systems for providing safe, good quality water throughout its operating area in line with its vision of 'healthy environment, thriving communities'.

Mark Williams
Managing Director

Section 23 of the Safe Drinking Water Act 2003 requires Grampians Wimmera Mallee Water Corporation (GWMWater) to make available for inspection by the public the results of any water quality monitoring program conducted on any drinking water supplied by GWMWater. Customers and members of the public may access drinking water quality data by contacting GWMWater either by telephone on 1300 659 961 or via the internet at www.gwmwater.org.au.

Revision	Revision Date	Details	Authorised
1	12 September 2024	Draft for internal review	Matthew Kube
2	16 September 2024	Manager Water Treatment review	Suzy McDonald
3	19 September 2024	Executive Manager Infrastructure review	Nalaka Vitharana
4	26 September 2024	Department of Health review	Bronwyn Stewart
5	22 October 2024	Review by Senior Leadership Team	Senior Leadership Team
6	25 October 2024	Managing Director review and sign off	Mark Williams
7		Final copy to Department of Health	

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1 Introduction

Grampians Wimmera Mallee Water Corporation (trading as GWMWater) is a government-owned corporation, created by an order of the Victorian Government under the *Water Act 1989*. On 1 July 2004, GWMWater assumed the responsibilities of the predecessor organisations Grampians Water and Wimmera Mallee Water. The vision and mission of GWMWater are:

Vision
'Healthy environment, thriving community.'

Mission
'Through partnerships with our stakeholders, we will provide affordable services using our precious resources to ensure a productive and liveable region.'

GWMWater provides water services to a region covering an area of 62,000 km^2, with a population of approximately 77,600 at a density of only a little over one person/km^2. This includes 32,700 water supply connections for people living in 71 urban areas throughout the region and providing domestic and stock water supply to 8,900 rural customers.

1.1 Safe Drinking Water Act 2003

1.1.1 Background

The *Safe Drinking Water Act 2003* (the Act) and the Safe Drinking Water Regulations 2015 (the Regulations) is the legislative framework for assuring drinking water quality in Victoria.

The Act is based on:
a) Adoption of 'catchment-to-tap' risk management obligations.
b) Standards are applicable to all drinking water samples for key water quality criteria.
c) Information disclosure obligations for water suppliers.
d) Adoption of systemic community consultation processes.

This approach is consistent with regulatory best practice for the management of complex and inter-dependent risks.

1.1.2 Purpose and Outline

The Act:
a) Requires water suppliers and water storage managers to prepare and implement Risk Management Plans (RMPs) to manage risk in relation to drinking water and some types of non-potable water.
b) Provides for the auditing of those plans by approved auditors.
c) Requires water suppliers to ensure that the drinking water they supply meets quality standards specified by the regulations.
d) Requires water suppliers to disclose to the public information concerning the quality of drinking water.

e) Provides for the variation, after community consultation, of water quality standards that relate only to aesthetic factors.
f) Requires the reporting of known or suspected contamination of drinking water to the Department of Health (DH).

1.1.3 Definitions

The Act provides the following definitions for water quality classification:

Drinking Water
As defined by the Act, drinking water is water that is intended for human consumption or for purposes connected with human consumption, such as the preparation of food or the making of ice for consumption or for the preservation of unpackaged food, whether or not the water is used for other purposes.

Regulated Water
As defined by the Act, regulated water is water that is the subject of a declaration made by the minister under Section 6 of the Act. The minister may only make a declaration in relation to particular water if the Minister is satisfied that the water may be supplied to the public in circumstances in which it may be mistaken as being drinking water.

1.1.4 Safe Drinking Water Regulations 2015

The objective of the Regulations is to give effect to key aspects of the Act. In particular, the Regulations:
a) Specifies the major elements to be incorporated in risk management plans.
b) Specifies the standards relating to the quality of drinking water supplied to customers by water suppliers.
c) Specifies criteria for approval of auditors.
d) Specifies details to be included in annual reports.

This annual report is a requirement under Section 26 of the Act and addressed the specific requirements from the Regulations.

1.1.5 *Health Fluoridation Act 1973*

The *Health Fluoridation Act 1973* governs the addition of fluoride to drinking water. Fluoridation of drinking water supplies requires a preventive risk management approach. For this purpose, the Code of practice for fluoridation of drinking water supplies, second edition (2018) supports utilities in the adoption and safe operation of fluoride addition to drinking water supplies.

1.2 Australian Drinking Water Guidelines 2011

The Australian Drinking Water Guidelines 2011 (ADWG) provide a framework for the management of drinking water supplies and is designed to assure safety at point of use. The ADWG is concerned with both health and aesthetic quality.

The ADWG has been developed after consideration of the best available scientific evidence.

The ADWG is the authoritative reference of what constitutes safe, good quality water, and aligns with the Victorian's Safe Drinking Water Regulatory Framework. The ADWG and Safe Drinking Water Regulations are consistent with the Act *and* provide a basis for determining the quality of water to be supplied to consumers in all parts of Australia. These need to consider the diverse array of regional or local factors, and consider economic, political and cultural issues, including customer expectations and willingness and the ability to pay.

The ADWG are intended for use by the Australian community and all agencies with responsibilities associated with the supply of drinking water, including catchment and water resource managers, drinking water suppliers, water regulators and health authorities.

1.3 GWMWater Drinking Water Quality Policy

GWMWater is committed to managing its water supply to provide safe drinking water that meets the ADWG, other regulatory and consumer expectations. For this purpose, GWMWater has a drinking water quality policy (Figure 1-1) that provides the framework for managing the risks involved in harvesting, treating and distributing drinking water. GWMWater's drinking water quality policy was last updated February 2024 and is next due for review in 2026.

GWMWater is committed to managing its water supply effectively to provide a safe high quality drinking water that consistently meets the Australian Drinking Water Guidelines and consumer and other regulatory requirements.

To achieve this, in partnership with stakeholders and relevant agencies, GWMWater will:

- Manage water quality at all points along the delivery chain from catchment to the customers' tap.
- Use a risk based approach in which potential threats to water quality are identified and balanced.
- Integrate the needs and expectations of our customers, stakeholders, regulators and employees into our planning.
- Establish regular monitoring of the quality of drinking water and effective reporting mechanisms to provide relevant and timely information and promote confidence in the water supply and its management.
- Develop appropriate contingency planning and incident response capability.
- Participate in appropriate research and development activities to ensure continued understanding of drinking water quality issues and performance.
- Contribute to the debate on setting industry regulations and guidelines, and other standards relevant to public health and the water cycle.
- Continually improve our performance against corporate commitments and stakeholder expectations.

The organisation will implement and maintain a water quality management system consistent with the Australian Drinking Water Guidelines to effectively manage the risks to drinking water quality.

All GWMWater employees involved in the supply of drinking water are responsible for understanding, maintaining and continuously improving the water quality management system.

Mark Williams
Managing Director

Caroline Welsh
Chair

GWMWater

CMS/2747V2

Figure 1-1 - Statement for GWMWater's Drinking Water Quality Policy.

1.4 Characterisation of the System

GWMWater's operational area is shown in Figure 1-2. Key components of the water supply system include:

1. Headworks system, comprising the area in and around the Grampians Ranges and the Wimmera River. The main storages are Lake Bellfield, Lake Fyans, Taylors Lake, Lake Wartook, Mt Cole Reservoir, and Rocklands Reservoir, with raw water for drinking water localities also collected from creeks and Mt William and Edenhope Borefield. The total catchment area is 400,000 hectares with a maximum reservoir operating capacity of 522,000 megalitres.
2. GWMWater provides water to the majority of towns through extensive pipeline systems.
    a. The Wimmera Mallee Pipeline (WMP) system, as follows:
        i. Supply Systems 1,2,3,4,6 and the South West Loddon Pipeline, all originate from the Grampians headworks and consist of 9,270 kilometres of pipeline; and
        ii. Supply System 5, draws water from the Murray River and consists of approximately 860 kilometres of pipeline.
3. The Northern Mallee Pipeline (NMP) system consisting of 3,390 kilometres of pipeline which draws water from the Murray River.
4. A total of 1,620 kilometres of pipeline classified as urban, servicing the 71 urban water supplies.
5. Thirty-three towns receive water that is classified as drinking water (Table 1-1).
6. The fully treated water is supplied by 15 water treatment plants owned and operated by GWMWater, transfer of treated water from Swan Hill which is operated by Lower Murray Water, and a further four water treatment plants operated under a Build, Own, Operate and Transfer (BOOT) agreement. These BOOT plants are located at Halls Gap, Ararat, Great Western and Stawell, and as of 23 June 2014 have been operated by Trility, an independent private sector owner and operator.
7. GWMWater also supplies regulated water to 38 towns (Table 1-2). These supplies are harvested from a range of sources, including surface water and groundwater. Regulated supplies have low-level or no treatment, and is not intended for human consumption, drinking or food preparation.

1.5 Source of Water

GWMWater sources water from a range of surface water catchments, rivers and groundwater aquifers across the region. The catchments located within National Parks and State Forest are co-managed with Parks Victoria and DEECA – Department of Energy, Environment and Climate Action. GWMWater also partners with Catchment Management

Authorities, Local Government, Goulburn Murray Water and Southern Rural Water to address issues affecting water quality in the catchments from where water is sourced.

The Safe Drinking Water Regulations 2015 require water suppliers to detail the methodology used to quantify microbial hazards in source waters. GWMWater conducted sanitary surveys and vulnerability assessments of raw water source based on the drinking water source assessment and treatment requirements. GWMWater has a Hazard Analysis and Critical Control Points (HACCP) Plan for operation of its water treatment plants and supply system it operates to ensure the delivery of safe drinking water. Sanitary surveys, vulnerability assessment and HACCP are continuously reviewed, audited and improved.

Table 1-1 and Table 1-2 provide a summary of the source waters by water supply for both drinking water and regulated water. The populations recorded in these tables are based on GWMWater's residential connections and from Australian Bureau of Statistics census data of the average household size at each location.

Figure 1-2 - GWMWater's Operational Area.

Table 1-1 - Water Source for Drinking Water Supplies.

Locality	Source Water	Water Storages	Treatment Plant	Population
Ararat	Surface water (Lake Fyans, Mt Cole & Langi Ghiran Reservoirs)	Copes Hill and Olivers Gully earthen storages (raw) 1 x lined steel tank (treated) 1 x concrete elevated tank (treated)	Ararat WTP	8290
Beulah	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 3 x poly tanks (treated)	Warracknabeal WTP	300
Birchip	Grampians Headworks (WMP)	1 x lined earthen storages (raw) 1 x lined steel tanks (treated)	Birchip WTP	810
Brim	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x fibreglass elevated tank (treated)	Warracknabeal WTP	110
Charlton	Grampians Headworks (WMP)	1 x lined earthen storages (raw) 2 x lined steel tanks (treated) 1 x lined steel elevated tank (treated)	Charlton WTP	1140
Dimboola	Grampians Headworks (WMP)	2 x lined earthen storages (raw) 2 x lined steel tanks (treated)	Dimboola WTP	1630
Donald	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x lined steel elevated tank (treated)	St Arnaud WTP	1500
Edenhope	Groundwater (bores)	Fed directly from bores (raw) 1 x concrete tank (treated) 1 x elevated tank (treated)	Edenhope WTP	900
Great Western	Surface water (Lake Fyans)	1 x earthen storage (raw) 1 x lined steel tanks (treated)	Great Western WTP	270
Halls Gap	Surface water (Lake Bellfield, Dairy Creek)	Lake Bellfield and Dairy Creek earthen storages (raw) 1 x concrete tank (treated)	Halls Gap WTP	930
Hopetoun	Grampians Headworks (WMP)	1 x lined earthen storages (raw) 1 x lined steel tank (treated)	Hopetoun WTP	650
Horsham	Surface (Lake Wartook) and back up bore water and (Laharum bores)	1 x earthen storage (raw) 1 x concrete tank (treated) 1 x concrete storage (treated) 1 x concrete elevated tank (treated)	Mt Zero WTP	17260
Jeparit	Grampians Headworks (WMP)	2 x lined steel tanks (treated)	Rainbow WTP	530
Lake Bolac	Surface water (Mt William Creek, Stony Creek, Masons Creek) & Groundwater (bores)	2 x lined steel tanks (treated)	Willaura WTP	310
Manangatang	Surface water (Murray River via NMP)	1 x lined steel tank (raw) 1 x lined steel tank (treated) 1 x lined steel elevated tank (treated)	Manangatang WTP	290
Minyip	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x concrete tank (treated)	Murtoa WTP	500
Murtoa	Grampians Headworks (WMP)	2 x lined earthen storages (raw) 2 x lined steel tank (treated) 1 x lined steel elevated tank (treated)	Murtoa WTP	910
Natimuk	Surface (Lake Wartook) and back up bore water and (Laharum bores)	1 x lined steel tank (treated)	Mt Zero WTP	490
Nhill	Grampians Headworks (WMP)	3 x lined steel tanks (treated) 1x elevated tank (treated)	Dimboola WTP	2270

