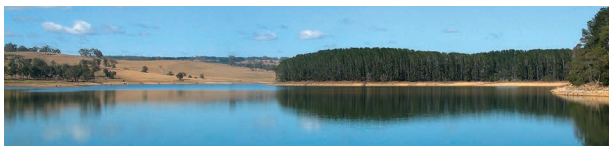
Coliban WATER



2020/2021
Safe Drinking Water Act 2003
ANNUAL REPORT

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Contents

1 Overview

This report, to the Secretary to the Department of Health (DH), has been prepared to satisfy the annual reporting requirement under Section 26 of the *Safe Drinking Water Act 2003 (*the Act), for Coliban Water, as a Water Supplier, to produce an annual water quality report.

Coliban Water is one of the major urban water corporations in Victoria. Led by our vision of *Water to Live, Grow and Enjoy*, we manage, maintain and operate 35 reservoirs and water storage basins across North-Central Victoria, and provide water and wastewater services to rural and urban customers across an area of 16,550 square kilometres (Figure 1).

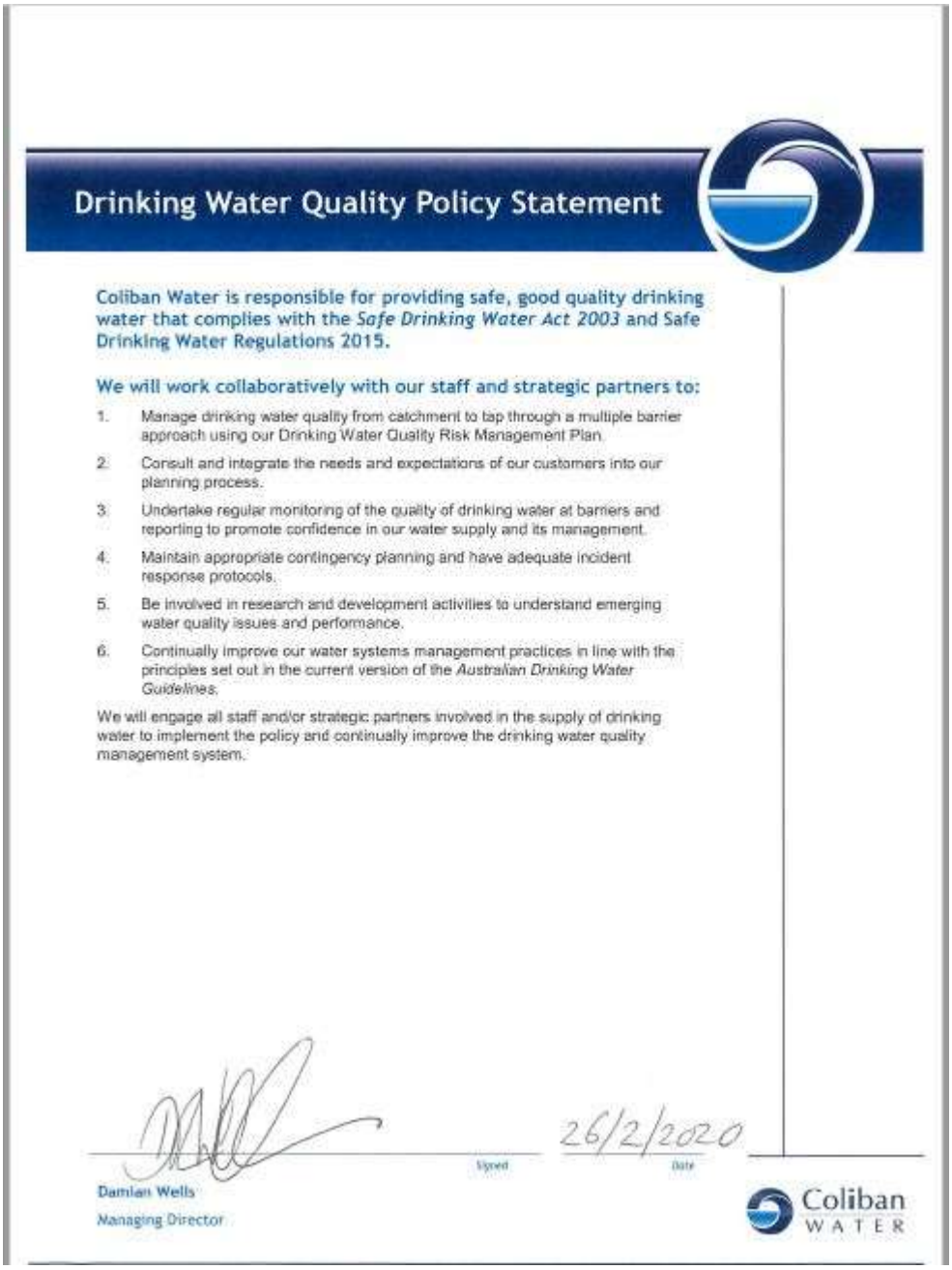
Our service region includes 49 towns, extending from Cohuna and Echuca in the north, to Kyneton and Trentham in the south. The western boundary incorporates Boort, Wedderburn, Bealiba and Dunolly, and the eastern boundary includes Heathcote and Tooborac.

Raw water is sourced from eight individual water supply systems: the Coliban, Campaspe, Wimmera, Loddon, Goulburn and Murray River systems, and two groundwater sources. Coliban Water has 19 water treatment plants (WTP's), providing drinking water to 42 separate water sampling localities. We also have seven regulated water supply systems.

Figure 1: Coliban Water Service Region

Coliban Water is committed to the provision of safe drinking water as outlined in our Drinking Water Quality Policy Statement. As a minimum this policy statement is reviewed every two years.

Our Drinking Water Quality Policy Statement is as follows:



Drinking Water Quality Policy Statement

Coliban Water is responsible for providing safe, good quality drinking water that complies with the *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015.

We will work collaboratively with our staff and strategic partners to:

1. Manage drinking water quality from catchment to tap through a multiple barrier approach using our Drinking Water Quality Risk Management Plan.
2. Consult and integrate the needs and expectations of our customers into our planning process.
3. Undertake regular monitoring of the quality of drinking water at barriers and reporting to promote confidence in our water supply and its management.
4. Maintain appropriate contingency planning and have adequate incident response protocols.
5. Be involved in research and development activities to understand emerging water quality issues and performance.
6. Continually improve our water systems management practices in line with the principles set out in the current version of the *Australian Drinking Water Guidelines*.

We will engage all staff and/or strategic partners involved in the supply of drinking water to implement the policy and continually improve the drinking water quality management system.

26/2/2020

Signed Date

Damian Wells
Managing Director

Coliban WATER

1.1 Characterisation of the System

Coliban Water operates various types of water supply systems, Bendigo, Castlemaine and Kyneton are supplied with water harvested from headwork reservoirs on the Coliban River (Upper Coliban, Lauriston and Malmsbury Reservoirs) that are managed by Coliban Water. Water is transported to Bendigo and Castlemaine by open channel and stored in the Sandhurst and McCay Reservoirs, respectively, which are both off-stream storages managed by Coliban Water. Water for Kyneton is supplied via a pipeline direct from Lauriston Reservoir. The three water treatments plants (WTPs) servicing these areas are owned and operated by Bendigo Water Services Pty Ltd (Veolia Water), and treated water is supplied to Coliban Water under a 25-year contract, which commenced in 2001.

Supply to Bendigo is supplemented by water from both Lake Eppalock (a major reservoir on the Campaspe River, managed by Goulburn-Murray Water) and the Waranga Western Channel (Goulburn System, also managed by Goulburn-Murray Water).

WTPs servicing the other 16 systems are owned by Coliban Water and are operated by Lendlease. Lendlease operate the WTPs under an operations and maintenance service contract, which commenced 1 July 2013.

Two of these systems rely on groundwater supplies, and the other systems receive raw water by diversions from either water courses, irrigation channels or pipelines directly managed by Coliban Water, or managed by Grampians Wimmera Mallee Water or Goulburn-Murray Water, as bulk water suppliers to Coliban Water. For the purposes of the Act, Grampians Wimmera Mallee Water and Goulburn-Murray Water are water storage managers for Coliban Water. The water storage managers work closely with Coliban Water, communicating raw water data regularly, with direct contact when issues are identified, enabling water treatment plant operators to be prepared for managing the changes to raw water.

All raw water supplied to Coliban Water's water treatment plants is sourced from open catchments. All identified catchment risks are included in the risk register that forms part of Coliban Water's Drinking Water Quality Risk Management Plan, and they are managed as required.

The Safe Drinking Water Regulations 2015 requires water suppliers to detail the methodology used to quantify microbial hazards in source waters. Coliban Water has applied the Microbial Health Based Targets manual, developed by Water Services Association of Australia (WSAA), to meet this requirement. This work required all catchments supplying water to water treatment plants to be assessed, together with analysis of raw water data, to identify the appropriate source water category. Each source water category has an associated level of potential pathogen risk that the water treatment plants need to manage. The processes at each water treatment plant are then aligned with the source water category to identify the level of pathogen risk post treatment.

The information from the catchment/source water/treatment plant review enables Coliban Water to identify which of its water treatment plants and their processes may require enhancement to manage the potential pathogen risk in the source water. Where a potential pathogen risk has been identified, options to reduce the risk are assessed, which can result in a treatment plant upgrade, or asset modifications. All of our water treatment plants have critical control points throughout the process, which will firstly alarm the operators if outside the required range, and then stop the process if certain critical limits are exceeded.

Coliban Water also supplies seven townships with water that is classified as Regulated Water, as detailed in Section 6 of the Act (see part 7 of this report for more details). Regulated Water is water that is not intended for drinking, but which could be reasonably be mistaken as drinking water.

1.2 Source Water Protection

Coliban Water works in partnership with the North Central Catchment Management Authority, local government, Goulburn Murray Water, Grampians Wimmera Mallee Water and Landcare Groups to address issues affecting water quality in the catchments (Coliban, Campaspe, Loddon, Wimmera and Murray River catchments) from where drinking water is sourced.