Locality	Source Water	Water Storages	Treatment Plant	Population
Ouyen	Surface water (Murray River via NMP)	2 x earthen storages (raw) 1 x lined steel tank (clarified) 1 x lined steel tank (treated) 2 x lined steel elevated tank (treated)	Ouyen WTP	1200
Pomonal	Surface water (Lake Bellfield)	1 x concrete tank (treated)	Halls Gap WTP	290
Quambatook	Surface water (Goulburn & Loddon Rivers) via Normanville Pipeline	1 x earthen storage (raw) 1 x steel elevated tank (treated)	Quambatook WTP	240
Rainbow	Grampians Headworks (WMP)	2 x lined earthen storages (raw) 1 x lined steel tank (treated)	Rainbow WTP	650
Rupanyup	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x concrete tank (treated)	Murtoa WTP	450
Sea Lake	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x lined steel tank (treated)	Warracknabeal WTP	750
St Arnaud	Grampians Headworks (WMP)	Volcano lined & St Arnaud earthen storage (raw) 3 x concrete tanks (treated)	St. Arnaud WTP	2430
Stawell	Surface water (Lake Fyans, Lake Bellfield, Fyans Creek)	3 x earthen storages (raw) 1 x lined steel tank (treated) 2 x elevated tanks (treated)	Stawell WTP	6480
Ultima*	Surface water (Murray River)	2 x lined steel tanks (treated) 2 x lined steel tanks (treated) 1 x elevated steel tank (treated)	Swan Hill WTP	180
Underbool	Surface water (Murray River via NMP)	1 x lined steel tank (raw) 1 x lined steel tank (treated) 1 x elevated tank (treated)	Underbool WTP	230
Warracknabeal	Grampians Headworks (WMP)	2 x lined earthen storages (raw) 2 x lined steel tank (treated) 1 x steel elevated tank (treated)	Warracknabeal WTP	2500
Willaura	Surface water (Mt William Creek, Stony Creek, Masons Creek) and Groundwater (bores)	2 x earthen storages at Willaura and Mt Pleasant (raw) 1 x lined steel tank (treated) 1 x lined steel tank (treated)	Willaura WTP	420
Woomelang	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x steel elevated tank (treated)	Warracknabeal WTP	200
Wycheproof	Grampians Headworks (WMP)	2 x lined steel tanks (treated) 1 x concrete elevated tank (treated)	Charlton WTP	710

WMP – Wimmera Mallee Pipeline **NMP – Northern Mallee Pipeline**
*Ultima was declared drinking water 12 January 2024.

Table 1-2 - Water Source for Regulated Water Supplies.

Water Supply	Source Water	Water Storages	Population
Antwerp	Grampians Headworks (WMP)	2 x poly lined steel tanks	20
Apsley	Groundwater (bores)	1 x elevated steel tank	210
Berriwillock	Grampians Headworks (WMP) Back up supply: Murray River via NMP)	2 x earthen storages	170
Buangor	Surface water (McLeods Creek)	1 x earthen storage	90
Chillingollah	Surface water (Murray River via NMP)	1 x concrete tank	10
Chinkapook	Surface water (Murray River via NMP)	1 x concrete tank	30
Cowangie	Groundwater (bores)	1 x elevated tank	20
Culgoa	Surface water (Murray River via NMP)	1 x earthen storage	90
Dooen	Grampians Headworks (WMP)	2 x poly tanks	40
Elmhurst	Surface water (Hickmans Creek)	1 x earthen storage 1 x lined steel tank	200
Glenorchy	Grampians Headworks (WMP)	1 x steel tank 1 x elevated steel tanks	120
Goroke	Groundwater (bores)	1 x elevated steel tanks	310
Harrow	Groundwater (bores) & surface water (Glenelg River)	2 x poly lined steel tanks	160
Jung	Grampians Headworks (WMP)	2 x poly lined steel tanks 1 x elevated steel tank	100
Kaniva	Groundwater (bores)	1 x elevated concrete tank	870
Kiata	Groundwater (bores)	2 x poly tanks 1 x elevated steel tank	40
Lalbert	Surface water (Murray River via NMP)	2 x poly lined steel tanks 1 x elevated steel tank	90
Lascelles	Grampians Headworks (WMP)	2 x lined steel tanks	60
Lillimur	Groundwater (bores)	1x elevated steel tank	50
Marnoo	Grampians Headworks (WMP)	1 x steel tank	110
Miram	Groundwater (bores)	1 x elevated steel tank	20
Moyston	Surface water (Mt William, Stony and Masons Creeks) and Groundwater (bores)	1 x earthen storage	220
Murrayville	Groundwater (bores)	1 x lined steel tank	330
Nandaly	Surface water (Murray River via NMP)	1 x concrete tank	30
Nullawil	Surface water (Murray River via NMP)	2 x lined steel tanks	80
Patchewollock	Surface water (Murray River, clarified at Ouyen)	1 x concrete elevated tank	90
Pimpinio	Grampians Headworks (WMP)	2 x lined earthen storages 1 x elevated tank storage	90
Serviceton	Groundwater (bores)	1 x elevated steel tank	70
Speed	Surface water (Murray River, clarified at Ouyen)	1 x concrete tank	60
Streatham	Groundwater (bores)	1 x earthen storage	100
Tarranyurk	Grampians Headworks (WMP)	2 x lined steel tanks	10
Tempy	Surface water (Murray River, clarified at Ouyen)	1 x steel tank 1 x concrete tank	50
Waitchie	Surface water (Murray River via NMP)	1 x concrete tank	10
Walpeup	Surface water (Murray River, clarified at Ouyen)	2 x earthen storages	130
Watchem	Grampians Headworks (WMP)	2 x poly lined steel tanks	150
Westmere	Groundwater (bores)	1 x earthen storage	20
Wickliffe	Surface water (Mt William, Stony and Masons Creeks) and Groundwater (bores)	1 x earthen storage	70
Yaapeet	Grampians Headworks (WMP)	2 x poly lined steel tanks	70

WMP – Wimmera Mallee Pipeline **NMP – Northern Mallee Pipeline**

2 Quality Management System

2.1 Water Treatment

The water treatment processes utilised at the drinking water treatment plants are shown in Table 2-1.

Table 2-1 - Water Treatment Processes and Chemicals in Drinking Water Towns.

Water Sampling Localities	Treatment Processes	Chemicals that can be added
Ararat*^	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction, fluoridation	Lime, potassium permanganate, powder activated carbon, aluminium sulphate (alum), polymer, chlorine, hydrofluorosilicic acid
Beulah	Receives water from Warracknabeal WTP, booster disinfection	Chlorine
Birchip*	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction	Aluminium chlorohydrate (Megapac 23), sodium hydroxide, chlorine
Brim	Receives water from Warracknabeal WTP, booster disinfection	Chlorine
Charlton*	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction	Aluminium chlorohydrate (Megapac 23), chlorine
Dimboola*	Coagulation, flocculation, dissolved air flotation, filtration, chlorine, disinfection, pH correction	Sodium hydroxide, aluminium chlorohydrate (Megapac 23), chlorine
Donald	Receives water from St Arnaud WTP, booster disinfection	Chlorine
Edenhope*	Coagulation, flocculation, dissolved air flotation, filtration, desalination, chlorine disinfection	Aluminium chlorohydrate (Megapac 23), chlorine
Great Western*^	Microfiltration, chlorine disinfection, pH correction	Sulphuric acid, aluminium chlorohydrate (Megapac 23), sodium hydroxide, chlorine
Halls Gap*^	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction	Lime, aluminium sulphate (alum), polymer, chlorine
Hopetoun*	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction	Aluminium chlorohydrate (Megapac 23), chlorine

Water Sampling Localities	Treatment Processes	Chemicals that can be added
Horsham*	Powdered activated carbon dosing, coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction, fluoridation	Lime, aluminium chlorohydrate (Megapac 23), chlorine, carbon dioxide, hydrofluorosilicic acid
Jeparit	Receives water from Rainbow WTP, booster disinfection	Chlorine
Lake Bolac	Receives water from Willaura WTP	None additional to Willaura
Manangatang*	Coagulation, flocculation, dissolved are floatation, multimedia filtration, microfiber filtration (2 µm), chlorine disinfection	Ultrion 44560 coagulant, chlorine
Minyip	Receives water from Murtoa WTP, booster disinfection	Chlorine
Murtoa*	Coagulation, flocculation, dissolved air flotation, filtration, pH correction, chlorine disinfection	Sodium hydroxide, Aluminium chlorohydrate (Megapac 23), chlorine
Natimuk	Receives water from Horsham WTP, booster disinfection	Chlorine
Nhill	Receives water from Dimboola WTP, booster disinfection	Chlorine
Ouyen*	Coagulation, flocculation, dissolved air flotation, Microfiltration, chlorine disinfection, UV disinfection	Aluminium chlorohydrate (Megapac 23), chlorine
Pomonal	Receives water from Halls Gap WTP, booster disinfection	Chlorine
Quambatook*	Coagulation, flocculation, dissolved air flotation, filtration, granular activated carbon filtration, pH correction, chlorine disinfection	Aluminium chlorohydrate (Megapac 23), hydrochloric acid, chlorine
Rainbow*	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection	Aluminium chlorohydrate (Megapac 23), chlorine
Rupanyup	Receives water from Murtoa WTP, booster disinfection	Chlorine
Sea Lake	Receives water from Warracknabeal WTP, booster disinfection	Chlorine

Water Sampling Localities	Treatment Processes	Chemicals that can be added
St Arnaud*	Coagulation, flocculation, dissolved air flotation, filtration, pH correction, chlorine disinfection	Aluminium chlorohydrate (Megapac 23), sodium hydroxide, chlorine
Stawell*^	Coagulation, flocculation, dissolved air flotation, filtration, chlorine disinfection, pH correction	Lime, aluminium sulphate (alum), polymer, chlorine
Ultima	Received water treated at Swan Hill WTP by: coagulation, powdered activated carbon, clarification, media filtration, pH adjustment, chlorine disinfection, fluoridation.	Caustic soda, powdered activated carbon, aluminium chlorohydrate (Megapac 23), polymer, chlorine, fluoride.
Underbool*	Clarified water from Ouyen, coagulation, flocculation, sand filters, pH correction, chlorine disinfection, UV disinfection	Ultrion 44560 coagulant, chlorine
Warracknabeal*	Coagulation, flocculation, dissolved air flotation, filtration, pH correction, chlorine disinfection	Lime, aluminium chlorohydrate (Megapac 23), chlorine
Willaura*	Coagulation, flocculation, dissolved air flotation, microfiltration, pH correction, disinfection by chloramination	Soda ash, calcite, aluminium chlorohydrate (Megapac 23), sodium hypochlorite, carbon dioxide, ammonia
Woomelang	Receives water from Warracknabeal WTP, booster disinfection	Chlorine
Wycheproof	Receives water from Charlton WTP, booster disinfection	Chlorine

^ Operated by Trility under a BOOT Contract
** Localities with a Water Treatment Plant*

Table 2-2 - Water Treatment Processes and Chemicals in Regulated Towns.

Water Supply	Treatment Processes	Chemicals used in Treatment
Berriwillock	Coagulation	PolyDADMAC
Culgoa	Coagulation	PolyDADMAC
Glenorchy	Coagulation	PolyDADMAC
Elmhurst*	Coagulation, flocculation, dissolved air flotation, filtration, granular activated carbon filtration, pH correction, chlorine disinfection	Aluminium chlorohydrate (Megapac 23), polymer, calcite, chlorine
Jung	Coagulation, disinfection	PolyDADMAC, chlorine
Lalbert	Coagulation, disinfection	PolyDADMAC, chlorine
Marnoo	Coagulation	PolyDADMAC
Murrayville	Disinfection	Chlorine
Nandaly	Coagulation, flocculation, dissolved air flotation (at Ouyen)	Aluminium chlorohydrate (Megapac 23)
Nullawil	Coagulation	PolyDADMAC
Speed	Coagulation, flocculation, dissolved air flotation (at Ouyen)	Aluminium chlorohydrate (Megapac 23)
Tempy	Coagulation, flocculation, dissolved air flotation (at Ouyen)	Aluminium chlorohydrate (Megapac 23)
Walpeup	Coagulation, flocculation, dissolved air flotation (at Ouyen), disinfection (at Walpeup)	Aluminium chlorohydrate (Megapac 23), Chlorine
Watchem	Coagulation, disinfection	PolyDADMAC, sodium hypochlorite, hydrochloric acid

**Construction completed January 2024. Previously there was no treatment processes at Elmhurst.*

2.2 Water Treatment Changes

Ultima had been a regulated water town that was historically supplied untreated water from the Murray River. In 2023, construction of a pipeline connecting Swan Hill treated water to Ultima was completed. Swan Hill is a drinking water locality managed by Lower Murray Water. Treated water from Swan Hill is boosted with chlorine at Ultima, before being distributed to the town. GWMWater undertook commissioning, cleaning and flushing processes, followed by a comprehensive verification sampling program to confirm the water was safe for consumption. Ultima was officially declared a drinking water supply on 12 January 2024.

Elmhurst is a regulated water town that had been supplied untreated water from Hickmans Creek near Mt Cole. GWMWater has constructed and commissioned a new water treatment plant at Elmhurst, consisting of: coagulation and flocculation with aluminium chlorohydrate (Megapac 23); dissolved air flotation and filtration; granular activated carbon; calcite bed pH correction; and chlorine disinfection. The Elmhurst treated water tank and reticulation system has been cleaned and flushed, and a comprehensive verification sampling program to confirm the water was safe for consumption has been completed. Elmhurst is expected to be declared drinking water in the second half of 2024.

There were no water treatment changes that impacted existing treated water supplied for the 2023 to 2024 year.

2.3 Water Treatment Issues

Issues related to water quality that occurred in 2023/2024 include:

- *E. coli* detected in a compliance sample from the Stawell reticulation on 10 July 2023 (Section 22 report). Investigations found that it was a sampling error.
- Bushfire event leading to a 'do not drink' advisory for the locality of Pomonal being issued on 14 February 2024 (Section 22 report).

These issues are discussed further in the Section 10 Emergency, Incident and Event Management.

GWMWater's drinking water locality of Ultima receives treated water from Lower Murray Water from the locality of Swan Hill. Lower Murray Water had no relevant water treatment issues or water quality incidents for the locality of Swan Hill.

3 Drinking Water Quality Results

For the 2023/2024 year, the sampling frequency and drinking water quality standards for *Escherichia coli*¸ trihalomethanes and turbidity were as specified in Schedule 2 under the Regulations (Table 3-1).

Table 3-1 – Summary of sampling and 2023/2024 results to meet Schedule 2 under the Regulations.

Parameter	Sampling frequency	Benchmark compliance standard	All Standards met	Comments
Escherichia coli (*E. coli*)	Weekly	No *Escherichia coli* per 100 mL of drinking water, with the exception of any false positive samples.	Yes	All localities were compliant for the period. Refer to Section 3.1 for details.
Trihalomethanes (THM)	Monthly	Must not exceed 0.25 mg/L.	Yes	All localities were compliant for the period. Refer to Section 3.2 for details.
Turbidity	Weekly	95th percentile of results for samples in any 12 months must be ≤ 5.0 NTU.	Yes	All localities were compliant for the period. Refer to Section 3.3 for details.

A water sampling locality is defined under the Part 2 of the Regulations. Drinking water quality results are reported for each sampling locality. A water sampling locality is:

- A discrete area of similar water quality where collected samples represent the drinking water within that defined area.
- Able to be described by its boundaries.
- Inclusive of all consumers supplied with drinking water within that area.

The water sampling program is based on ADWG recommendations, specific risks, historical data and operational changes, from catchment to tap. The water sampling points are located within a water sampling locality and are designed to ensure that the samples collected are representative of the supply system. Samples are sent to a National Association of Testing Authorities (NATA) accredited laboratory for analysis. If a sample result is at the lower limit of detection the conservative approach outlined in Guidance – Drinking Water Quality Standards of adopting the detection limit without the less than qualifier is used in this report.

The sampling program is reviewed periodically and as risk changes to align with changes in the risk profile of each locality. The review of the sampling program involves risk assessing each parameter based on the frequency that it is expected to exceed limits at that location and the consequence of the parameter exceeding that limit. This is conducted over all regulated and drinking water systems from catchment to tap, and a conclusion made on the frequency of sampling required to appropriately manage identified risks. Any changes to the sampling program compared with the previous year are noted in Table 3-2.

Table 3-2 – Changes in water quality sampling frequency (2022/2023 compared with 2023/2024).

Parameter(s)	Town(s)	Change	Reason
Arsenic, Iron	Murtoa, Nhill	Quarterly to nil	Risk diminished due to length of time since had been supplied untreated bore water and historic results showing no concentrations of concern.
Metals	Stawell	Annual to nil	No metals of concern have been historically found in the raw or treated water. Sampling is being conducted biannually in the raw water.
E. coli, Turbidity, pH, Free Chlorine, Fluoride	Ultima	Implemented weekly	Declared a drinking water locality.
Aluminium, Electrical Conductivity, Trihalomethanes, Chloroacetic acids	Ultima	Implemented monthly	Declared a drinking water locality.
Lead	Ultima	Implemented quarterly	Declared a drinking water locality.
Hardness, Alkalinity	Ultima	Implemented annually	Declared a drinking water locality.

3.1 Escherichia coli (*E. coli*)

The health impacts and epidemiology of thermotolerant coliforms, and specifically *E. coli*, are described in detail in the ADWG fact sheet. *E. coli* is used as a specific indicator of faecal contamination and hence is a measure used to determine the drinking water safety. *E. coli* should not be detected in a sample of drinking water. If detected, immediate action is taken.

As required by the Regulations, at least one sample of drinking water is collected each week from each water sampling locality, with more samples per week for towns with populations over 5000 recommended. All samples of drinking water collected in any 12 months period must contain no *E. coli* per 100 mL. In the case that *E. coli* is detected, an investigation is conducted in accordance with Schedule 2 of the Safe Drinking Water Regulations 2015 to determine whether the result was representative of the drinking water in the relevant locality. A false positive sample is considered to have occurred where the water supplier can demonstrate that treatment and control systems were in place, and the detection is more likely be from an external factor such as laboratory or sampling error.

3.1.1 Results

E. coli sampling and analysis was undertaken at two sites weekly for the larger potable towns of Ararat, Horsham and Stawell, and weekly for all other smaller potable towns.

A sample from the locality of Stawell recorded 4 *E. coli*/100 mL on the 10 July 2023. The Department of Health (DH) was provided with a Section 22 report immediately and, following investigation, it was found the likely cause of the *E. coli* result was from sampling from a contaminated tap. There were no contributing factors to cause the *E. coli* result in accordance with (c)(i)(ii)(iii) and (iv) in Schedule 2 of the Regulations, thus the *E. coli* event was a false positive sample. Please refer to Section 10 Emergency, Incident and Event Management for further details.

All other samples met the standard for the reporting period (Table 3-3).

Table 3-3 – Results for Escherichia coli in Drinking Water: 1 July 2023 – 30 June 2024. All samples of drinking water collected in any 12 months period must contain no E. coli/100 mL, with the exception of any false positive samples.

Sampling Locality	Sampling Frequency	No. of Samples	Maximum (*Escherichia coli*/100 mL)	No. of samples where standard was not met (S 18)
Ararat*	Weekly (2)	104	0	0
Beulah	Weekly	52	0	0
Birchip	Weekly	52	0	0
Brim	Weekly	52	0	0
Charlton	Weekly	52	0	0
Dimboola	Weekly	52	0	0
Donald	Weekly	52	0	0
Edenhope	Weekly	52	0	0
Great Western	Weekly	52	0	0
Halls Gap	Weekly	52	0	0
Hopetoun	Weekly	52	0	0
Horsham*	Weekly (2)	104	0	0
Jeparit	Weekly	52	0	0
Lake Bolac	Weekly	52	0	0
Manangatang	Weekly	52	0	0
Minyip	Weekly	52	0	0
Murtoa	Weekly	52	0	0
Natimuk	Weekly	52	0	0
Nhill	Weekly	52	0	0
Ouyen	Weekly	52	0	0
Pomonal	Weekly	52	0	0
Quambatook	Weekly	52	0	0
Rainbow	Weekly	52	0	0
Rupanyup	Weekly	52	0	0
Sea Lake	Weekly	52	0	0
St. Arnaud	Weekly	52	0	0
Stawell*	Weekly (2)	104	4	0^
Ultima#	Weekly	24	0	0

Sampling Locality	Sampling Frequency	No. of Samples	Maximum (*Escherichia coli*/100 mL)	No. of samples where standard was not met (S 18)
Underbool	Weekly	52	0	0
Warracknabeal	Weekly	52	0	0
Willaura	Weekly	52	0	0
Woomelang	Weekly	52	0	0
Wycheproof	Weekly	52	0	0

** Due to the population size of these towns two samples are taken.*
^The E. coli reading was found to be false positive sample.
#Declared drinking water 12 January 2024

3.2 Trihalomethanes (THMs)

Trihalomethanes (THMs) are a disinfection by-product present in drinking water, principally as the result of a reaction between organic and inorganic material in the water with chlorine, and to a lesser extent chloramine.

Based on health considerations, the concentration of THMs, either individually or in total, in drinking water should not exceed 0.25 mg/L.

3.2.1 Results

THM sampling and analysis was undertaken on a minimum monthly basis for all drinking water localities.

All localities met the standard for this reporting period (Table 3-4).

Table 3-4 – Results for Trihalomethanes in Drinking Water: 1 July 2023 – 30 June 2024. The concentration of THMs must not exceed 0.25 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Ararat*	Monthly (2)	24	0.110	0.076	0
Beulah	Monthly	12	0.110	0.080	0
Birchip	Monthly	12	0.062	0.038	0
Brim	Monthly	12	0.120	0.081	0
Charlton	Monthly	12	0.094	0.070	0
Dimboola	Monthly	12	0.074	0.056	0
Donald	Monthly	12	0.100	0.078	0
Edenhope	Monthly	12	0.086	0.063	0
Great Western	Monthly	12	0.180	0.136	0
Halls Gap	Monthly	12	0.088	0.061	0
Hopetoun	Monthly	12	0.067	0.037	0
Horsham*	Monthly (2)	24	0.130	0.102	0
Jeparit	Monthly	12	0.094	0.057	0

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Lake Bolac	Monthly	12	0.011	0.007	0
Manangatang	Monthly	12	0.230	0.072	0
Minyip	Monthly	12	0.100	0.061	0
Murtoa	Monthly	12	0.076	0.062	0
Natimuk	Monthly	12	0.210	0.160	0
Nhill	Monthly	12	0.089	0.064	0
Ouyen	Monthly	12	0.150	0.095	0
Pomonal	Monthly	12	0.089	0.078	0
Quambatook	Monthly	12	0.220	0.183	0
Rainbow	Monthly	12	0.064	0.041	0
Rupanyup	Monthly	12	0.085	0.069	0
Sea Lake	Monthly	12	0.140	0.100	0
St. Arnaud	Monthly	12	0.083	0.065	0
Stawell*	Monthly (2)	24	0.085	0.062	0
Ultima#	Monthly	6	0.150	0.080	0
Underbool	Monthly	12	0.110	0.075	0
Warracknabeal	Monthly	12	0.130	0.080	0
Willaura	Monthly	12	0.011	0.006	0
Woomelang	Monthly	12	0.130	0.091	0
Wycheproof	Monthly	12	0.082	0.066	0

** Due to the population size of these towns two samples are taken every month.*
#Declared drinking water 12 January 2024

3.3 Turbidity

Turbidity is caused by the presence of very fine suspended matter, such as clay, silt, colloidal particles, plankton and other microscopic organisms in water. High turbidity can result in a water sample having a 'muddy' or 'milky' appearance.

Turbidity is a measurement of the light scattering property of water, and the degree of scattering is dependent on the amount, size and composition of the suspended matter.

The ADWG fact sheet contains a detailed account of turbidity and its implications for water supply. The Regulations require that the 95th percentile of results for samples in any 12-month period must not exceed 5 Nephelometric Turbidity Units (NTU). The ADWG also recommends turbidity should not exceed 5 NTU for aesthetic purposes.

3.3.1 Results

Turbidity sampling and analysis is undertaken as a minimum, on a weekly basis for all drinking water supplies.

All sites met the standard for turbidity for the reporting period (Table 3-5).

Table 3-5 – Results for turbidity in Drinking Water: 1 July 2023 – 30 June 2024. The 95th percentile of results for samples in any 12-month period must be less than or equal to 5.0 NTU.