Our catchments and operational areas are closely managed to ensure we monitor our land for fire and tree hazards, manage our pest plant obligations, whilst also protecting water quality in our storages. We also work to enhance river health and support biodiversity across our lands and catchments.

Through our fire hazard management programs, we take a proactive approach to reducing fuel loads to minimise risks to adjacent landowners, high value assets, as well as public areas. We have undertaken a fuel load and fire assessment at our Coliban River Storages this year to help inform management actions. We also work collaboratively with other agencies through regional forums to prepare for upcoming and future fire seasons.

Coliban Water engages with Traditional Owner enterprises such as Djandak (Dja Dja Wurrung Enterprises Pty Ltd) to deliver land and natural resource management outcomes on Country and identify opportunities to work together collaboratively. This includes sensitively managing access to areas around the storages and across sites that contain cultural heritage.

Since the release in February 2015 of our *Drinking Water Storages and Land Management Plan*, numerous Catchment Works Agreements have been entered into with adjoining landowners, effectively removing stock access from adjoining private property to raw water supplies around the Malmsbury and Upper Coliban Reservoirs. Negotiations with landowners with respect to fencing at Lauriston Reservoir are ongoing, with positive progress being made towards the protection of water quality from Catchment to Tap.

We are responsible for providing statutory and strategic land use planning engagement with municipalities where sewerage is not connected, and we are a determining referral authority under section 55 of the *Planning and Environment Act 1987*. As part of our role in special water supply catchments, declared under the *Catchment and Land Protection Act 1994*, we provided responses to planning permit applications referred to us by local government under clause 66.02-5 – 'Special Water Supply Catchment' of the Victorian Planning Provisions and relevant municipal planning schemes.

Our responses provide support to local government, by recommending conditions to applications for the use and development of privately-owned land in open water supply catchments, so as to ensure minimal impacts on the quality and quantity of water available to the environment and for use in water supply to the townships that we service. We have, on occasions, objected to the issuing of a planning permit, where we consider there is potential for adverse impacts.

In September 2017, Department of Environment, Land, Water and Planning (DELWP) released a Statewide Framework for Catchment Partnership Agreements. The purpose of Catchment Partnership Agreements is to strengthen coordination, collaboration and accountability, reduce duplication, and provide clarity on roles and responsibilities between key catchment management partners. Coliban Water is a partner organisation, established through the Catchment Partnership Agreement, which was signed in June 2018 with the North Central Catchment Management Authority (North Central CMA) and other partner organisations. Our ongoing role as a partner organisation has seen our continued participation on the regional Catchment Partnership Forum and provided us representation on the Steering Committee convened by North Central CMA for the renewal of the North Central Regional Catchment Strategy.

The Memorandum of Understanding (MoU) between Coliban Water and North Central CMA was reviewed and an updated 2020-21 Action Plan that supports the Coliban Water – North Central CMA MoU formulated. The MoU enables the protection and/or enhancement of the beneficial uses of catchment areas and the environment, with a focus on risks to water security from climate change and land-use change. A key action outlined in the MoU addendum Action Plan was the continued development and implementation of the Upper Coliban Catchment Integrated Catchment Management Plan (ICMP).

The ICMP was developed from work that commenced in 2015/16, in response to various threats facing the Upper Coliban Catchment (UCC). Through active participation by a range of stakeholders, including landholders within the catchment, local Landcare groups, local and Victorian government agencies, and Goulburn-Murray Water, the ICMP is a comprehensive analysis of the benefits and costs of protecting and enhancing the UCC. The ICMP is a key step in the delivery of safe drinking water supply and a key principle of 'Catchment to Tap' multi-barrier approach for the production of safe drinking water.

The ICMP will enable the provision of a safe and secure water supply for communities in central and northern Victoria, along with enhanced river, biodiversity and catchment health outcomes. The ICMP has a 20-year horizon, and has been developed around three specific, measurable, achievable, realistic and time-bound goals which address future development pressures, waterway protection and habitat connectivity goals.

Delivery and implementation of the ICMP is through a Coliban Water and North Central CMA partnership program, now entering its third year of operation, called 'A Healthy Coliban Catchment' (AHCC). The program involves a range of on-ground actions (stock exclusion from waterways, riparian regeneration and revegetation, willow removal) and strategic planning through municipal planning scheme amendments and the development of Environmental Significance Overlay controls to protect and enhance source water supplies.

Over 2020/21, COVID-related restrictions impacted upon the delivery of on the ground works. With work crews being restricted, the program delivered a decrease on the previous reporting period of on-ground works, as outlined through the AHCC Annual Works Plan, including 1.5 kilometres of riparian fencing, two off-stream watering points, 32 hectares of weed management and 30 hectares of revegetation across the UCC. Increased targets are being planned for 2021/22, with landholder agreements put in place over the preceding six months. So far, the program has seen a total investment in the on-ground works of 48km of stream-front fencing, 97 off stream watering systems installed, 354 ha of weed control and 102 ha of revegetation.

The 2019 Social Benchmarking survey undertaken under the AHCC banner presented evidences that supported the conclusion that the UCC is a multifunctional landscape; that is, there is a mix of values that shape the land use and management practices of rural landowners in the UCC. It seems likely that agriculture is an important element of the appearance and condition of the UCC, however, other values, such as amenity (e.g. recreation and aesthetic) and conservation, are likely to be more important for most UCC landowners. We also continued to support projects, such as the DELWP Planning for Melbourne's Green Wedges and Agricultural Land, which encompasses all of the Upper Coliban Catchments.

The AHCC has initiated a partnership with Macedon Ranges Shire Council supporting their delivery of a Regenerative Grazing Workshop and short course, and landholder information sessions. We also continue to support the project, Health Landscapes-Practical Regenerative Agricultural Communities.

Catchment water quality monitoring continues in conjunction with the AHCC program, and this is being complemented with a Healthy Coliban Citizen Science water quality monitoring program, being delivered by North Central CMA. All this information will provide long-term trends to assist Coliban Water better understand the catchment.

The delivery of catchment works, through partnerships between water corporations and catchment management authorities, is a key element of the Our Catchments, Our Communities policy framework, which is a state-wide strategy for integrated catchment management in Victoria.

The catchment works are also helping to achieve outcomes against key elements of the Victorian Water Management Strategy, with respect to implementing and maintaining on ground works, and managing environmental water in priority waterways, fostering strong community partnerships and using regulations (legislation and statutory processes), such as including amendments to planning schemes, for improved catchment outcomes. These works are not only a priority for Coliban Water, but also align with the North Central Waterway Strategy 2014-2022 priority assets approach. Feedback provided by DELWP to North Central CMA noted the positive impacts the delivery of priority on ground works provided to the catchment community, and detailed their continued support for future works funding.

Djandak (Dja Dja Wurrung Enterprises Pty Ltd) are supported by the AHCC through funded inclusion on the Technical Working Group that support AHCC, and they have direct input into the development of the Annual Works Plan. The Healthy Coliban Catchment program continues to provide support to Dja Dja Wurrung to participate in the planning and management of waterways, and develop culturally-informed management objectives.

1.2.1 Raw Water Monitoring Parameters

The following table details the parameters for which monitoring is undertaken in all the raw water sources from which water is extracted, treated and then supplied as drinking water. The program is reviewed every year (or more frequently, depending on seasonal conditions). All monitoring is performed by an independent National Association of Testing Authorities, Australia (NATA)-accredited laboratory.

The raw water monitoring is conducted for the purposes of managing risks to the water treatment process. The sampling frequency for each parameter can vary depending on the identified risk for the different raw water e.g. *E. coli* is sampled weekly for some locations and monthly for others. The data from the raw water monitoring program does not represent the quality of drinking water supplied to customers.

Table 1: Raw Water Monitoring Parameters and Frequency

Group	Parameter	Sampling Frequency[1]
Bacteria	Coliforms	Weekly September to April and, monthly remainder of year or Monthly or Quarterly
	E. coli	Weekly, Weekly September to April and, monthly remainder of year, Fortnightly, Monthly or Quarterly
	Enterococci	Weekly, Fortnightly or Monthly
Protozoa	*Cryptosporidium*	Weekly, Fortnightly or Monthly
Physical and chemical	pH	Weekly September to April and, monthly remainder of year or Monthly or Quarterly
	Turbidity	
	Colour	
	Electrical conductivity	
	Alkalinity	Quarterly
	Hardness	
Inorganic	Arsenic	Quarterly
	Cadmium	
	Chromium	
	Cyanide	
	Mercury	
	Nitrate	
	Selenium	
	Sodium	
	Sulphate	
	Chloride	
	Antimony	
	Barium	Quarterly or Annually
	Boron	
	Beryllium	
Organic	MIB	Weekly or Fortnightly September to April and, monthly remainder of year or Monthly September to April, or Monthly or Fortnightly
	Geosmin	
	TOC (Total Organic Carbon)	Monthly or Quarterly
Corrosion Products	Iron	Fortnightly or Monthly or Quarterly
	Manganese	
	Copper	Quarterly
	Lead	
	Zinc	
	Nickel	
Cyanobacteria (Blue Green Algae)	BGA count	Weekly – September to April, monthly remainder of the year or Fortnightly – September to April, monthly remainder of the year
	BGA ID	
	Biovolume	
Bromide	Bromide	Monthly
Fluoride	Fluoride	Quarterly
Nutrients	Total phosphorus	Weekly September to April and, monthly remainder of year
	Total nitrogen	
Organic (Pesticide/Herbicides)	MCPA	Six monthly or Annual
	2,4-D	
	Chlordane	
	DDT (total isomers)	
	Dieldrin	
	Aldrin	
	Epoxide	
	Heptachlor	
	Lindane	
	Triazine	Six monthly
	Glyphosate	
	Phoxyacetic acids	
	OPPs (Organophosphorous)	

Note:

1 Water sampling localities are assessed individually and the sampling frequencies for each parameter are allocated depending on the risk.