Sampling Locality	Sampling Frequency	No. of Samples	Max (NTU)	Max 95th percentile in any 12 months (NTU)	No. of 95th percentile of results in any 12 months above standard (S 18)
Ararat*	Weekly (2)	104	0.8	0.2	0
Beulah	Weekly	52	0.6	0.3	0
Birchip	Weekly	52	0.2	0.2	0
Brim	Weekly	52	1.9	0.4	0
Charlton	Weekly	52	1.2	0.5	0
Dimboola	Weekly	52	0.2	0.2	0
Donald	Weekly	52	0.4	0.2	0
Edenhope	Weekly	52	1.1	0.4	0
Great Western	Weekly	52	3.1	0.2	0
Halls Gap	Weekly	52	0.8	0.4	0
Hopetoun	Weekly	52	1.0	0.3	0
Horsham*	Weekly (2)	104	2.0	0.3	0
Jeparit	Weekly	52	1.0	0.5	0
Lake Bolac	Weekly	52	0.2	0.2	0
Manangatang	Weekly	52	0.3	0.3	0
Minyip	Weekly	52	0.5	0.2	0
Murtoa	Weekly	52	0.3	0.6	0
Natimuk	Weekly	52	1.6	0.7	0
Nhill	Weekly	52	0.2	0.1	0
Ouyen	Weekly	52	0.6	0.1	0
Pomonal	Weekly	52	0.3	0.2	0
Quambatook	Weekly	52	0.9	0.3	0
Rainbow	Weekly	52	1.4	0.5	0
Rupanyup	Weekly	52	1.1	0.2	0
Sea Lake	Weekly	52	1.0	0.2	0
St. Arnaud	Weekly	52	0.8	0.3	0
Stawell*	Weekly (2)	104	0.2	0.2	0
Ultima#	Weekly	24	0.5	0.2	0
Underbool	Weekly	52	1.3	0.3	0
Warracknabeal	Weekly	52	0.3	0.2	0
Willaura	Weekly	52	0.2	0.4	0
Woomelang	Weekly	52	0.4	0.3	0
Wycheproof	Weekly	52	1.5	0.3	0

** Due to the population size of these towns two samples are taken every week.*
#Declared drinking water 12 January 2024. The 95th percentile given is from 12 January 2024 to 30 June 2024.

3.4 Other chemicals, pathogens, algal toxins or substance that may pose a risk to human health

Regulation 12(b) requires the water supplier to ensure that the drinking water supplied to customers does not contain any chemical, toxin, pathogen or other substance at the levels that may pose a risk to human health. The ADWG fact sheets contain a detailed account of other water quality standards and their implications for water supply.

3.4.1 Algal toxins, pesticides and radiological parameters

The sampling of algal toxins, pesticides and radiological parameters is risk-based. All tests of pesticides, algal toxins or radiological parameters in drinking water supplies were well within ADWG values.

3.4.2 Chlorine

Chlorine is used extensively as a disinfectant for drinking water supplies. The fact sheets in the ADWG provide a detailed account of the health impacts and other considerations relating to chlorine.

In addition to chlorine sampling in the reticulation, chlorine contact times are calculated for each drinking water town to ensure the water delivered to customers has sufficient disinfection. Critical alarms are adjusted at the WTP to meet this chlorine contact time and customer aesthetic expectations. Based on health considerations, the guideline value for chlorine in drinking water is 5 mg/L, the ADWG also gives general guidance that chlorine should be at least 0.2 mg/L at the end of the reticulation system. GWMWater aims to meet this guidance by providing adequate chlorine dose at the WTP.

3.4.2.1 Results

Free chlorine was measured in localities treated by chlorination, and total chlorine was measured in localities treated by chloramination systems. All results met the standard for the reporting period.

Table 3-6 - Concentrations of chlorine in Drinking Water for 1 July 2023 – 30 June 2024.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Ararat*	Weekly (2)	104	1.00	0.61	0
Beulah	Weekly	52	1.70	1.06	0
Birchip	Weekly	52	1.66	1.08	0
Brim	Weekly	52	1.50	0.89	0
Charlton	Weekly	52	1.10	0.51	0
Dimboola	Weekly	52	1.60	0.97	0
Donald	Weekly	52	1.10	0.67	0
Edenhope	Weekly	52	1.72	0.80	0
Great Western	Weekly	52	0.50	0.16	0

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Halls Gap	Weekly	52	1.40	0.99	0
Hopetoun	Weekly	52	1.60	1.01	0
Horsham*	Weekly (2)	104	1.70	0.93	0
Jeparit	Weekly	52	1.45	0.85	0
Lake Bolac (Total Chlorine)	Weekly	52	2.80	1.86	0
Manangatang	Weekly	52	1.60	1.07	0
Minyip	Weekly	52	1.19	0.83	0
Murtoa	Weekly	52	1.40	0.72	0
Natimuk	Weekly	52	1.42	0.76	0
Nhill	Weekly	52	1.40	0.84	0
Ouyen	Weekly	52	1.67	1.01	0
Pomonal	Weekly	52	1.30	0.53	0
Quambatook	Weekly	52	1.53	0.89	0
Rainbow	Weekly	52	1.64	1.04	0
Rupanyup	Weekly	52	1.20	0.81	0
Sea Lake	Weekly	52	1.65	1.04	0
St. Arnaud	Weekly	52	1.25	0.89	0
Stawell*	Weekly (2)	104	1.45	0.54	0
Ultima#	Weekly	24	1.74	1.27	0
Underbool	Weekly	52	1.68	1.12	0
Warracknabeal	Weekly	52	1.50	0.74	0
Willaura (Total Chlorine)	Weekly	52	2.20	1.80	0
Woomelang	Weekly	52	1.37	0.88	0
Wycheproof	Weekly	52	1.54	0.97	0

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

3.4.3 Fluoride

Fluoride is added to some water supplies to help protect teeth against dental decay. Based on health considerations, the concentration of fluoride in fluoridated drinking water supplies should not exceed 1.5 mg/L and Under s. 5 (3) of the *Health (Fluoridation) Act 1973*, fluoride added to drinking water must not result in an average optimum concentration of over 1 mg/L. A detailed description of fluoride and its implications in a water supply can also be found by reference to the ADWG.

GWMWater has four fluoridated water supplies, including Ararat, Horsham, Natimuk and Ultima. Fluoridation was installed at the Horsham WTP in November 2006 and Ararat WTP in August 2016. Natimuk receives treated water from Horsham. Ultima receives treated water from Swan Hill.

3.4.3.1 Results

The sampling of fluoride is based on ADWG recommendations, the Code of practice for fluoridation of drinking water supplies, risks, historical data and any operational changes.

The average fluoride concentration in Horsham (0.32 mg/L) and Natimuk (0.32 mg/L) for 2023/2024 was less than the Department of Health specified target of 0.9 mg/L. This was due to faults with the fluoride dosing system at Mt Zero WTP that supplies both Horsham and Natimuk, leading to the fluoride dosing being offline for prolonged periods of time. GWMWater has planned fluoride dosing plant renewals to be undertaken in 2025, which is expected to make the specified fluoride concentration target more achievable.

There was an interruption to fluoride dosing at Lower Murray Water's Swan Hill WTP which supplies Ultima, from 30 October 2023 to 9 November 2023, however this did not lead to a notable impact on the average fluoride concentration in the Ultima supply.

No water supplies exceeded the ADWG health-based guideline value for fluoride, and the average fluoride concentration delivered did not exceed 0.1 mg/L over the Department of Health specified target designated by the *Health (Fluoridation) Act 1973* (Table 3-7).

Table 3-7 - Fluoride Results in Drinking Water for 1 July 2023 – 30 June 2024. The total concentration of fluoride should not exceed 1.5 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	Specified Target Concentration (mg/L)	No. of samples where standard was not met (S 18)
Ararat*	Weekly (2)	104	0.96	0.88	0.9	0
Horsham*	Weekly (2)	104	0.80	0.32	0.9	0
Natimuk	Weekly	52	0.83	0.35	0.9	0
Ultima#	Weekly	24	0.90	0.83	0.8	0

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

3.4.4 Chloroacetic acids

Chloroacetic acids (monochloroacetic acid, dichloroacetic acid and trichloroacetic acid) are produced in drinking water as disinfection by-products (DBPs) of the reaction between chlorine and naturally occurring humic and fulvic acids. The fact sheets in ADWG provide a detailed account of the health impacts and other considerations relating to chloroacetic acids.

3.4.4.1 Results

The sampling of these parameters is based on ADWG recommendations, risks, historical data and any operational changes.

All samples for chloroacetic acids met the standard for the reporting period.

Table 3-8 - Concentrations of Monochloroacetic Acid in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of monochloroacetic acid should not exceed 0.15 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Results (mg/L)		No. of samples where standard was not met (S 18)
			Max	Average	
Great Western	Monthly	12	0.005	0.005	0
Ouyen	Quarterly	4	0.005	0.005	0
Ultima#	Monthly	6	0.005	0.005	0

#Declared drinking water 12 January 2024

Table 3-9 - Concentrations of Dichloroacetic Acids in Drinking Water of 1 July 2023 – 30 June 2024. The concentration of dichloroacetic acid should not exceed 0.1 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Results (mg/L)		No. of samples where standard was not met (S 18)
			Max	Average	
Great Western	Monthly	12	0.025	0.014	0
Ouyen	Quarterly	4	0.027	0.017	0
Ultima#	Monthly	6	0.012	0.007	0

#Declared drinking water 12 January 2024

Table 3-10 - Concentrations of Trichloroacetic Acids in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of trichloroacetic acid should not exceed 0.1 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Results (mg/L)		No. of samples where standard was not met (S 18)
			Max	Average	
Great Western	Monthly	12	0.095	0.062	0
Ouyen	Quarterly	4	0.031	0.020	0
Ultima#	Monthly	6	0.005	0.005	0

#Declared drinking water 12 January 2024

3.4.5 Ammonia, Nitrite, Nitrate and NDMA

Ammonia: Based on aesthetic considerations, ammonia in drinking water should not exceed 0.5 mg-NH_3/L. Presence of ammonia can increase nitrification (nitrite and nitrate formation).

Nitrite: Based on health considerations, the concentration of nitrite in drinking water should not exceed 3 mg-NO_2/L, equivalent to 0.913 mg N/L. Nitrite can be formed by nitrifying bacteria in reticulations of chloramination systems.

Nitrate: Based on health considerations, the concentration of nitrate in drinking water should not exceed 50 mg-NO_3/L, equivalent to 11.3 mg/L.

NDMA: Based on health considerations NDMA in drinking water should not exceed 0.0001 mg/L. NDMA forms when nitrates and nitrites are present and cross react with amines and can be a by-product of chloramination.

A detailed description of ammonia, nitrite, nitrate and NDMA and its implications in a water supply can be found by reference to the ADWG.

3.4.5.1 Results

Ammonia, Nitrite, Nitrate and NDMA were measured in the chloramination system of Willaura and Lake Bolac. The concentration of ammonia in both Willaura and Lake Bolac (Table 3-11) was above the ADWG aesthetic guideline value of 0.5 mg/L which is based on minimising corrosion in copper pipes and fittings. However, all results in these localities were below the ADWG stated threshold that ammonia is detectable in water of 1.5 mg/L; and there were no aesthetic water quality customer complaints for either Willaura or Lake Bolac. All the results for nitrite (Table 3-12), nitrate (Table 3-13) and NDMA (Table 3-14) met the standard for this reporting period.

Table 3-11 - Concentrations of Ammonia in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of Ammonia should not exceed 0.5 mg-NH_3/L (0.41 mg N/L).

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg N/L)	Average (mg N/L)	No of samples where standard was not met
Lake Bolac	Monthly	12	0.63	0.54	10
Willaura	Monthly	12	0.63	0.52	9

Table 3-12 - Concentrations of Nitrite in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of Nitrite should not exceed 3 mg-NO_2/L (0.913 mg N/L).

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg N/L)	Average (mg N/L)	No of samples where standard was not met (S 18)
Lake Bolac	Monthly	12	0.019	0.011	0
Willaura	Monthly	12	0.002	0.002	0

Table 3-13 - Concentrations of Nitrate in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of Nitrate should not exceed 50 mg-NO_3/L (11.3 mg N/L).

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg N/L)	Average (mg N/L)	No of samples where standard was not met (S 18)
Lake Bolac	Monthly	12	0.150	0.083	0
Willaura	Monthly	12	0.146	0.078	0

Table 3-14 - Concentrations of NDMA in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of NDMA should not exceed 0.0001 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No of samples where standard was not met (S 18)
Lake Bolac	Quarterly	4	0.000006	0.000005	0
Willaura	Quarterly	4	0.000004	0.000004	0

3.4.6 Arsenic

The concentration of arsenic should not exceed 0.01 mg/L in drinking water based on health consideration. Arsenic is naturally occurring element, which can be present in ground water and introduced into water through dissolution of minerals and ore from industrial effluent and atmospheric deposition.

A detailed description of arsenic and its implications in a water supply can be found by reference to the ADWG.

3.4.6.1 Results

The sampling of arsenic is based on ADWG recommendations, risks, historical data and any operational changes. All samples for arsenic met the standard for the reporting period (Table 3-15).

Table 3-15 - Concentrations of Arsenic in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of Arsenic should not exceed 0.01 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Edenhope	Monthly	12	0.002	0.002	0

3.4.7 Lead

Lead can be present in drinking water as a result of dissolution from natural sources, or from plumbing systems containing lead. Lead concentrations in drinking water can be reduced by conventional methods of water treatment using coagulants or lime softening.