1.3 Water Supply Systems

A summary of general water supply system information is presented in Table 2.

Table 2: Water Sampling Locality, Population, Source Water, Storage & Water Treatment Plant information for 2020-21

Water Sampling Locality	Population supplied[1]	Source Water	Raw Water Storage	Water Treatment Plant (WTP)
Axedale	430	Upper Coliban Reservoir Lauriston Reservoir Malmsbury Reservoir Lake Eppalock Waranga Western Channel	Sandhurst Reservoir	Bendigo WTP
Bendigo Northern	35020			
Bendigo Southern	40010			
Bendigo Spring Gully	12820			
Bendigo Raywood	180			
Bendigo Sebastian	160			
Big Hill	870			
Epsom - Huntly	7990			
Junortoun	3200			
Maiden Gully - Marong	5610			
Strathfieldsaye	5370			
Boort	830	Waranga Western Channel	Boort Basin	Boort WTP
Bridgewater-Inglewood	1460	South West Loddon Pipeline Loddon River	Bridgewater Basins	Bridgewater WTP
Castlemaine	11660	Upper Coliban Reservoir Lauriston Reservoir Malmsbury Reservoir	McCay Reservoir	Castlemaine WTP
Fryerstown	190			
Guildford	260			
Harcourt	1060			
Maldon	1700			
Newstead	740			
Taradale - Elphinstone	480			
Cohuna	2520	Gunbower Creek	Nil	Cohuna WTP
Echuca	15490	Murray River	Nil	Echuca WTP
Elmore	780	Groundwater Bore No.3 Groundwater Bore No.4	Nil	Elmore WTP
Goornong	400	Campaspe River	Goornong Basin	Goornong WTP
Gunbower	340	Taylors Creek	Nil	Gunbower WTP
Heathcote	2260	Caledonia	Caledonia	Heathcote WTP

Water Sampling Locality	Population supplied[1]	Source Water	Raw Water Storage	Water Treatment Plant (WTP)
Tooborac	120	Reservoir Lake Eppalock Waranga Western Channel Upper Coliban Reservoir Lauriston Reservoir Malmsbury Reservoir	Reservoir	
Korong Vale	220	Grampian Wimmera Mallee Pipeline South West Loddon Pipeline	Korong Vale Basins	Korong Vale WTP
Wedderburn	830			
Kyneton	6400	Lauriston Reservoir Upper Coliban Reservoir	Lauriston Reservoir	Kyneton WTP
Malmsbury	700			
Tylden	320			
Bealiba	140	Loddon River	Nil	Laanecoorie WTP
Dunolly	710			
Laanecoorie	60			
Tarnagulla	170			
Leitchville	370	Gunbower Creek Cohuna Channel	Nil	Leitchville WTP
Lockington	460	Waranga Western Channel	Lockington Basins	Lockington WTP
Pyramid Hill	550	Pyramid Hill Channel	Pyramid Hill Basin	Pyramid Hill WTP
Rochester	3060	Waranga Western Channel Campaspe River	Nil	Rochester WTP
Serpentine	130	East Loddon stock and domestic pipeline	Serpentine Raw Water Tank	Serpentine WTP
Trentham	1410	Groundwater Reservoir 1 and 2	Trentham Reservoir 1 and 2	Trentham WTP

Note:

1 Population is calculated using property connection numbers multiplied by mean household size from the 2017 census.

2 Drinking Water Treatment Processes

2.1 Water Treatment

The following table provides a summary of the water treatment processes used to produce drinking water for each water sampling locality[1] and the chemicals that are added during the various water treatment processes. There were no changes to the water sampling localities during 2020/21.

Appendix C contains a more detailed version of the table below.

Table 3: Water treatment processes

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Axedale Bendigo Northern Bendigo Southern Bendigo Spring Gully Bendigo Raywood Bendigo Sebastian Big Hill Epsom - Huntly Junortoun Maiden Gully - Marong Strathfieldsaye	Bendigo WTP	Oxidation Coagulation Microfiltration Ozonation BAC filtration Fluoridation pH correction Chloramination	Potassium permanganate Carbon dioxide Aluminium Chlorohydrate Ozone Hydrofluorosilicic acid Lime Chlorine gas Ammonia	Disinfection process was changed from Chloramination to Free Chlorination from 27 January 2021 until end of April 2021 for the purpose of routine mains cleaning.

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Boort	Boort WTP	Coagulation Clarification Dual-media filtration pH correction Chlorination	Powdered activated carbon[2] Aluminium sulphate Polyelectrolyte Caustic soda Chlorine gas	
Bridgewater-Inglewood	Bridgewater WTP	Coagulation Clarification Dual-media filtration GAC filtration Desalination (off-line) UV Disinfection pH correction Chlorination/ Chloramination[3]	Sulphuric acid Powdered activated carbon Ultrion Caustic soda Chlorine gas Ammonia	
Castlemaine Fryerstown Guildford Harcourt Maldon Newstead Taradale - Elphinstone	Castlemaine WTP	Coagulation Microfiltration Ozonation BAC filtration Fluoridation pH correction Chlorination	Carbon dioxide Aluminium chlorohydrate Ozone Hydrofluorosilicic acid Lime Chlorine gas	

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Cohuna	Cohuna WTP	Coagulation Clarification Oxidation Dual-media filtration pH correction Chlorination	Powdered activated carbon Caustic soda Aluminium sulphate Polyelectrolyte Chlorine gas Sodium hypochlorite Sodium Fluoride	DH requested fluoride be added to the Cohuna drinking water supply. The project has been completed, with fluoridated water being put into the supply commencing the week of 26 April 2021.
Echuca	Echuca WTP	Coagulation Clarification Oxidation Dual-media filtration Fluoridation pH correction Chlorination	Powdered activated carbon Caustic soda Aluminium sulphate Polyelectrolyte Hydrofluorosilicic acid Chlorine gas Sodium hypochlorite	
Elmore	Elmore WTP	pH correction UV disinfection	Caustic soda	

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Goornong	Goornong WTP	Coagulation Clarification Sand filtration pH correction Chlorination	Powdered activated carbon[2] Aluminium sulphate Soda ash Sodium hypochlorite	
Gunbower	Gunbower WTP	Ion Exchange Coagulation Clarification Microfiltration GAC filtration UV disinfection Chlorination	Powdered activated carbon[2] Aluminium Chlorohydrate Caustic soda Chlorine gas	A project for a new mobile powdered activated carbon unit was completed during 2020/21, with the commissioning of the unit undertaken at Gunbower WTP. During the commissioning period, this additional process assisted with a high taste and odour event in the source water.
Heathcote Tooborac	Heathcote WTP	Coagulation Clarification Oxidation Dual-media filtration UV disinfection pH correction Chlorination/ Chloramination[3]	Powdered activated carbon (PAC) Caustic soda Aluminium sulphate Sodium hypochlorite Polyelectrolyte Chlorine gas Ammonia	

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Korong Vale Wedderburn	Korong Vale WTP	Coagulation Clarification Dual-media filtration pH correction Chloramination	Powdered activated carbon[2] Caustic soda Aluminium sulphate Polyelectrolyte Chlorine gas Ammonia	
Kyneton Malmsbury Tylden	Kyneton WTP	Coagulation Microfiltration Ozonation BAC filtration Fluoridation pH correction Chlorination	Carbon dioxide Aluminium Chlorohydrate Ozone Hydrofluorosilicic acid Lime Chlorine gas	
Bealiba Dunolly Laanecoorie Tarnagulla	Laanecoorie WTP	Coagulation Clarification Oxidation Dual Media filtration pH correction Chlorination/ Chloramination[3]	Powdered activated carbon Aluminium sulphate Polyelectrolyte Caustic soda Chlorine gas Ammonia Sodium hypochlorite	

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Leitchville	Leitchville WTP	Coagulation Clarification Microfiltration pH correction UV disinfection Chlorination	Powdered activated carbon Aluminium sulphate Polyelectrolyte Caustic soda Chlorine gas	
Lockington	Lockington WTP	Coagulation DAFF pH correction Chlorination	Powdered activated carbon[2] Aluminium Chlorohydrate (ACH) Polyelectrolyte Caustic soda Calcium Hypochlorite	The successful trial of ACH as an alternate coagulant resulted in a permanent change over to ACH. The disinfection system was replaced. The previous system was based on chlorine gas, and has been replaced with a calcium hypochlorite system.
Pyramid Hill	Pyramid Hill WTP	Coagulation Clarification Dual-media filtration pH correction Chlorination	Powdered activated carbon Aluminium sulphate Aluminium Chlorohydrate (ACH) Polyelectrolyte Caustic soda Chlorine gas	ACH was trialed as a coagulant. As of October 2020, following the trial and review of results, aluminum sulphate was found to be the preferred coagulate for this water treatment plant.

Water Sampling Locality	Treatment Plant	Treatment Processes	Added Substances	Comments
Rochester	Rochester WTP	Coagulation Clarification Microfiltration GAC filtration pH correction Chlorination	Aluminium sulphate Polyelectrolyte Chlorine gas Caustic Soda	
Serpentine	Serpentine WTP	Coagulation Clarification Dual-media filtration pH correction Chlorination	Aluminium sulphate Polyelectrolyte Caustic soda Chlorine gas	
Trentham	Trentham WTP	Ultrafiltration GAC filtration Chlorination	Chlorine gas	

Note:

1 A water sampling locality is a discrete area of similar water quality.

2 There is no permanent PAC dosing system at these treatment plants; however, there is provision for a mobile PAC dosing system to be added into the process when required.

3 Primary disinfection occurs through chlorination, and then the treated water is chloraminated, in order to maintain disinfection residual for a longer period of time.

2.2 Improvements to water supply and treatment

Coliban Water continued to monitor the network systems for possible nitrification issues.

Late January 2021 through to late April 2021 the Bendigo water supply system shifted from chloramination to free chlorination to improve disinfection and manage the potential for nitrification.