Based on health considerations, the guideline value of lead in drinking water should not exceed 0.01 mg/L. The fact sheets in the ADWG provide a detailed account of the health impacts and other considerations relating to lead.

3.4.7.1 Results

The sampling of lead is based on ADWG recommendations, risks and historical data. All samples for lead met the standard for reporting period (Table 3-16).

Table 3-16 - Concentrations of Lead in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of lead should not exceed 0.01 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Ararat*	Quarterly (2)	8	0.001	0.001	0
Beulah	Quarterly	4	0.001	0.001	0
Birchip	Quarterly	4	0.002	0.001	0
Brim	Quarterly	4	0.001	0.001	0
Charlton	Quarterly	4	0.001	0.001	0
Dimboola	Quarterly	4	0.001	0.001	0
Donald	Quarterly	4	0.001	0.001	0
Edenhope	Quarterly	4	0.001	0.001	0
Great Western	Quarterly	4	0.001	0.001	0
Halls Gap	Quarterly	4	0.001	0.001	0
Hopetoun	Quarterly	4	0.001	0.001	0

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met (S 18)
Horsham*	Quarterly (2)	8	0.001	0.001	0
Jeparit	Quarterly	4	0.002	0.002	0
Lake Bolac	Quarterly	4	0.001	0.001	0
Manangatang	Quarterly	4	0.002	0.001	0
Minyip	Quarterly	4	0.001	0.001	0
Murtoa	Quarterly	4	0.001	0.001	0
Natimuk	Quarterly	4	0.001	0.001	0
Nhill	Quarterly	4	0.001	0.001	0
Ouyen	Quarterly	4	0.001	0.001	0
Pomonal	Quarterly	4	0.001	0.001	0
Quambatook	Quarterly	4	0.001	0.001	0
Rainbow	Quarterly	4	0.002	0.001	0
Rupanyup	Quarterly	4	0.001	0.001	0
Sea Lake	Quarterly	4	0.002	0.001	0
St. Arnaud	Quarterly	4	0.001	0.001	0
Stawell*	Quarterly (2)	8	0.001	0.001	0
Ultima#	Quarterly	2	0.001	0.001	0
Underbool	Quarterly	4	0.001	0.001	0
Warracknabeal	Quarterly	4	0.001	0.001	0
Willaura	Quarterly	4	0.001	0.001	0
Woomelang	Quarterly	4	0.002	0.001	0
Wycheproof	Quarterly	4	0.002	0.001	0

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

4 Aesthetic Parameters

Individual monitoring results for 2023/2024 that exceed the aesthetic guideline value set out in ADWG are highlighted in the tables in this section.

4.1 pH

The aesthetic parameter, pH is a measure of the hydrogen ion concentration of water. It is measured on a logarithmic scale from 0 to 14. A pH of seven is neutral, while a pH greater than seven is alkaline, and a pH less than seven is acidic.

The ADWG suggests that, based on the need to reduce corrosion and encrustation in pipework, drinking water should have a pH value between pH 6.5 and pH 8.5.

4.1.1 Results

Sampling and laboratory analysis for pH during the reporting period was undertaken on a weekly basis for all drinking water towns (Table 4-1).

There were 3.0% of results across all samples that did not satisfy the aesthetic guideline values set out in the ADWG. Continuous monitoring at the WTPs showed no deviations in critical control limits of pH. The pH varies in the reticulation due to reaction with the pipeline, particularly when water usage is low. There were no water quality complaints that could be associated with the pH of the water.

Table 4-1 - pH of Drinking Water for 1 July 2023 – 30 June 2024. pH value should be between pH 6.5 and pH 8.5.

Sampling Locality	Sampling Frequency	No. of Samples	Max pH	Min pH	Average pH
Ararat*	Weekly	104	7.8	7.2	7.5
Beulah	Weekly	52	9.0	6.8	7.2
Birchip	Weekly	52	7.2	6.2	6.7
Brim	Weekly	52	9.5	7.0	7.6
Charlton	Weekly	52	9.1	6.9	7.5
Dimboola	Weekly	52	7.7	6.8	7.3
Donald	Weekly	52	9.0	6.8	7.4
Edenhope	Weekly	52	8.3	7.4	7.9
Great Western	Weekly	52	7.9	7.3	7.6
Halls Gap	Weekly	52	7.7	7.0	7.3
Hopetoun	Weekly	52	7.6	6.6	6.9
Horsham*	Weekly	104	7.5	6.6	7.1
Jeparit	Weekly	52	10.0	6.5	7.0
Lake Bolac	Weekly	52	9.2	7.3	8.4
Manangatang	Weekly	52	7.6	6.8	7.3
Minyip	Weekly	52	9.3	7.0	7.3
Murtoa	Weekly	52	8.0	7.2	7.4

Sampling Locality	Sampling Frequency	No. of Samples	Max pH	Min pH	Average pH
Natimuk	Weekly	52	10.4	6.7	7.5
Nhill	Weekly	52	7.9	6.9	7.2
Ouyen	Weekly	52	8.1	7.4	7.7
Pomonal	Weekly	52	7.6	7.0	7.2
Quambatook	Weekly	52	8.2	7.2	7.7
Rainbow	Weekly	52	7.4	6.5	6.7
Rupanyup	Weekly	52	7.6	6.9	7.2
Sea Lake	Weekly	52	7.9	6.8	7.3
St Arnaud	Weekly	52	7.6	7.0	7.3
Stawell*	Weekly	104	7.8	7.1	7.4
Underbool	Weekly	24	8.1	7.2	7.5
Warracknabeal	Weekly	52	8.2	7.3	7.6
Willaura	Weekly	52	9.2	7.2	7.9
Woomelang	Weekly	52	8.5	7.2	7.4
Wycheproof	Weekly	52	8.2	6.8	7.3

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

4.2 Aluminium

Aluminium chlorohydrate (Megapac 23) is a coagulant used in water treatment to remove turbidity, natural organic matter (including colour), microorganisms and many inorganic chemicals. The coagulant is aluminium based, however, under normal operation, no aluminium is contained in the final drinking water.

As stated in the ADWG, based on aesthetic considerations, the concentration of acid-soluble aluminium in drinking water should not exceed 0.2 mg/L. There are no health-based guideline values set for aluminium at this time.

4.2.1 Results

The sampling of acid-soluble aluminium is based on ADWG recommendations, risks and historical data. The ADWG recommends acid-soluble aluminium should not exceed 0.2 mg/L for aesthetic purposes. A sample in Dimboola on 8 November 2023 exceeded the aesthetic guideline with 0.24 mg/L of acid-soluble aluminium. The water treatment process was working well at the time, and the most likely cause was historic floc sediment in the reticulation being stirred up. Flushing was undertaken and no customer complaints occurred related to aluminium. All other results from Dimboola for acid-soluble aluminium were below 0.1 mg/L. All other localities met the standard for acid-soluble aluminium in the reporting period (Table 4-2).

Table 4-2 – Aluminium acid-soluble in Drinking Water for 1 July 2023 – 30 June 2024. The concentration of Aluminium acid-soluble should not exceed 0.2 mg/L.

Sampling Locality	Sampling Frequency	No. of Samples	Max (mg/L)	Average (mg/L)	No. of samples where standard was not met
Ararat*	Monthly (2)	24	0.07	0.05	0
Beulah	Monthly	12	0.05	0.02	0
Birchip	Monthly	12	0.05	0.02	0
Brim	Monthly	12	0.03	0.02	0
Charlton	Monthly	12	0.05	0.02	0
Dimboola	Monthly	12	0.24	0.04	1
Donald	Monthly	12	0.08	0.02	0
Edenhope	Monthly	12	0.05	0.01	0
Great Western	Monthly	12	0.04	0.02	0
Halls Gap	Monthly	12	0.06	0.02	0
Hopetoun	Monthly	12	0.11	0.03	0
Horsham*	Monthly (2)	24	0.19	0.05	0
Jeparit	Monthly	12	0.03	0.01	0
Lake Bolac	Monthly	12	0.02	0.01	0
Manangatang	Monthly	12	0.01	0.01	0
Minyip	Monthly	12	0.02	0.02	0
Murtoa	Monthly	12	0.06	0.02	0
Natimuk	Monthly	12	0.13	0.05	0
Nhill	Monthly	12	0.16	0.04	0
Ouyen	Monthly	12	0.06	0.03	0
Pomonal	Monthly	12	0.02	0.02	0
Quambatook	Monthly	12	0.12	0.05	0
Rainbow	Monthly	12	0.03	0.01	0
Rupanyup	Monthly	12	0.02	0.01	0
Sea Lake	Monthly	12	0.03	0.02	0
St. Arnaud	Monthly	12	0.06	0.02	0
Stawell*	Monthly (2)	24	0.05	0.04	0
Ultima	Monthly	6	0.01	0.01	0
Underbool	Monthly	12	0.09	0.04	0
Warracknabeal	Monthly	12	0.07	0.04	0
Willaura	Monthly	12	0.01	0.01	0
Woomelang	Monthly	12	0.04	0.02	0
Wycheproof	Monthly	12	0.04	0.02	0

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

4.3 Hardness

Hardness is the sum of calcium and magnesium ions. Alkalinity is the sum of carbonate, bicarbonate and hydroxide content. High total hardness may be a problem for supplies reliant on groundwater. Surface waters can generally be expected to have acceptable values.

ADWG suggest that to minimise build-up of scale in hot water systems total hardness in drinking water should not exceed 200 mg $CaCO_3$/L. The ADWG discusses ramifications of hardness and what constitutes hard and soft water. Alkalinity has no independent ADWG guideline value.

4.3.1 Results

Hardness and alkalinity sampling and analysis was conducted annually for all drinking water towns and quarterly for Edenhope. Edenhope is supplied from groundwater bores, which commonly have higher hardness than surface waters. While this has no health implications, this can increase the level of scale and deposit build-up in customer's systems and can also increase the amount of soap and detergent required for cleaning. A sample on 5 October 2023 from Edenhope had a Hardness of 220 mg ($CaCO_3$)/L, exceeding the ADWG aesthetic guideline. Operation of reverse osmosis at Edenhope WTP led to both samples from Edenhope in 2024 having Hardness less than 100 mg ($CaCO_3$)/L. All other samples for hardness met the standard for the reporting period (Table 4-3).

Table 4-3 – Hardness and alkalinity of Drinking Water for 1 July 2023 – 30 June 2024. The concentration of hardness should be less than 200 mg/L. The ADWG sets no recommendation for Alkalinity.

Sampling Locality	Sampling Frequency	No. of Samples	Max Hardness (mg $CaCO_3$/L)	Max Alkalinity (mg $CaCO_3$/L)
Ararat*	Annually (2)	2	39	14
Beulah	Annually	1	22	10
Birchip	Annually	1	14	5
Brim	Annually	1	25	13
Charlton	Annually	1	22	13
Dimboola	Annually	1	13	8
Donald	Annually	1	21	15
Edenhope	Quarterly	4	220	150
Great Western	Annually	1	35	22
Halls Gap	Annually	1	30	7
Hopetoun	Annually	1	17	8
Horsham*	Annually (2)	2	26	9
Jeparit	Annually	1	17	7
Lake Bolac	Annually	1	21	18
Manangatang	Annually	1	32	23
Minyip	Annually	1	15	10
Murtoa	Annually	1	14	10
Natimuk	Annually	1	24	6

Sampling Locality	Sampling Frequency	No. of Samples	Max Hardness (mg $CaCO_3$/L)	Max Alkalinity (mg $CaCO_3$/L)
Nhill	Annually	1	14	8
Ouyen	Annually	1	78	48
Pomonal	Annually	1	30	7
Quambatook	Annually	1	180	130
Rainbow	Annually	1	22	12
Rupanyup	Annually	1	16	11
Sea Lake	Annually	1	30	12
St Arnaud	Annually	1	18	14
Stawell*	Annually (2)	2	36	14
Ultima#	Annually	1	40	28
Underbool	Annually	1	80	86
Warracknabeal	Annually	1	23	14
Willaura	Annually	1	16	14
Woomelang	Annually	1	25	12
Wycheproof	Annually	1	17	7

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

4.4 Electrical Conductivity

Electrical Conductivity (EC) is caused by inorganic salts and small amounts of organic matter that are dissolved in water. Electrical conductivity mostly comprises sodium, potassium, calcium, magnesium, chloride, sulphate, bicarbonate, carbonate, silica, organic matter, fluoride, iron, manganese, nitrate (and nitrite) and phosphate.

High EC values may be associated with excessive scaling in pipes, fittings and household appliances.

The ADWG sets a guideline value for Total Dissolved Solids (TDS) of 600 mg/L and approximates that the TDS is 0.64 times the electrical conductivity value. As it is more cost effective to monitor electrical conductivity than total dissolved solids, the analysis for compliance is based on electrical conductivity. The ADWG value for TDS is equivalent to an electrical conductivity of 940 µS/cm.