This year, some of the major Water Treatment Plant (WTP) improvement works that were undertaken included the following:

- Cohuna WTP:
    - Commissioning of fluoride dosing system
    - Upgrade of the PAC contact tank to improve the management of any taste and odour issues.
    - Renewal of raw water and town delivery pipelines to improve reliability.
- Installation of a calcium hypochlorite dosing system at the Lockington WTP to improve the efficiency of water disinfection.
- Delivery of a Mobile Powdered Activated Carbon (PAC) unit to assist with the treatment of taste and odour at multiple sites.
- Upgrade of Trentham WTP blower and motor unit to improve efficiency of the backwash system.
- The fluoride system at the Bendigo WTP had its storage tank and its day tank replaced, as well as the replacement of pipework as part of routine preventative maintenance and condition assessment work.

Across our region, we replaced approximately 2.14 kilometres of water mains as part of our ongoing water mains renewal program, at a cost of around $495,000. The mains were renewed using directional boring, a trenchless technology that reduces the need for excavations and overall cost savings of 25 to 50 per cent.

We identify sites for mains replacement by analysing a range of criteria, including the criticality, risk to customers, number of failures, number of supply interruptions, number of customers impacted and the assessed remaining useful life of the asset.

At a cost of approximately $90,000, in excess of 291 km of water mains cleaning was completed in Bendigo, Axedale, Junortoun, Goornong, Malmsbury and Eaglehawk.

This program removes sediment from the water mains and improves chlorine residuals across our networks using multiple techniques, including air scouring. Air scouring involves forcing a mixture of compressed air and water through the system to remove naturally occurring sediment and other particles. This method of mains cleaning is safe, uses minimal water compared to other methods, and is environmentally-friendly.

Our ongoing water mains cleaning program helps protect the integrity of the water system, enhances the drinking water quality we supply to customers and ensures our water continues to meet Australian Drinking Water Guidelines.

In our water supply network, there are in excess of 10,000 water isolation valves that play an important role in ensuring supply is maintained to customers. A valve maintenance program has been implemented that involves proactively exercising (opening and closing) valves to confirm their location (mapped into our Geographic Information System [GIS]), condition and operability. This ensures that the valves can be located quickly, and are functioning correctly, allowing the quick isolation of water mains in the event of any bursts or works that are required. This year, 475 valves were exercised in Echuca and areas around Bendigo (Huntly to White Hills and in the Eaglehawk area).

2.3 Issues

During 2020/21 the drinking water supplied to our customers was of a high standard, except as described below.

Schedule 2 of Victoria's Safe Drinking Water Regulations 2015 (SDWR) lists three specific drinking water quality standards that apply to all drinking water supplies in Victoria: *Escherichia coli* (*E. coli*), Total

Trihalomethanes (THMs) and Turbidity, all of which have mandated limits, and frequencies for sampling and testing.

All of our drinking water supplies were compliant with the SDWR Schedule 2 drinking water standard during 2020/21.

The SDWR also require that any drinking water that is supplied to customers must not contain any toxin, pathogen, substance or chemical, whether alone or in combination with another toxin, pathogen, substance or chemical, in such amounts that may pose a risk to human health.

There were a few instances where elevated results for some chemicals were recorded during the monitoring of the drinking water that we supply; and the circumstances associated with their detection are described below.

2.3.1 Health Based and Aesthetic Guideline Value Exceedances

The concentration of N-Nitrosodimethylamine (NDMA) exceeded the health-based guideline value of 0.0001 mg/L specified in the Australian Drinking Water Guidelines (ADWG) in samples collected from the Laanecoorie water supply system in June and July 2020. NDMA is a disinfection by-product (DBP) of the disinfection process known as chloramination.

The investigation that was undertaken showed that the elevated NDMA results were due to a transient change in raw water quality. Given the health risks associated with DBPs, including NDMA, are based on life-time exposure, occasional exceedances above the listed guideline value are considered a low risk from a public health perspective. A number of corrective actions were initiated and completed to minimise excessive NDMA formation in the future.

The samples tested for the presence of NDMA after the implementation of the corrective actions indicated that the actions were effective in reducing the concentration of NDMA in the treated drinking water. This issue was reported to DH under the Act.

A range of organisms that grow naturally in water bodies can produce substances that can create unpleasant tastes and odours (T&O) in drinking water supplies. The most common of these substances are Geosmin and 2-Methylisoborneol (MIB). While these substances create unpleasant tastes and odours in drinking water, they do not pose a risk to public health.

Elevated concentrations of these T&O compounds, but mainly Geosmin, were experienced across the Murray River System between late November 2020 and February 2021, which affected the drinking water produced by the Cohuna, Echuca, Gunbower and Leitchville WTPs that draw raw water from the Murray River and its tributaries. The concentration of Geosmin in the treated drinking water leaving these four WTPs exceeded the T&O threshold of 10 ng/L mentioned in the ADWG on a few occasions during this period.

Given the potential for widespread customer complaints to occur as a result of the presence of these compounds in drinking water, DH was proactively notified under the Act. In response, a number of works have been completed to minimise impacts to customers should these T&O compounds be present at elevated concentrations in the future.

Manganese (Mn) is a naturally-occurring element which is often found in a variety of natural environments, including raw water sources. On 12 January 2021, Coliban Water detected elevated levels of manganese in both the raw water and treated drinking water at the Heathcote WTP.

The identified cause of the elevated level of Mn in the raw water was that water was being drawn from a lower level than usual from Lake Eppalock. The issue with the treated water was linked to a partial blockage in the pre-filter chlorine dosing lines at the WTP. As a result of these issues, the concentration of Mn in the drinking water supplied to the townships of Heathcote and Tooborac exceeded the aesthetic guideline value of 0.1 mg/L listed in the ADWG for a short period of time, but it remained well below the health-based guideline value of 0.5 mg/L.

With the potential for widespread customer complaints due to discolouration of water that can be caused by elevated Mn, DH were notified. The pre-filter chlorine dosing system at the Heathcote WTP was repaired and the treatment process was optimised. Additionally, changes were made to the management of the offtakes from Lake Eppalock.

There were also some other isolated water quality incidents that occurred during the reporting period. The circumstances leading to the events, and actions taken in response, are described below.

2.3.2 Event Incidents Reported to DH

Widespread customer complaints were received from the township of Marong, with customers describing the drinking water that they received between 12 and 14 September 2020 as discoloured and cloudy. In total, twenty-three complaints were received during this period. The root cause of the issue was air that was trapped within the water distribution network following repair works undertaken on a water main that had a significant leak. Corrective actions included flushing the Marong water distribution network, which successfully resolved the issue. Water quality test results and pressure observations showed that the event did not cause an unacceptable risk to customers.

During the year there were two burst main events, that due to the issue and the size of the area impacted, it was decided at the time there was a heightened risk to water quality. The subsequent investigation included a review of water quality results for the drinking water samples collected in response to the event, network pressure readings and other risk factors, and these showed that the event did not cause an unacceptable risk to customers. The two burst main events were:

- Cohuna 26 October 2020, resulting in low or no water pressure to a number of customers for up to 8 hours.
- Harcourt and Castlemaine (part of) 15 February 2021, identification of burst was difficult and approx. 50 properties were without water for about 8 hours.

During the period 2 to 5 May 2021, Coliban Water received six customer complaints from the township of Raywood, with customers describing the drinking water being supplied as having an earthy or muddy taste. An investigation revealed that the taste & odour issue was due to a failure in a redundant pipeline, which impacted the water quality in the system. Based on a review of the relevant water quality data and that chlorine residual was maintained at all times, the public health risk associated with the drinking water supplied during the period was considered low. A number of corrective actions, including cleaning and inspection of the Treated Water Storage (TWS) tanks at Raywood, isolation of all redundant pipework, and flushing of the distribution network, were completed to address the issue.

As a consequence of severe weather conditions that affected most of the state on the evening of 9 June 2021, the mains power supply to the Trentham WTP was interrupted between the night of 9 June 2021 and 13 June 2021, resulting in the WTP being offline for a significant period of time. Given the safety risks posed by fallen trees, or trees that may fall, access to the WTP was also restricted by Emergency Services.

Access to the Trentham WTP was gained on the afternoon of 10 June 2021, and the WTP was brought back online using the onsite generator, with normal operation being restored. However, the water demand was higher than the plant's production capacity, causing the water level in the TWS tank to drop significantly. It was suspected that the higher than usual water demand was caused by a burst water main. Considering the low water level in the TWS tank, and the suspected burst main, there was a concern regarding the potential safety of the drinking water being supplied. Therefore, as a precaution, a "do not drink" advisory was issued evening of 10 June 2021, in consultation with DH. Subsequently, the burst water main was identified and repaired, and the affected distribution network was flushed. Based on information related to the Trentham WTP operation, water quality test results, distribution network pressure and identification and isolation of the burst water main, the "do not drink" advisory was lifted in consultation with DH on the evening of 12 June 2021.

2.3.3 Fluoride Shutdowns

DH was notified twice during 2020/21 regarding shutdowns of the fluoride system at the Echuca Water Treatment Plant (WTP). Details of the shutdowns are below:

1. The fluoride system shutdown on 1 April 2021 – 6 April 2021 was due to the fluoride dosing pumps being unable to maintain the setpoint (i.e. 0.8 mg/L) due to low plant flow resulting from a drop in water demand. The plant flow was increased to get stable dosing and the operator also adjusted the back pressure regulator to compensate for the change in viscosity on the fluoride due to the drop in the ambient temperature.
2. On 26 April 2021, the fluoride system shut down. An investigation identified that the root cause of the problem was an issue with the control logic for the system, which was causing the fluoride system to shut down, as it was unable to meet the dose set points after the filter backwashes occurring at the WTP. The control logic was corrected, and the issue was resolved enabling the fluoride system to be restarted on 3 May 2021.

3 Emergency Incident and Event Management

3.1 Section 22 Reports

The following notifications were made to the Water Program of DH under Section 22 of the Act. Ten Section 22 reports were submitted to DH within the required timeframe for such notifications.

Table 4: Section 22 Reports 2020/21

Date incident occurred	Drinking water locality affected	Nature of Incident	Actions taken in response to the incident
12/09/2020	Maiden Gully/Marong (only impacted Marong area)	Widespread customer complaints were received from the township of Marong, with customers describing the drinking water that they received between 12 and 14 September 2020 as discoloured and cloudy. The root cause of the event was trapped air within the water distribution network due to repair work undertaken on a water main that had a significant leak, which resulted in drinking water that was discoloured and cloudy in appearance.	The affected distribution network was flushed to remove the air entrapped within the mains. Additionally, drinking water samples were collected and tested for relevant parameters, which showed that the event did not cause an unacceptable health risk to customers.
26/10/2020	Cohuna	On 26 October 2020, there was a significant burst on a trunk water main in Cohuna. The burst and subsequent repair works resulted in low or no water pressure to a number of customers in Cohuna for a period of up to 8 hours.	The burst main was repaired and the affected part of the distribution network was flushed. Additionally, drinking water samples were collected and tested for relevant parameters, which showed that the event did not cause an unacceptable risk to customers.
1/12/2020	Cohuna	A range of organisms that grow naturally in water bodies can produce substances that can create unpleasant tastes and odours (T&O) in drinking water supplies. The most common of these substances are Geosmin and 2- Methylisoborneol (MIB). While these substances create unpleasant tastes and odours in drinking water they do not pose a risk to public health. Elevated concentrations of these T&O compounds, but mainly Geosmin, were experienced across the Murray River system between late November 2020 and February 2021, which affected the Cohuna, Echuca, Gunbower and Leitchville Water Treatment Plants (WTPs) that draw raw water from the Murray River and its tributaries. Given that the concentration of Geosmin in the raw water was very high, the concentration of Geosmin in the treated water leaving these four WTP exceeded the T&O threshold (10 ng/L) mentioned in the ADWG on a	The plant consists of a Powdered Activated Carbon (PAC) dosing system to reduce T&O compounds. A dedicated contact tank for PAC system was installed to improve treatment efficiency.
07/12/2020	Echuca		Switched over to a finer grade of PAC to improve the efficiency of T&O removal. The capacity of the dosing pumps has been increased in order to increase the dose rate up to 40 mg/L of PAC.
07/12/2020	Gunbower		The plant consists of a Granular Activated Carbon (GAC) filter to reduce T&O compounds. The GAC media was replaced to improve treatment efficiency.

Date incident occurred	Drinking water locality affected	Nature of Incident	Actions taken in response to the incident
15/12/2020	Leitchville	few occasions during this period.	Installed a new PAC dosing system in series with the existing system in order to increase treatment capacity.
12/01/2021	Heathcote	On 12 January 2021, Coliban Water detected elevated levels of manganese (Mn) in both the raw and treated water at the Heathcote WTP. The identified cause of the elevated level of Mn in the raw water was that water was being drawn from a lower level than usual from Lake Eppalock. The issue with the treated water was linked back to a partial blockage in the pre-filter chlorine dosing lines. As a result of these issues, the concentration of manganese in the drinking water supplied exceeded the aesthetic guideline value in ADWG (i.e. > 0.1 mg/L) for a short period of time, but it remained well below the ADWG health-based guideline value (i.e. 0.5 mg/L).	The pre-filter chlorine dosing system at the Heathcote WTP was repaired and the treatment process was optimised. Additionally, changes were made to the management of the offtakes from Lake Eppalock.
15/02/2021	Harcourt	On 15 February 2021, Coliban Water received widespread customer complaints from the townships of Harcourt and Castlemaine, as a result of a loss of water supply due to a burst water main. It took a while to identify the location of the burst, which resulted in approximately fifty properties being without water for about 8 hours.	The burst main was repaired and the affected part of the distribution network was flushed. Additionally, drinking water samples were collected and tested for relevant parameters, which showed that event did not cause an unacceptable risk to customers.
04/05/2021	Bendigo - Raywood	During the period 2 to 5 May 2021, Coliban Water received six customer complaints from Raywood, with customers describing the drinking water being supplied as having an earthy or muddy taste. An investigation revealed that the T&O issue was due to a failure in a redundant pipeline, which impacted the water quality in the system.	A number of corrective actions, including cleaning and inspection of the Treated Water Storage (TWS) tanks, isolation of all redundant pipework, and flushing of the distribution network, were completed to address the issue. Additionally, water samples were collected and tested for relevant parameters. Based on the relevant water quality data and that re-chlorination was maintained at all times, the public health risk associated with the drinking water supplied during the period was considered acceptably low.

Date incident occurred	Drinking water locality affected	Nature of Incident	Actions taken in response to the incident
10/06/2021	Trentham	As a consequence of severe weather conditions that affected most of the state on the evening of 9 June 2021, the mains power supply to the Trentham WTP was interrupted between the night of 9 June 2021 and 13 June 2021, resulting in the WTP being offline for a significant period of time. Given the falling tree risk, access to the WTP was also restricted by Emergency Services. Access to the Trentham WTP was gained on the afternoon of 10 June 2021, and the WTP was brought back online using the onsite generator, until power was restored. The WTP functioned without any issues. However, the water demand was higher than the plant's production causing the water level in the TWS tank to drop significantly. It was suspected that the higher than usual water demand was caused by a burst water main. Considering the low water level in the TWS tank, and the suspected burst main, there was a concern regarding the safety of the drinking water being supplied. Therefore, as a precaution, a "do not drink" advisory was issued, in consultation with DH.	The burst water main was identified and repaired, and the affected distribution network was flushed. Water samples were collected and tested for relevant parameters. Based on information on the operation of the Trentham WTP, water quality test results, distribution network pressure monitoring, and the identification and isolation of the burst water main, the "do not drink" advisory was lifted, in consultation with DH, on the evening of 12 June 2021.

4 Drinking Water Quality Standards

The Safe Drinking Water Regulations 2015, specify specific water quality standards under Schedule 2. Any exceedance of water quality standards is notifiable to the DH under Section 18 of the Act.

4.1 Section 18 Notifications

The following notifications were made to the Water Program of DH under Section 18 of the Act. All Section 18 notification were submitted to DH within the required timeframe for such notifications.

Table 5: Section 18 Notifications 2020/21

Date incident occurred	Drinking water locality affected	Nature of Incident	Actions taken in response to the incident
8/07/2020	Bealiba	The concentration of N-Nitrosodimethylamine (NDMA) exceeded the health-based guideline value (i.e. 0.0001 mg/L) specified in the ADWG in a sample collected from a Bealiba customer tap sample point. NDMA is a disinfection by-product (DBP) of the disinfection process known as chloramination. The investigation that was undertaken showed that the elevated NDMA results were due to a transient change in raw water quality.	A number of corrective actions, including optimisation of pH and chlorine to ammonia ratio, were completed to minimise NDMA formation in the future. The samples tested for NDMA after the implementation of the corrective actions indicate that the actions were effective in reducing the concentration of NDMA in the treated drinking water.

4.2 Water Quality Sampling Program

The Safe Drinking Water Regulations 2015 require water suppliers to incorporate a water sampling program into their risk management plan. Coliban Water's water sampling program is reviewed annually. Coliban Water's water sampling program, which is supported by an extensive water quality monitoring program, is separated into three categories - raw water, storage tanks and contact points (i.e. storage tanks that are used to provide contact time for chlorine or chloramine disinfection) and distribution networks (i.e. customer taps).

Raw water sites include catchments, raw water storage reservoirs/basins and irrigation storages. Storage tanks and contact points include storage tanks in both our potable and non-potable (regulated) water supplies. The final verification monitoring is undertaken at customer tap sites. The parameters included in the sampling program include the Safe Drinking Water Regulations 2015 Schedule 2 requirements, together with the parameters that would identify any algal toxins, pathogens, chemical, radiological or other substances that may pose a risk to human health, and the parameters which are included in the program are based on system-specific and catchment-based risk assessments.

During the review process consideration is given to:

- ADWG recommendations;
- The likelihood of a particular hazard being present in the water, and historical data trends; and
- Operational changes.

The following changes were made to the water quality monitoring programs for 2020/21.

1. *Raw Water*

- Increased testing for Taste & Odour (T&O) causing compounds at the following locations due to high seasonal variation observed in concentration of T&O causing compounds:
    - Heathcote WTP raw water inlet
    - Bridgewater WTP raw water inlet
    - Waranga Channel raw water at Rochester
    - Boort service basin
    - Goornong raw water inlet
- The Campaspe River at Rochester was included in the program as an alternate raw water supply for the Rochester WTP in the event of severe deterioration of raw water quality in the Waranga Channel.
- Decreased iron and manganese testing at Caledonia Reservoir, down to a monthly frequency, as these parameters are being tested at the WTP inlet at a higher frequency and additional monitoring will be undertaken at Caledonia Reservoir prior to any source changeover.
- Removed bromide testing at the Bridgewater WTP raw water inlet due to change in source from Loddon River to the South West Loddon Pipeline, which is predominately from the Waranga Channel, and the concentration of bromide in the Waranga Channel has historically been low. Hence, it was considered a low risk of being at concentrations of concern.
- Removed acid soluble aluminium testing at the Trentham raw water reservoirs, as aluminium-based chemicals are not directly used in the drinking water production and historical results have been low.
- *Cryptosporidium*, *Giardia*, *E. coli* and Enterococci were added to the sampling program for the Upper Coliban, Lauriston, Malmsbury Reservoirs, and Lake Eppalock in response to on-water recreational activity, with the intention of monitoring for any changes in pathogen concentration in the raw water.