4.4.1 Results

Sampling for electrical conductivity was undertaken monthly. All samples for electrical conductivity met the standard for the reporting period (Table 4-4).

Table 4-4 - Electrical Conductivity (EC) of Drinking Water for 1 July 2023 – 30 June 2024. EC in drinking water should be less than 940 µS/cm.

Sampling Locality	Sampling Frequency	No. of Samples	Max (µS/cm)	Average (µS/cm)
Ararat*	Monthly (2)	24	220	189
Beulah	Monthly	12	127	108
Birchip	Monthly	12	137	97
Brim	Monthly	12	130	109
Charlton	Monthly	12	110	101
Dimboola	Monthly	12	100	95
Donald	Monthly	12	120	108
Edenhope	Monthly	12	870	697
Great Western	Monthly	12	200	188
Halls Gap	Monthly	12	150	131
Hopetoun	Monthly	12	150	104
Horsham*	Monthly (2)	24	140	117
Jeparit	Monthly	12	144	100
Lake Bolac	Monthly	12	140	127
Manangatang	Monthly	12	230	153
Minyip	Monthly	12	110	99
Murtoa	Monthly	12	100	97
Natimuk	Monthly	12	130	122
Nhill	Monthly	12	105	97
Ouyen	Monthly	12	290	213
Pomonal	Monthly	12	140	131
Quambatook	Monthly	12	793	679
Rainbow	Monthly	12	135	102
Rupanyup	Monthly	12	110	98
Sea Lake	Monthly	12	169	116
St Arnaud	Monthly	12	130	110
Stawell*	Monthly (2)	24	280	172
Ultima#	Monthly	6	340	233
Underbool	Monthly	12	375	231
Warracknabeal	Monthly	12	110	102
Willaura	Monthly	12	140	120
Woomelang	Monthly	12	142	109
Wycheproof	Monthly	12	164	110

** Due to the population size of these towns two samples are taken every sampling visit.*
#Declared drinking water 12 January 2024

5 Analysis of Results

5.1 Meeting Regulatory Sampling Requirements

To ensure that GWMWater meets its risk-based sampling program and requirements under the Safe Drinking Water Regulations 2015, GWMWater uses a Water Information System, supported by procedures, manual checks, and training. There were no issues with meeting the regulatory sampling requirements for the 2023/2024 reporting period.

5.2 Water Quality

Analysis of all water quality sample information, data and results of drinking water supplied for this reporting period (2023/2024) with the last two reporting periods, 2022/2023 and 2021/2022 is summarised in Table 5-1.

The concentration of ammonia in both Willaura and Lake Bolac was above the ADWG aesthetic guideline value of 0.5 mg-NH_3/L, as was the case in previous reporting periods. This ADWG value is based on minimising corrosion in copper pipes and fittings. All results in these localities were below the ADWG stated odour threshold for ammonia in water of 1.5 mg-NH_3/L, and there were no customer complaints due to the aesthetics of the water at either Willaura or Lake Bolac.

In 2023/2024, 3.0% of all pH samples did not meet the 6.5-8.5 range recommended in the ADWG. This was less than the previous year of 4.8% of samples that did not meet the recommended aesthetic range. The average pH in the reticulation of all localities was within the ADWG limits. Reaction with the reticulation pipes leads to variation in pH. There were no customer complaints that could be linked to pH at any locality.

The ADWG recommends aluminium acid-soluble should not exceed 0.2 mg/L for aesthetic purposes. A sample in Dimboola on 8 November 2023 exceeded the aesthetic guideline with 0.24 mg/L of acid-soluble aluminium. The water treatment process was working well at the time, and the most likely cause was historic floc sediment in the reticulation being stirred up. Flushing was undertaken and no customer complaints occurred related to aluminium. All other results from Dimboola for acid-soluble aluminium were below 0.1 mg/L.

Edenhope is supplied from groundwater bores, which commonly have higher hardness than surface waters. While this has no health implications, this can increase the level of scale and deposit build-up in customer's systems and can also increase the amount of soap and detergent required for cleaning. A sample on 5 October 2023 from Edenhope had a Hardness of 220 mg ($CaCO_3$)/L, exceeding the ADWG aesthetic guideline. Operation of reverse osmosis at Edenhope WTP led to both samples from Edenhope in 2024 having Hardness less than 100 mg ($CaCO_3$)/L.

Table 5-1 - Comparison of analysis of water quality results of drinking water supplied from 2021/2022 to 2023/2024.

Parameters	2021/2022		2022/2023		2023/2024	
	Localities supplied drinking water that met standard (%)	Customers supplied drinking water that met standard (%)	Localities supplied drinking water that met standard (%)	Customers supplied drinking water that met standard (%)	Localities supplied drinking water that met standard (%)	Customers supplied drinking water that met standard (%)
Escherichia coli	96.9	97.2	100	100	100	100
Trihalomethanes	100	100	96.9	99.1	100	100
Turbidity	100	100	100	100	100	100
Chlorine	100	100	100	100	100	100
Fluoride	100	100	100	100	100	100
Monochloroacetic acid	100	100	100	100	100	100
Dichloroacetic acid	100	100	100	100	100	100
Trichloroacetic acid	100	100	93.8	97.4	100	100
Ammonia	93.8	98.5	93.8	98.7	93.9	98.7
Nitrite	100	100	100	100	100	100
Nitrate	100	100	100	100	100	100
NDMA	100	100	100	100	100	100
Arsenic	100	100	100	100	100	100
Lead	100	100	100	100	100	100
pH*	34.4	42.6	59.4	81.4	75.8	86.8
Aluminium acid-soluble	96.9	99.7	100	100	97.0	97.1
Hardness	96.9	98.2	100	100	97.0	98.4
Electrical conductivity	100	100	100	100	100	100

* pH counted as not meeting targeted standard for the locality if multiple (≥2) exceedances occurred.

6 Complaints

6.1 Complaints and Responses

GWMWater's Customer Complaints and Disputes Policy recognises the customer's rights, including the right to complain. GWMWater systematically records all complaints in a register and investigates them to determine the cause and significance. Complaints response vary depending on the nature of the complaint but can include further customer consultation and corrective actions such flushing. Operational changes or capital improvements which optimise treated water quality may be implemented in response to customer complaints.

Table 6-1 and Table 6-2 summarises the complaints received during the reporting period for both drinking water and regulated water supplies, respectively.

Table 6-3 and Table 6-4 provide a detailed breakdown of the total number of complaints received from customers supplied with drinking and regulated water, respectively.

Table 6-1 – Drinking Water Quality Complaints comparison between 2021/2022 to 2023/2024.

Type of Complaint	Number of complaints			Comparison with previous reporting periods
	2021/2022	2022/2023	2023/2024	
Discoloured	35	37	45	22% increase.
Taste/Odour	10	9	7	Similar level of complaints.
Other	6	3	1	There are typically only scattered complaints categorised as other.
Total	51	49	53	Similar level of complaints.

Table 6-2 – Regulated Water* Quality Complaints comparison between 2021/2022 to 2023/2024.

Type of Complaint	Number of complaints			Comparison with previous reporting periods
	2021/2022	2022/2023	2023/2024	
Discoloured	51	28	46	64% increase due to a quality event at Culgoa.
Odour	23	10	22	120% increase due to a quality event at Culgoa.
Other	2	4	2	There are typically only scattered complaints categorised as other.
Total	76	42	70	67% increase due to a quality event at Culgoa.

** Regulated water is water that is not intended for drinking.*

6.2 Analysis of Issues

Over the 2023/2024 year the total number of customer complaints for drinking water was similar to the previous two reporting periods. Ararat received 22 complaints for dirty, coloured or white water, 6 more than the previous reporting period, mostly explaining the 22% increase in discoloured water complaints compared with 2022/2023. Between 12 and 15 of the complaints from Ararat were attributed to separate mains breaks throughout the year. Ararat has multiple pressure zones and contains aging reticulation assets. Combined, this can lead to deterioration in water quality, particularly if there is a change in system

flow such as from works or breaks on reticulation mains. GWMWater has a renewals program for replacement of aging assets such as drinking water reticulation mains and valves. Otherwise, there were no noticeable water quality complaints for any drinking water towns, with Horsham (6), Stawell (6), Edenhope (5) and Ouyen (4) being towns that received four or more complaints for the year. None of these towns had any underlying water quality issues, and complaints are generally resolved by consultation with the customer and flushing and testing of the reticulation.

Over the 2023/2024 year the total number of customer complaints for regulated water supplies increased compared with the previous reporting period. The increase in complaints was due to deterioration of water quality in the raw water storage at Culgoa, leading to 26 colour and odour complaints from Culgoa compared with 6 the previous year. Higher complaints at Nullawil (7) and Berriwillock (4) also occurred due to receiving some of the poor water from Culgoa storage. GWMWater resolved the water quality issues by turning over and recirculating the water in the Culgoa storage. Upgrades for the towns of Berriwillock and Culgoa to drinking water are in the planning phase.

Pimpinio had a higher level of complaints (7) due to the water in the reticulation system stagnating. This causes coloured and odorous water, which was resolved by turning the whole town reticulation water over by flushing. Kaniva had the next highest number of complaints (5) for smelly and coloured water. The Kaniva upgrade to drinking water is in project delivery phase. The only other towns with 4 or more complaints were Lalbert (4 complaints) impacted by dirty water coming from the Murray River, Harrow (4 complaints) as sections of the reticulation had stagnant water requiring flushing, and Patchewollock (4 complaints) related to dirty water at the terminal point of the water main. GWMWater conducts periodic flushing at selected locations to improve water quality and regular assesses priorities for water quality improvements for customers in our smaller towns as part of the overall water quality management objectives.

Table 6-3 - Water Quality Complaints for Drinking Water Towns.

Locality	Population	Number of Complaints			
		Colour	T&O^	Other	Total
Ararat	8,290	22			22
Beulah	300				
Birchip	810				
Brim	110				
Charlton	1,140			1	1
Dimboola	1,630	2			2
Donald	1,500		1		1
Edenhope	900	5			5
Great Western	270				
Halls Gap	930				
Hopetoun	650				
Horsham	17,260	4	2		6
Jeparit	530				
Lake Bolac	310				
Manangatang	290				
Minyip	500	1			1
Murtoa	910				
Natimuk	490	2			2
Nhill	2,270				
Ouyen	1,200	2	2		4
Pomonal	290				
Quambatook	240	2	1		3
Rainbow	650				
Rupanyup	450				
Sea Lake	750				
St Arnaud	2,430				
Stawell	6,480	5	1		6
Ultima*	180				
Underbool	230				
Warracknabeal	2,500				
Willaura	420				
Woomelang	200				
Wycheproof	710				
Total	55,790	45	7	1	53

^ *Taste and Odour (T & O).*

**Ultima was declared drinking water 12 January 2024. Only complaints after then are included as drinking water complaints.*

Table 6-4 - Water Quality Complaints for Regulated Supplies.

Locality	Population	Number of Complaints			
		Colour	Odour	Other	Total
Antwerp	20				
Apsley	210				
Berriwillock	170	3	1		4
Buangor	90	2	1		3
Chillingollah	10				
Chinkapook	30				
Cowangie	20				
Culgoa	90	13	13		26
Dooen	40				
Elmhurst	200	3			3
Glenorchy	120				
Goroke	310				
Harrow	160	4			4
Jung	100				
Kaniva	870	3	2		5
Kiata	40				
Lalbert	90	4			4
Lascelles	60				
Lillimur	50				
Marnoo	110				
Miram	20				
Moyston	220				
Murrayville	330	1			1
Nandaly	30	1			1
Nullawil	80	4	3		7
Patchewollock	90	3		1	4
Pimpinio	90		7		7
Serviceton	70				
Speed	60				
Streatham	100				
Tarranyurk	10				
Tempy	50				
Ultima	180				
Waitchie	10				
Walpeup	130				
Watchem	150	1			1
Westmere	20				
Wickliffe	70				
Yaapeet	70				
Total	4,560	42	27	1	70

**Ultima was declared drinking water 12 January 2024. Only complaints prior to then are included as regulated water complaints.*

7 Risk Management Plan Audit

A risk management plan audit was conducted by Viridis Consultants Pty Ltd in February 2023 in accordance with s. 11 of the *Safe Drinking Water Act 2003*. The period audited was from 1 January 2021 to 31 December 2022. Under s. 9 of the Act, the auditor determined that GWMWater:

- complied with the obligations imposed by section 7 (1) of the *Safe Drinking Water Act 2003*, and
- complied with the obligations imposed by section 8 (1) of the *Safe Drinking Water Act 2003*.

There were 12 opportunities for improvements identified in the audit which are summarised in Table 7-1.

Table 7-1 - Summary of audit actions and status.