2. *Tanks/Contact Points*

- Added fluoride at the Cohuna WTP contact point as the new fluoridation system was commissioned during this financial year.
- Increased iron and manganese testing at the Boort and Rochester WTP contact points to fortnightly frequency due to recent water quality issues.
- Decreased Total Organic Carbon (TOC) testing at the Bridgewater WTP treated water storage tanks outlet due to low concentration of TOC in water drawn from the South West Loddon Pipeline, compared to the concentrations seen in the Loddon River.
- THM monthly sampling was extended to including Heathcote, Rochester, Serpentine and Trentham WTP contact points, in order to better understand the risks associated with the potential for excess disinfection by- products formation at these sites. Sampling commenced in August 2020.
- Monthly turbidity sampling was added to the Boort and Gunbower high level tanks to assist overall water quality monitoring, with sampling commencing in August 2020.
- An additional *E. coli* sample point was added to the Cohuna WTP monitoring program in late July 2020, and weekly sampling commenced mid-August 2020.

3. *Distribution Network (Customer taps)*

- Removed nitrification indicators (i.e. Nitrates and Nitrites) from the Castlemaine distribution network as the drinking water supplied from the Castlemaine WTP is now chlorinated.
- Bromate and Formaldehyde customer tap sampling was reduced to quarterly (from monthly) for Kyneton, Malmsbury and Tylden water sampling localities, as a review of historic data identified that the potential for their presence at concentrations of concern to be low.
- As required under Schedule 2 of the SDWR 2015, THM were added to the Elmore customer tap sampling program. The sampling commenced in January 2021.

4.2.1 Samples Within the Water Quality Monitoring Program

All samples were collected and analysed as outlined in our water quality monitoring program.

4.3 Water Quality Monitoring results

The following table is a comparison of the analysis for each parameter in the monitoring programs for the period from 2018/19 to 2020/21.

Sections 4.4.1 and 4.4.2 contain the individual data tables for each parameter sampled, as per the monitoring program undertaken during 2020/21.

4.3.1 Analysis of Water Sampling Results

Coliban Water has undertaken substantial water quality monitoring for a number of years. The following table refers to compliance with the parameters in our drinking water sampling programs for 2018/19 – 2020/21.

Table 6: Water Quality Parameter Comparison Results 2018/19 to 2020/21

Parameter	Compliant Localities 2018/19	Compliant Localities 2019/20	Compliant Localities 2020/21
Escherichia coli[1]	100%	88%	100%
Trihalomethanes[1]	100%	93%	100%
Turbidity[1]	100%	100%	100%
Chloroacetic acid[2]	100%	100%	100%
Dichloroacetic acid[2]	100%	100%	100%

Parameter	Compliant Localities 2018/19	Compliant Localities 2019/20	Compliant Localities 2020/21
Trichloroacetic acid[2]	100%	100%	100%
Bromate[2]	100%	100%	100%
Formaldehyde[2]	100%	100%	100%
Aluminium[3]	98%	98%	98%
Fluoride[2]	100%	100%	100%
Arsenic[2]	100%	100%	100%
Cadmium[2]	100%	100%	100%
Chlorine[2]	100%	98%	100%
Chromium[2]	100%	100%	100%
Cyanide[2]	100%	100%	100%
Mercury[2]	100%	100%	100%
Nitrate[2]	100%	100%	100%
Selenium[2]	100%	100%	100%
Sulphate[2]	100%	100%	100%
Manganese[2]	100%	100%	100%
Copper[2]	100%	100%	100%
Lead[2]	98%	100%	100%
Nickel[2]	98%	100%	100%
Gross alpha[2]	100%	100%	100%
Gross beta[2]	100%	100%	100%
Nitrite[2]	100%	100%	100%
pH[3]	81%	81%	74%
Hardness[3]	100%	100%	100%
Iron[3]	100%	95%	100%
True Colour[3]	100%	98%	100%
Electrical Conductivity[3]	100%	100%	100%
Sodium[3]	100%	100%	100%
Chloride[3]	100%	93%	100%
Zinc[3]	100%	100%	100%
Ammonia[3]	100%	93%	98%
NDMA[2]	100%	90%	98%
Total no. water sampling localities	42	42	42

Note:

1 This parameter is a water quality standard as listed in Schedule 2 of the SDW Regulations 2015.

2 This parameter is a water quality standard with reference to the relevant ADWG health-based guideline value.

3 This parameter has an ADWG aesthetic guideline value.

Coliban Water's compliance against each sampled parameter in 2020/21 has experienced an improvement across most parameters, compared to the two previous years, other than the aesthetic parameter of pH. Sections 4.3.1.1 and 4.3.1.2 contain the details for the non-compliant parameters for 2020/21.

4.3.1.1 Actions Undertaken for Non-compliant Health Parameters

NDMA

The NDMA result that exceeded the health-based guideline value in the ADWG was recorded in the Bealiba water sampling locality, which is supplied from the Laanecoorie WTP. Details of the actions undertaken in response to this exceedance are included in Section 4.1- Section 18 Notifications.

4.3.1.2 Actions Undertaken for Aesthetic Parameters That Were Not Met

pH

Eleven water sampling localities did not meet the ADWG aesthetic guideline value range for pH (pH 6.5 to 8.5). Three of those water sampling localities (Bealiba, Dunolly, and Tarnagulla) are supplied from the Laanecoorie WTP, and the other locality (Bridgewater-Inglewood) is supplied from the Bridgewater WTP. The treated water supplied from these plants is chloraminated and an elevated pH (>8.0) is maintained to improve the effectiveness of chloramination. Therefore, pH in these localities occasionally exceeds the aesthetic guideline value of 8.5.

The Korong Vale and Wedderburn water sampling localities are supplied from the Korong Vale WTP, which also uses chloramination disinfection process. Therefore, pH > 8.0 is maintained to improve the effectiveness of chloramination. Additionally, the hardness of the raw water supply for the Korong Vale WTP is low, which can cause leaching to occur from the cement-lined and asbestos cement (AC) pipes in the distribution networks. If leaching does occur, alkalinity is drawn out from the cement, which may cause a rise in alkalinity levels and an increase in pH.

The Serpentine water sampling locality is supplied from the Serpentine WTP, which uses chlorination disinfection process, hence pH is maintained at below pH 8.0. However, pH measured in the distribution network exceeded the aesthetic guideline value of 8.5 on a few occasions. Similarly, to Korong Vale and Wedderburn water sampling localities, hardness of the raw water is low, which can cause leaching to occur from the asbestos cement (AC) pipes in the distribution network. If leaching does occur, alkalinity is drawn out from the cement, which may cause a rise in alkalinity levels and an increase in pH.

Coliban Water has a routine water mains renewal program to replace water mains based on a number of criteria, such as age, size, population served and frequency of failures. We are working to replace all cement-lined and AC pipes with pipes made of an appropriate material, as part of this renewals program.

Elevated pH results (> 8.5) were also reported for water samples collected in the Tooborac water sampling locality on two occasions. The Tooborac water sampling locality is supplied from the Heathcote WTP, which uses chloramination disinfection process, which to be effective, pH greater than 8.0 is maintained. An investigation was undertaken to determine the cause of these elevated results. The conclusion of the investigation was that the elevated pH results were an unexplainable anomaly due to the following reasons: 1) pH of the treated water measured at the Heathcote WTP was within the aesthetic guideline values for pH, 2) similarly, pH results for the samples collected from the Heathcote water sampling locality, which is also supplied from the Heathcote WTP, at the time samples collected from Tooborac were below 8.5, and 3) no other factors were identified that could have led to an increase in pH in the distribution network.

Elevated pH results were reported for the Goornong and Gunbower water sampling localities on one occasion. An investigation concluded that the elevated pH results reported for these localities were an unexplainable anomaly, as pH of the treated water measured at the respective WTPs was well within the aesthetic guideline values (i.e. between pH 6.5 and 8.5) at the time samples that had elevated pH were collected in the distribution networks, and no factors were identified that could have led to an increase in pH in the distribution network.

Elevated pH results were reported for the Trentham water sampling locality on a few occasions. The elevated pH results could be attributed to a variation in raw water quality, as an increase in pH was observed in the raw water during the period when elevated pH results were reported for the samples collected in the distribution network. The Trentham WTP does not have a process to adjust the pH of treated water. Whilst the pH results were above 8.5, they were less than or equal to 9.0; hence, there was no significant impact on the quality of

water supplied, and the results for other water quality parameters measured during the same period support this.

Ammonia

Sample collected from the Big Hill treated water storage tank returned a result for ammonia exceeding the aesthetic guideline value (0.5 mg/L) of the ADWG on one occasion. This water sampling locality is supplied from the Bendigo WTP and water is disinfected by chloramination.

One of the issues associated with the use of chloramination as a disinfection process is the potential for nitrification to occur within distribution networks, which can contribute to an increase in ammonia in drinking water. Therefore, the short-term spike (one sample) in the ammonia concentration observed at the Big Hill tank could have been attributed to nitrification in the distribution network.

Aluminium

A sample collected from the treated water storage tanks at the Bridgewater WTP exceeded the aluminium aesthetic guideline value 0.2 mg/L. In response to this elevated result, the water treatment plant processes were checked and were verified to be working appropriately. Additionally, a review of other data from the water treatment plant and customer tap samples was undertaken. There were no issues identified and no indicators of any process issues. Therefore, the elevated aluminium result was considered an unexplainable anomaly.

4.4 Water Quality Data for Sampling Localities: 1 July 2020 – 30 June 2021

As described in Section 4.2, Coliban Water undertakes a comprehensive water quality monitoring program that includes collecting samples from various points in the water supply system:

- Exit points from water treatment plants and water storage tanks into the distribution system
- Customer tap sites, which are dedicated sampling points that are prior to the customer's water meter.

4.4.1 Treated Water Results from WTP Exit/Storage Points

Following are tables that detail the sampling results for each parameter at WTP exit/storage points in each of the water sampling localities.

Escherichia coli (E. coli) – WTP exit/storage points for 2020-21

E. coli is monitored in all water sampling localities as it is an indicator of the potential presence of faecal contamination in water.