OPPORTUNITY FOR IMPROVEMENT	PROPOSED ACTIONS	STATUS
Outline clearly the risk management activities/assessments/plans and strategies which are being implemented in the role as the Storage Manager, in relation to supply of water to a water supplier (e.g. Coliban Water and Wannon Water). This can be as a section in the Water Quality Management System and should reference the various risk management measures, monitoring and communication protocols, as relevant (but not limited to these). Consider any linkages and overlaps with GWMWater's Storage Manager role under the Water Act.	Allocate and define the storage manager role in line with the Act.	Completed
Document the step to verify accuracy of the process flow diagrams/schematics during reviews of the site-specific risk assessments and management plans, including the process for it (e.g. discussion with operators or field verification and signing off).	Outline in CMS/2166 Water Quality Management System the site-specific risk management process. Add additional relevant staff to the CMS document review process of the site-specific risk management plans.	Completed
Maintain attendance records for the risk team involved in risk assessments and risk assessment workshops to demonstrate that the composition reflects section 2.1 of the Water Quality Management System.	Review the participants and process of their involvement in risk assessments. This includes using the Site Management Plan process for consultation with operating staff at the front end of the risk assessments and then using the CMS document review process to include relevant additional staff in the site specific RMPs. Document in CMS/2166 Water Quality Management System.	Completed

OPPORTUNITY FOR IMPROVEMENT	PROPOSED ACTIONS	STATUS
Undertake refresher training for staff conducting treated water tank inspections on key aspects to be cautious of in relation to rainwater/vermin ingress potential.	Put a training pack together. Deliver to Regional meetings and link an instruction or the training presentation to the existing scheduled work orders. Include training on a list of regular key activity refreshers for Service Delivery staff.	Completed
Review the requirement for filter inspection frequency at every 12 months against the risk assessment done for missing a filter inspection (CMS 3024). Clarify need/justification for variations, as needed, in relevant documents (e.g. WTP Maintenance Plan, Filter Inspection Work Instruction).	Update CMS/32343 Filter Inspection Work Instruction and CMS/3558 Water Treatment Plant Maintenance Plan to reflect risk assessed frequency of inspections. Provide training on updated procedure. Update the work order schedule for filter inspection frequency.	Completed
Document the competency and/or training requirements for internal auditors of the Water Quality Management System.	Review training requirements for internal audits. Update CMS/3301 Drinking water internal audit procedure based on determined training requirements.	Completed
Review reference and use of 'Specification of water sampling localities and water sampling points - July 2006 published by DHHS - July 2006' in water sampling program documents (e.g. Selection of Water Sampling Sites Procedure, Water Quality Sampling Tap Site Locations spreadsheet, WQMS). This 2006 guidance note has been superseded by "Appendix A - Water Sampling Program 2015".	Update reference in CMS/2743 Selection of Water Sampling Sites Procedure. Complete an assessment of the number of sampling location requirements in drinking water reticulations based on updated procedure.	Completed
Review the Water and Wastewater Quality Sample Scheduling Procedure to include the actions/steps to undertake when an issue is identified with the monthly checks on compliance against the sampling schedule.	In CMS/3679 Water and Wastewater Quality Sample Scheduling Procedure, document the current process which includes conducting a risk assessment and notifying DH if necessary.	Completed
Discuss with the operators on record keeping requirements in relation to the pH and specific gravity testing undertaken onsite upon receipt of the coagulant.	Provide refresher of requirements for coagulant receival as per CMS/2672 Work Instruction - Water Treatment Chemical Delivery. Include this in a list of regular key activity refreshers for Water Treatment staff.	Completed
Review the Chemical Introduction Risk Assessment Form. AS4020 certification is for products and materials, chemicals may be better assessed against the ADWG	Update the reference in CMS/2004 Chemical Introduction Risk Assessment Form.	Completed

OPPORTUNITY FOR IMPROVEMENT	PROPOSED ACTIONS	STATUS
Chapter 8 guidance. Maintain AS4020 checks for products and materials.		
Review how the recent Chapter 5 of the ADWG Microbial Quality of Drinking Water may be considered within the "Methodology for the Quantification of Microbiological Hazards in Drinking Water Supplies work instruction" and update the work instruction accordingly as relevant.	Review CMS/3182 Methodology for the Quantification of Microbiological Hazards in Drinking Water Supplies work instruction to incorporate any relevant information from the updated ADWG.	Completed
Document the process undertaken to periodically verify land-use changes that can impact on the sanitary survey and vulnerability assessment outcomes.	GWMWater has an existing process of referral review under the Planning Act. Add steps to ensure water quality risks are considered in this process. Clearly document how information for any land use changes are fed into the Sanitary Survey.	Completed

Table 7-2 – Remaining opportunities for improvement from previous audit covering 28 March 2018 to 26 August 2020.

OFI	ACTIONS	STATUS
Track all risk reduction measures through from identification to completion. Identify a target completion date and a status for the required actions.	A tracking process is being implemented through TechnologyOne to track risk reduction measures.	GWMWater track risk reduction measures through regular review of external and internal audit actions, site management plan and identified high risks. A full module for managing risk in TechnologyOne is being commissioned.

8 Undertakings under Section 30 of the Act

There were no undertakings during the reporting period.

9 Regulated Water

Regulated water is water that is not intended for drinking, but which could reasonably be mistaken as drinking water. This could be the case when such water is, for example, delivered to households through a piped reticulation system.

Section 6 of the *Safe Drinking Water Act 2003* allows the Minister for Health to declare certain water as regulated. The Minister for Health declared rural water pipelines constructed at the time, other than the WMP, as regulated supplies in the Victorian Government Gazette No. S 36 on Monday 23 February 2009.

GWMWater must manage risks in relation to water that is not intended for drinking, as part of its normal business practices. GWMWater is required to:

- Prepare a Risk Management Plan for the regulated water.
- Ensure the Risk Management Plan contains the matters specified in Regulation 8 of the Safe Drinking Water Regulations 2015.
- Have the Plan audited by an approved auditor.
- Take all reasonable steps to minimise the likelihood of the water being mistaken as drinking water.
- Include a summary of the management activities for regulated water supply in the Annual Report.

GWMWater had a total of 39 towns supplied with water classified as 'regulated water' under Section 6 of the Act during the reporting period. The regulated water supplies are listed in Table 1-2.

Under Section 25 of the *Safe Drinking Water Act 2003*, water suppliers are required to report on the steps taken to make the public aware of regulated water (non-drinking water). GWMWater informs their customers in towns with a regulated water supply are advised of the water quality through:

a) 'Do not drink the water' symbol notices on their water bills, - four bills per annum.
b) Issue 'Untreated Water Supply' newsletters annually.
c) Provide 'Do not drink the water' signage/stickers to Local Government to place on publicly accessible taps in each town.
d) Provide information on GWMWater's website.

10 Emergency, Incident and Event Management

Water quality incidents are notifiable to Department of Health (DH) under Section 18 and 22 of the *Safe Drinking Water Act 2003*. Section 22 reports give DH an early warning notification of any known or suspected contamination, whereas Section 18 notifications are given when the water quality standard has not been met. For the year, in regard to drinking water localities, GWMWater:

- provided DH with no notifications for section 18 of the Safe Drinking Water Act 2003, and
- provided DH with two reports for section 22 of the *Safe Drinking Water Act 2003*.

10.1 Stawell detection of *Escherichia. coli* – section 22 report

A reading of 4 *E. coli*/100 mL was recorded in the Stawell locality on the 10 July 2023. GWMWater provided DH with a Section 22 report in response. Corrective actions were taken of a comprehensive sampling and flushing program, and an investigation carried out in accordance with Schedule 2 of the Safe Drinking Water Regulations 2015 to determine risk to public health.

The key findings from the incident response were:

- The sample tap was low to the ground, and the laboratory identified what appeared to be debris that entered the bottle during sampling, which was the most likely cause of the *E. coli* detection.
- There were no other issues with reticulation water quality.
- Samples taken in response to the *E. coli* detection, including re-sample of the incident sample tap, had expected chlorine residuals, and after taking a second series of samples to correct for a poor sample taken from a hydrant, the re-samples had no microorganisms detected.
- There were no issues at the treatment plant, and no tanks or no potential points of contamination were found in the system.

The investigation concluded there were no contributing factors in accordance with (c)(i)(ii)(iii) and (iv) in Schedule 2 to cause the *E. coli* results. The likely cause of the *E. coli* result was from non-representative contamination entering the sample bottle during sampling; thus the *E. coli* event was a false positive sample. GWMWater is looking to install dedicated sampling taps to reduce the risk of receiving non-representative sample results.

10.2 Pomonal bushfire – do not drink advisory and section 22 report

A bushfire passed through the township of Pomonal 13 February 2024 and burned 44 houses. GWMWater implemented an incident management team and was able to access the town on 14 February 2024. During the fire, some service leaks occurred, and meters were damaged destroying backflow prevention devices. Due to the leaks and emergency services

drawing large volumes of water from the reticulation there was risk of low pressure leading to ingress, particularly at locations without backflow prevention devices. At the time it was also not clear if fire retardant had been used, however it was later established that no retardant was used over the township. As a precautionary measure, GWMWater issued a do not drink advisory for the township on 14 February 2024 and provided Department of Health a Section 22 report. No non-compliance with the drinking water standards occurred during the event.

GWMWater kept residents informed of the do not drink advisory and maintained a drinking water trailer and bottled water in Pomonal until the advisory was revoked. All leaks and damaged meters were repaired 15 February 2024, reticulation flushing and cleaning of the Pomonal Clear Water Storage was conducted 16 February 2024, and sampling was conducted 17 and 18th of February 2024, which led to the do not drink advisory being revoked on 19 February 2024.

10.3 Bayindeen catchment bushfire – event management

Bushfires also occurred in the Bayindeen catchment area from 23 February 2024. The fire burned in the areas of Hickmans Weir that supplies the regulated town of Elmhurst; McLeods Creek that supplied the regulated town of Buangor; and Mt Cole Reservoir that, along with Like Fyans, supplies the Ararat Water Treatment Plant. GWMWater implemented an incident management team and monitored the fire's potential impact on GWMWater assets and supplies. In response to the fires, GWMWater conducted regular visual inspections of the catchments, increased water quality sampling, conducted selective harvesting and implemented physical barriers to minimise supply of dirty water The Bayindeen catchment bushfire did not lead to a reportable water quality incident.

11 Water Storage Manager

In addition to being a water supplier for the purposes of the Safe Drinking Water Regulations 2015, GWMWater is also a water storage manager. This arises when a water corporation owns reservoirs or major headworks assets that supply water to other water corporations that are water suppliers. Other water corporations may in turn use the water to supply drinking water to various localities.

GWMWater is a Water Storage Manager for some of the water used by Wannon Water and Coliban Water. To address GWMWater's obligations as a water storage manager a Memorandum of Understanding (MoU) exists between GWMWater and both these corporations.

GWMWater has developed a risk management framework for the headworks storages under its control and meet with Coliban Water and Wannon Water on an annual basis. The management role includes water quality monitoring for a suite of risk-based parameters with all analysis being conducted by a NATA accredited laboratory. These results are made available to the other water corporations as needed, who have access to monitoring data conducted by GWMWater in its role of water storage manager.

In management of reservoirs in the Wimmera catchment, GWMWater liaise with the Wimmera CMA, and liaise with the Glenelg Hopkins CMA for management of Rocklands and Moora Moora Reservoirs.

Table 11-1 – Summary of water supply systems and relevant GWMWater infrastructure.

Catchments	Source Water	Raw water storage area	Treatment*	Treatment Plant	Water Receivers
Lake Bellfield	Supply System 4, Wimmera Mallee Pipeline	N/A	N/A	N/A	Coliban Water
Waranga Western Channel	Waranga Basin	N/A	N/A	N/A	Coliban Water
Willaura Headwork (Mt William and Stoney Creek or bore field)	Glenthompson Pipeline	N/A	N/A	N/A	Wannon Water
Rocklands Reservoir	Pipeline	N/A	N/A	N/A	Wannon Water

* The water storage manager does not apply any drinking water treatment processes before supplying its water.

11.1 Coliban Water

GWMWater provides raw water to Coliban Water, which subsequently treats the water and supplies it to the localities of Wedderburn, Bridgewater, Inglewood, Borung, Korong Vale and Wychitella (Figure 11-1). In winter this water is sourced predominately from Supply System 4 of the WMP, which is fed from the Grampians Headworks, primarily Lake Bellfield. Between November and April, the raw water supply to Coliban Water can be

switched to the Waranga Basin via the Waranga Western Channel. The supply was from the Grampians Headworks at all times during the 2023/2024 period as there was sufficient capacity from Lake Bellfield and better water quality.