Table 7: E. coli results for WTP exit/storage points (Water quality standard: No Escherichia coli per 100mL of drinking water, with the exception of any false positive samples^)

Water Sampling Locality	Sampling Frequency	Number of Samples [1]	Maximum detected (orgs/100 mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met
Axedale	Weekly	52	0	0	0
Bealiba	Weekly	53	0	0	0
Bendigo (Northern)	Twice Weekly	104	0	0	0
Bendigo (Southern)	Twice Weekly	208	0	0	0
Bendigo (Spring Gully)	Twice Weekly	104	0	0	0
Big Hill	Weekly	104	0	0	0
Boort	Weekly	104	0	0	0
Bridgewater - Inglewood	Weekly	106	0	0	0
Castlemaine	Twice Weekly/ Weekly	155[2]	0	0	0
Cohuna	Weekly	99[3]	0	0	0
Dunolly	Weekly	53	0	0	0
Echuca	Weekly	104	0	0	0
Elmore	Weekly	52	0	0	0
Epsom - Huntly	Twice Weekly	104	0	0	0
Fryerstown	Weekly	52	0	0	0
Goornong	Weekly	104	0	0	0
Guildford	Twice Weekly	104	0	0	0
Gunbower	Weekly	104	0	0	0
Harcourt	Twice Weekly/ Weekly	156	0	0	0
Heathcote	Weekly	52	0	0	0
Junortoun	Twice Weekly	104	0	0	0
Korong Vale	Weekly	104	0	0	0
Kyneton	Twice Weekly/ Weekly	157	0	0	0
Laanecoorie	Weekly	53	0	0	0
Leitchville	Weekly	52	0	0	0
Lockington	Weekly	52	0	0	0
Maiden Gully - Marong	Twice Weekly	104	0	0	0
Maldon	Weekly	52	0	0	0
Malmsbury	Twice Weekly/ Weekly	157	0	0	0
Newstead	Weekly	52	0	0	0
Pyramid Hill	Weekly	52	0	0	0

Water Sampling Locality	Sampling Frequency	Number of Samples [1]	Maximum detected (orgs/100 mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met
Raywood	Weekly	52	0	0	0
Rochester	Weekly	52	0	0	0
Sebastian	Weekly	52	0	0	0
Serpentine	Weekly	52	0	0	0
Strathfieldsaye	Twice Weekly	104	0	0	0
Taradale - Elphinstone	Twice Weekly	104	0	0	0
Tarnagulla	Weekly	53	0	0	0
Tooborac	Weekly	52	0	0	0
Trentham	Weekly	53	0	0	0
Tylden	Weekly	53	0	0	0
Wedderburn	Weekly	104	0	0	0

Note:

1 The number of samples will vary due to the different number of exit/storage samples points within each water sampling locality.

2 Tank off-line for a week, routine sampling put on hold. Non-routine sampling completed before coming back on-line.

3 Review undertaken and additional sample point added, with sampling commencing mid-August 2020.

Trihalomethanes (THM) – WTP exit/storage points for 2020-21

Trihalomethanes are formed as a by-product, predominantly when chlorine is used to disinfect water to make it safe for drinking. They represent one group of chemicals generally referred to as disinfection by-products.

Table 8: Trihalomethanes results for WTP exit/storage points (Water quality standard for THM is 0.25 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples[1]	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	0.1400	0.0598	0
Bealiba	Monthly	12	0.1200	0.0835	0
Bendigo (Northern)	Monthly	12	0.1190	0.0277	0
Bendigo (Southern)	Monthly	12	0.1190	0.0277	0
Bendigo (Spring Gully)	Monthly	12	0.1190	0.0277	0
Big Hill	Monthly	24	0.1200	0.0317	0
Boort	Monthly	12	0.1100	0.0885	0
Bridgewater - Inglewood	Monthly	24	0.0240	0.0137	0
Castlemaine	Monthly	24	0.1030	0.0684	0
Cohuna	Monthly	12	0.0550	0.0379	0
Dunolly	Monthly	12	0.1500	0.0979	0
Echuca	Monthly	12	0.0560	0.0352	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	0.1190	0.0277	0
Fryerstown	Monthly	12	0.1400	0.0876	0
Goornong	Monthly	12	0.1300	0.1022	0
Guildford	Monthly	12	0.1030	0.0713	0
Gunbower	Monthly	12	0.0530	0.0358	0
Harcourt	Monthly	24	0.1030	0.0801	0
Heathcote	Monthly	11[2]	0.1100	0.0764	0
Junortoun	Monthly	12	0.1190	0.0277	0
Korong Vale	n/a	n/a	n/a	n/a	n/a
Kyneton	Monthly	24	0.0910	0.0644	0
Laanecoorie	Monthly	12	0.1300	0.0935	0
Leitchville	Monthly	12	0.0540	0.0288	0
Lockington	Monthly	12	0.0390	0.0228	0
Maiden Gully - Marong	Monthly	12	0.1190	0.0277	0
Maldon	Monthly	12	0.1100	0.0851	0
Malmsbury	Monthly	24	0.0910	0.0657	0
Newstead	Monthly	12	0.0990	0.0759	0
Pyramid Hill	Monthly	12	0.0340	0.0229	0
Raywood	Monthly	12	0.1800	0.0748	0
Rochester	Monthly	11[2]	0.0330	0.0267	0
Sebastian	Monthly	12	0.1800	0.0431	0
Serpentine	Monthly	11[2]	0.0380	0.0285	0
Strathfieldsaye	Monthly	12	0.1190	0.0277	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Monthly	12	0.1400	0.0947	0
Tooborac	Monthly	12	0.0870	0.0648	0
Trentham	Monthly	11[2]	0.0320	0.0233	0
Tylden	Monthly	12	0.0770	0.0590	0
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that THM sampling is not necessary to manage water quality risks.

1 The number of samples will vary due to the different number of exit/storage samples points within each locality.

2 Added to monitoring program in July 2020, and sampling commenced in August 2020.

Turbidity – WTP exit/storage points for 2020-21

Turbidity is a measure of the particulate matter in water and is monitored in all water sampling localities. High turbidity in the reticulation may indicate poor operation of the water treatment process and/or increased risk of microbiological contamination.

Table 9: Turbidity results for WTP exit/storage points (Water quality standard: 95th percentile of results over 12 month period must be ≤ 5.0 NTU)

Water Sampling Locality	Sampling Frequency	Number of Samples[1]	Maximum value (NTU)	95th percentile of results (NTU)	Number of 95th percentile of results above standard
Axedale	Monthly	12	0.2	0.1	0
Bealiba	Monthly	12	0.7	0.5	0
Bendigo (Northern)	Twice Weekly	104	0.3	0.1	0
Bendigo (Southern)	Twice Weekly	208	0.3	0.1	0
Bendigo (Spring Gully)	Twice Weekly	104	0.1	0.1	0
Big Hill	Monthly	24	0.1	0.1	0
Boort	Monthly	23[2]	0.3	0.2	0
Bridgewater - Inglewood	Monthly	24	0.1	0.1	0
Castlemaine	Twice Weekly/Mthly	116	0.2	0.1	0
Cohuna	Monthly	12	1.6	0.8	0
Dunolly	Monthly	12	0.1	0.1	0
Echuca	Monthly	24	0.2	0.1	0
Elmore	Monthly	12	0.1	0.1	0
Epsom - Huntly	Twice Weekly	104	0.3	0.1	0
Fryerstown	Monthly	12	0.1	0.1	0
Goornong	Monthly	24	0.3	0.2	0
Guildford	Twice Weekly	104	0.1	0.1	0
Gunbower	Monthly	23[2]	0.1	0.1	0
Harcourt	Twice Weekly/Mthly	116	0.1	0.1	0
Heathcote	Monthly	12	0.1	0.1	0
Junortoun	Twice Weekly	104	0.3	0.1	0
Korong Vale	Monthly	24	1.0	0.4	0
Kyneton	Twice Weekly/Mthly	116	0.1	0.1	0
Laanecoorie	Monthly	12	0.1	0.1	0
Leitchville	Monthly	12	0.1	0.1	0
Lockington	Monthly	12	0.1	0.1	0
Maiden Gully - Marong	Twice Weekly	104	0.3	0.1	0
Maldon	Monthly	12	0.1	0.1	0
Malmsbury	Twice Weekly/Mthly	116	0.1	0.1	0
Newstead	Monthly	12	0.1	0.1	0
Pyramid Hill	Monthly	12	0.1	0.1	0
Raywood	Monthly	12	0.3	0.2	0
Rochester	Monthly	12	0.1	0.1	0
Sebastian	Monthly	12	0.1	0.1	0
Serpentine	Monthly	12	0.3	0.2	0
Strathfieldsaye	Twice Weekly	104	0.1	0.1	0
Taradale - Elphinstone	Twice Weekly	104	0.2	0.1	0
Tarnagulla	Monthly	12	0.1	0.1	0
Tooborac	Monthly	12	0.1	0.1	0
Trentham	Monthly	12	0.1	0.1	0
Tylden	Monthly	12	0.1	0.1	0
Wedderburn	Monthly	24	1.0	0.6	0

Note:

1 The number of samples will vary due to the different number of exit/storage samples points within each locality.

2 Added to monitoring program in July 2020, sampling commenced in August 2020.

Fluoride – WTP exit/storage points for 2020-21

Table 10: Fluoride results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 1.5 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Target optimum operating fluoride concentration (mg/L)	Max (mg/L)	Min (mg/L)	Ave (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Bendigo (Southern)	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Bendigo (Spring Gully)	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Big Hill	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Boort	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Castlemaine	Twice Weekly	104	0.9	0.960	0.760	0.860	0
Cohuna	Monthly	2[2]	0.8	0.820	0.660	0.740	0
Dunolly	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Echuca	Monthly	12	0.8	0.890	0.660	0.749	0
Elmore	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Fryerstown	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guildford	Twice Weekly	104	0.9	0.960	0.760	0.860	0
Gunbower	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Harcourt	Twice Weekly	104	0.9	0.960	0.760	0.860	0
Heathcote	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Junortoun	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Korong Vale	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kyneton	Twice Weekly	104	0.9	1.000	0.710	0.879	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Maldon	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Malmsbury	Twice Weekly	104	0.9	1.000	0.710	0.879	0
Newstead	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Twice Weekly	98[1]	0.9	0.990	0.680	0.882	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note:

Fluoride is only currently added to drinking water at the Bendigo, Castlemaine, Cohuna, Echuca and Kyneton Water Treatment Plants.

n/a – not applicable, as the drinking water is not fluoridated.