The catchment of Lake Bellfield is in the Grampians National Park and is a moderately protected surface water (category 3). Taylors Lake provides an emergency back-up source of supply to the WMP if Lake Bellfield water is unsuitable. The catchment of Taylors Lake includes inflow from the Grampians National Park and land utilised for farming. Taylors Lake can also receive water transfers from other reservoirs within the Grampians Headworks. Taylors Lake and the Waranga Basin are considered to be a poorly protected catchment (category 4).

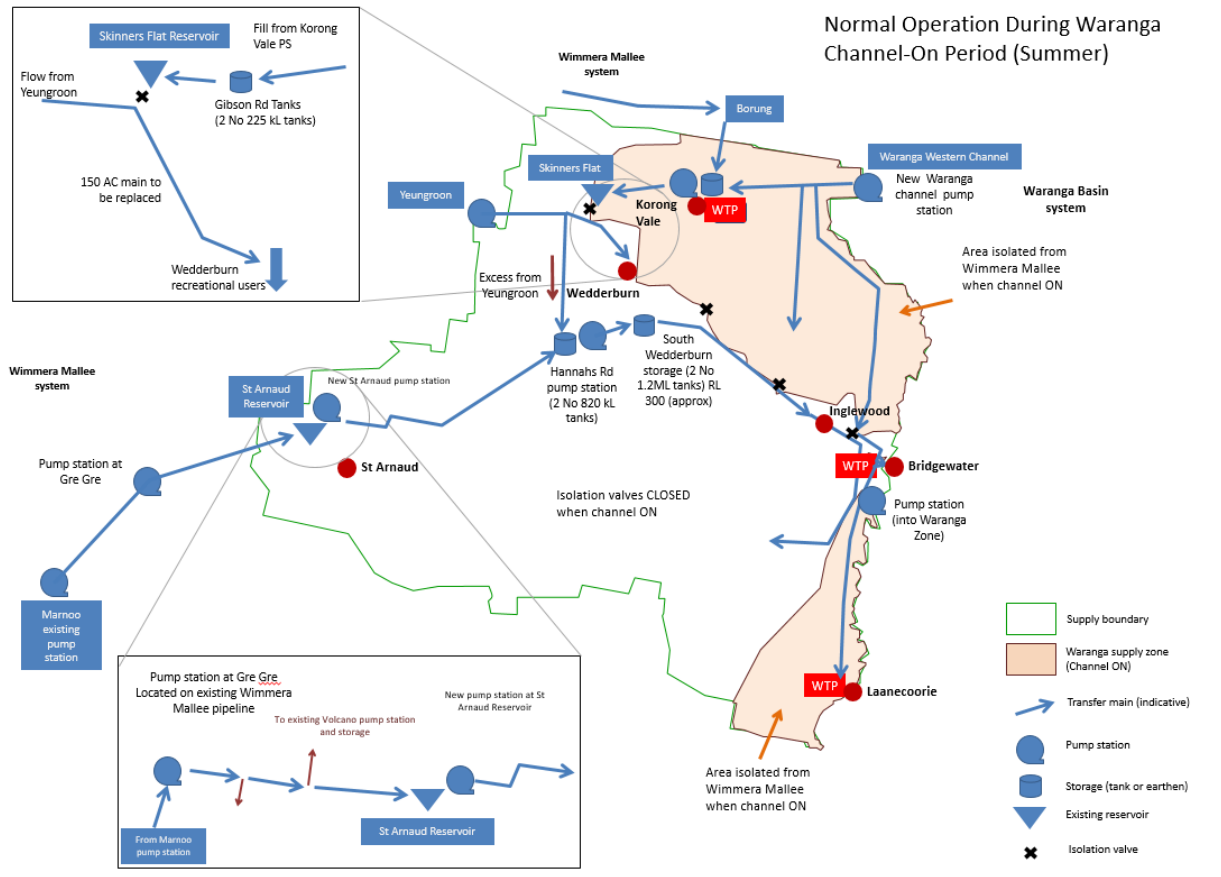

Figure 11-1 - Schematic showing supplies to Coliban Water from Bellfield and Waranga Western Channel (during summer).

11.2 Wannon Water

GWMWater delivers untreated water from the Willaura Headworks (Mt William and Stoney Creek) to Wannon Water through the Glenthompson Pipeline (Figure 11-2). Between the months of June and December, water supplied to Glenthompson is primarily from surface water diversion from unregulated waterways in the Grampians National Park. Groundwater bores supply water between January to May.

The bore water is considered a protected catchment (category 1), while the creeks deliver water from a moderately protected catchment (category 2). The overall catchment classification is category 2.

The water for Hamilton and Balmoral is taken directly from Rocklands Reservoir. Rocklands Reservoir is located between the Grampians National Park and Black Range State Park. The majority of the catchment is native forest; however, the storage is poorly protected (category 4).

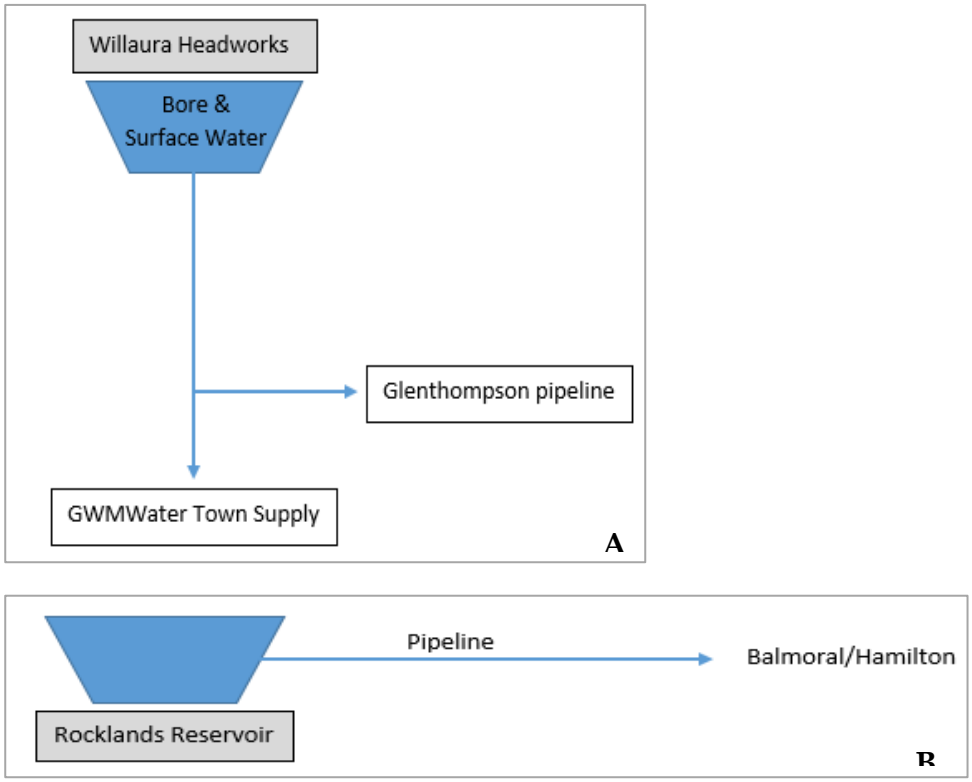

Figure 11-2 - Simplified schematic diagram showing supplies to Wannon Water from Willaura Headworks (A), and Rocklands Reservoir (B).

11.3 Water Storage Manager: Emergency, Incident and Event Management

The supply to Coliban Water was supplied through the Wimmera Mallee Pipeline from Lake Bellfield and not taken from the West Waranga Channel at any point for the year.

No incidents occurred for the Lake Bellfield supplied water.

No incidents occurred for the Rocklands Reservoir supplied water.

No incidents occurred for the Willaura Headworks supplied water.

12 Glossary of Terms

Terms and abbreviations used in this report have been collated into a Glossary to provide clarity.

Term/Abbreviation	Description
ADWG, 2011:	The Australian Drinking Water Guidelines provide a framework for the management of drinking water supplies designed to ensure safety at the point of use.
Alum:	Aluminium sulphate as used as a coagulant in the water treatment process.
BGA:	Blue Green Algae.
BOOT:	Build, Own, Operate and Transfer. A form of commercial contract associated with the provision of treated water at privately-owned water treatment plants.
Bore:	Conduit for extracting groundwater from an aquifer to the surface for use in a town water supply.
CCP:	Critical Control Point in the Risk Management Plan.
Chlorination:	Process of adding chlorine to water as a disinfectant.
Coagulation:	The clumping together of solids so they can more easily be settled out or filtered out of water. A chemical called aluminium sulphate (alum) or aluminium chlorohydrate (Megapac 23) is generally used to aid coagulation in water treatment.
Concentration:	A measure of how much of a given substance there is mixed with another substance (in this case water), usually expressed as a weight to volume, e.g. milligrams per litre (mg/L).
CWS:	Clear Water Storage.
DEEECA:	Department of Energy, Environment and Climate Action
DH:	Department of Health.
DBP:	Disinfection by-product – a reaction of natural organic material with the disinfectant medium producing by-products via reaction.
Disinfection-only	Water supplies that have disinfection as their only form of treatment.
Dissolution:	A form of chemical weathering in which water molecules, sometimes in combination with acid or another compound in the environment, attract and remove oppositely charged ions or ion groups from a mineral or rock.
Distribution system:	The system of pipes delivering water from the water treatment plant to the reticulation system.
Drinking water:	Legislatively defined as water intended for human consumption or associated with purposes for human consumption. Also known as a potable supply.
EC:	Electrical conductivity as measured in micro Siemens per centimetre (µS/cm).
Flocculation:	The water treatment process after coagulation that uses gentle stirring to cause suspended particles to form larger, aggregated masses (floc). The aggregates are removed from the water by a separation process (e.g. sedimentation, flotation, or filtration).
Fluoridation:	The act of adding fluoride to a water supply in accordance with the *Health (Fluoridation) Act 1973*.
Fully-treated water	Water supplies that have coagulation and filtration processes in addition to

supplies:	disinfection.
GWMWater:	Grampians Wimmera Mallee Water Corporation (trading as GWMWater).
Hardness:	Caused by the presence of calcium and magnesium ions in water and can contribute to scale build up in pipes and appliances.
HU:	Scientific units for true colour measurements – Hazen Units.
kL:	Kilolitre (1,000 L).
L:	Litre
Megapac 23:	Aluminium chlorohydrate as used as a coagulant in the water treatment process.
mg/L:	Scientific units for the concentration of a parameter given as milligrams per litre. Also known as parts per million (ppm).
ML:	Megalitre (1,000,000 L).
NATA:	National Association of Testing Authorities, Australia. National Accredited Testing Authority.
NMP:	Northern Mallee Pipeline drawing its water from the Murray River.
Notifications:	Pursuant to Sections 18 and 22 of the *Safe Drinking Water Act,* 2003.
NTU:	Scientific units for turbidity measurements – Nephelometric Turbidity Units.
Orgs/100 mL:	Organisms per 100 mL. A measure of the number of *E. coli*.
pH:	The measure of the concentration of hydrogen ions in a sample related to a logarithmic scale between 1 (acidic) and 14 (basic).
PS:	Pump Station.
Regulated water:	Water not intended for human consumption, but that could easily be mistaken as such. Also known as non-potable supply. This term is defined in the *Safe Drinking Water Act,* 2003.
Reticulation system:	The system of pipes delivering water to the customers tap from the entry point of the system.
RMP:	Risk Management Plan pursuant to the *Safe Drinking Water Act 2003*.
Safe Drinking Water Act, 2003:	Legislative framework for assuring drinking water quality in Victoria.
Safe Drinking Water Regulations, 2015:	Regulations made subsequent to the *Safe Drinking Water Act 2003* that give effect to key aspects of the Act.
Sampling:	The process of collecting a representative amount of water to analyse and compare against the ADWG Standards.
T&O:	Taste and odour.
THMs:	Trihalomethanes – disinfection by-products formed when using chlorine as a disinfectant. Take the form of trichloromethane, bromodichloromethane, dibromochloromethane and tribromomethane.
Undertakings:	Legally binding commitment made pursuant to Section 30 of the *Safe Drinking Water Act,* 2003.
WMP:	Wimmera Mallee Pipeline.
WTP:	Water treatment plant.
95th Percentile:	The value for which 95 percent of the time the data is below.

13 References

a) **Australian Drinking Water Guidelines 2011**, National Health and Medical Research Council, Canberra, 2011

b) ***Safe Drinking Water Act 2003*** (Act No. 46/2003), 11 June 2003, Parliament of Victoria.

c) **Safe Drinking Water Regulations 2015** (S/R No. 88/2015), 18 July 2015, Parliament of Victoria.

d) ***Health (Fluoridation) Act 1973***, (Act No. 8506/1973), 1 July 1973, Parliament of Victoria.

e) **Code of Practice for fluoridation of drinking water supplies**, Second edition, Department of Health and Human Services, Victoria, 2018.

f) **Guidance – Drinking Water Quality Standards,** Department of Health and Human Services, Victoria, 2015.