1 Bendigo WTP fluoride system off-line for fluoride tank replacement and maintenance for 6 weeks.

2 Cohuna WTP fluoride system commenced operation at end of April 2021.

Bromate – WTP exit/storage points for 2020-21

Table 11: Bromate results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 0.02 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.00	0.00	0
Bendigo (Southern)	Monthly	12	0.00	0.00	0
Bendigo (Spring Gully)	Monthly	12	0.00	0.00	0
Big Hill	Monthly	12	0.00	0.00	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a
Castlemaine	Monthly	12	0.00	0.00	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	0.00	0.00	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Monthly	12	0.00	0.00	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Monthly	12	0.00	0.00	0
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	Monthly	12	0.00	0.00	0
Korong Vale	n/a	n/a	n/a	n/a	n/a
Kyneton	Monthly	12	0.00	0.00	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Monthly	12	0.00	0.00	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	Monthly	12	0.00	0.00	0
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Monthly	12	0.00	0.00	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

Bromate is monitored in localities where ozone is used in treatment, as ozone can result in the production of this by-products in drinking water.

Ozone is used at the Bendigo, Castlemaine and Kyneton Water Treatment Plants.

Ozone-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been ozonated, therefore it is not monitored.

Formaldehyde – WTP exit/storage points for 2020-21

Table 12: Formaldehyde results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 0.5 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.0	0.0	0
Bendigo (Southern)	Monthly	12	0.0	0.0	0
Bendigo (Spring Gully)	Monthly	12	0.0	0.0	0
Big Hill	Monthly	12	0.0	0.0	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a
Castlemaine	Monthly	12	0.0	0.0	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	0.0	0.0	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Monthly	12	0.0	0.0	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Monthly	12	0.0	0.0	0
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	Monthly	12	0.0	0.0	0
Korong Vale	n/a	n/a	n/a	n/a	n/a
Kyneton	Monthly	12	0.0	0.0	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Monthly	12	0.0	0.0	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	Monthly	12	0.0	0.0	0
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Monthly	12	0.0	0.0	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

Formaldehyde is monitored in localities where ozone is used in treatment, as ozone can result in the production of this by-products in drinking water.

Ozone is used at the Bendigo, Castlemaine and Kyneton Water Treatment Plants.

Ozone-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been ozonated so is not monitored.

Arsenic – WTP exit/storage points for 2020-21

Table 13: Arsenic results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 0.01 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.0005	0.0005	0
Bendigo (Southern)	Monthly	12	0.0005	0.0005	0
Bendigo (Spring Gully)	Monthly	12	0.0005	0.0005	0
Big Hill	Monthly	12	0.0005	0.0005	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a
Castlemaine	Monthly	12	0.0005	0.0005	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	0.0005	0.0005	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Monthly	12	0.0005	0.0005	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Monthly	12	0.0005	0.0005	0
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	Monthly	12	0.0005	0.0005	0
Korong Vale	n/a	n/a	n/a	n/a	n/a
Kyneton	Monthly	12	0.0005	0.0005	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Monthly	12	0.0005	0.0005	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	Monthly	12	0.0005	0.0005	0
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Monthly	12	0.0005	0.0005	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that arsenic sampling is not necessary to manage water quality risks.

Nitrate – WTP exit/storage points for 2020-21

Table 14: Nitrate results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 50 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples[1]	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	n/a	n/a	n/a	n/a	n/a
Bendigo (Southern)	n/a	n/a	n/a	n/a	n/a
Bendigo (Spring Gully)	n/a	n/a	n/a	n/a	n/a
Big Hill	Monthly	24	2.5	1.6	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	Monthly	12	0.9	0.6	0
Castlemaine	n/a	n/a	n/a	n/a	n/a
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	Weekly	53	1.4	0.5	0
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	n/a	n/a	n/a	n/a	n/a
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	n/a	n/a	n/a	n/a	n/a
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	n/a	n/a	n/a	n/a	n/a
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	n/a	n/a	n/a	n/a	n/a
Korong Vale	Fortnightly	26	0.9	0.3	0
Kyneton	n/a	n/a	n/a	n/a	n/a
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	n/a	n/a	n/a	n/a	n/a
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	n/a	n/a	n/a	n/a	n/a
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	n/a	n/a	n/a	n/a	n/a
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Weekly	53	2.3	0.6	0
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	Fortnightly	52	0.9	0.3	0

Note:

1 The number of samples will vary due to the different number of exit/storage samples within each locality.

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that nitrate sampling is not necessary to manage water quality risks.

Manganese – WTP exit/storage points for 2020-21

Table 15: Manganese results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 0.5 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.001	0.001	0
Bendigo (Southern)	Monthly	12	0.001	0.001	0
Bendigo (Spring Gully)	Monthly	12	0.001	0.001	0
Big Hill	Monthly	12	0.001	0.001	0
Boort	Weekly	52	0.061	0.006	0
Bridgewater - Inglewood	Monthly	12	0.004	0.001	0
Castlemaine	Monthly	12	0.004	0.001	0
Cohuna	Weekly	52	0.007	0.003	0
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	Weekly	52	0.004	0.001	0
Elmore	Monthly	12	<0.001	<0.001	0
Epsom - Huntly	Monthly	12	0.001	0.001	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	Monthly	12	0.005	0.002	0
Guildford	Monthly	12	0.004	0.001	0
Gunbower	Weekly	52	<0.001	<0.001	0
Harcourt	Monthly	12	0.004	0.001	0
Heathcote	Weekly	52	0.083	0.007	0
Junortoun	Monthly	12	0.001	0.001	0
Korong Vale	Monthly	12	0.002	0.001	0
Kyneton	Monthly	12	0.001	0.001	0
Laanecoorie	Weekly	53	0.040	0.005	0
Leitchville	Weekly	52	0.010	0.002	0
Lockington	Monthly	12	<0.001	<0.001	0
Maiden Gully - Marong	Monthly	12	0.001	0.001	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	Monthly	12	0.001	0.001	0
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	Monthly	12	0.002	0.001	0
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	Weekly	52	0.004	0.002	0
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	Monthly	12	0.011	0.005	0
Strathfieldsaye	Monthly	12	0.001	0.001	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that manganese sampling is not necessary to manage water quality risks.

Nitrite – WTP exit/storage points for 2020-21

Table 16: Nitrite Results for WTP exit/storage points (Water quality standard - ADWG health-based guideline value: 3.0 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples[1]	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	n/a	n/a	n/a	n/a	n/a
Bendigo (Southern)	n/a	n/a	n/a	n/a	n/a
Bendigo (Spring Gully)	n/a	n/a	n/a	n/a	n/a
Big Hill	Monthly	24	0.36	0.08	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	Monthly	12	0.07	0.03	0
Castlemaine	n/a	n/a	n/a	n/a	n/a
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	Weekly	53	0.10	0.04	0
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	n/a	n/a	n/a	n/a	n/a
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	n/a	n/a	n/a	n/a	n/a
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	n/a	n/a	n/a	n/a	n/a
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	n/a	n/a	n/a	n/a	n/a
Korong Vale	Fortnightly	26	0.10	0.03	0
Kyneton	n/a	n/a	n/a	n/a	n/a
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	n/a	n/a	n/a	n/a	n/a
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	n/a	n/a	n/a	n/a	n/a
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	n/a	n/a	n/a	n/a	n/a
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Weekly	53	0.16	0.05	0
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	Fortnightly	52	0.10	0.03	0

Note:

1 The number of samples will vary due to the different number of exit/storage samples within each locality.

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that nitrite sampling is not necessary to manage water quality risks.

Aluminium – WTP exit/storage points for 2020-21

Table 17: Aluminium results for WTP exit/storage points (ADWG aesthetic guideline value: 0.2 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Weekly	52	0.040	0.029	0
Bendigo (Southern)	Weekly	52	0.040	0.029	0
Bendigo (Spring Gully)	Weekly	52	0.040	0.029	0
Big Hill	Weekly	52	0.040	0.029	0
Boort	Quarterly	4	0.040	0.025	0
Bridgewater - Inglewood	Quarterly	4	0.230	0.123	1[1]
Castlemaine	Weekly	52	0.030	0.021	0
Cohuna	Quarterly	4	0.020	0.013	0
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	Monthly	12	0.090	0.040	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Weekly	52	0.040	0.029	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	Monthly	12	0.180	0.069	0
Guildford	Weekly	52	0.030	0.021	0
Gunbower	Quarterly	4	0.040	0.020	0
Harcourt	Weekly	52	0.030	0.021	0
Heathcote	Quarterly	4	0.020	0.016	0
Junortoun	Weekly	52	0.040	0.029	0
Korong Vale	Quarterly	4	0.010	0.009	0
Kyneton	Weekly	52	0.030	0.024	0
Laanecoorie	Quarterly	4	0.010	0.009	0
Leitchville	Quarterly	4	0.020	0.009	0
Lockington	Quarterly	4	0.070	0.053	0
Maiden Gully - Marong	Weekly	52	0.040	0.029	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	Weekly	52	0.030	0.024	0
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	Quarterly	4	0.050	0.025	0
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	Quarterly	4	<0.01	<0.01	0
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	Quarterly	4	0.020	0.016	0
Strathfieldsaye	Weekly	52	0.040	0.029	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

1 Details of exceedance are located in Section 4.3.1.2.

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that aluminium sampling is not necessary to manage water quality risks.

Iron – WTP exit/storage points for 2020-21

Table 18: Iron results for WTP exit/storage points (ADWG aesthetic guideline value: 0.3mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.01	0.01	0
Bendigo (Southern)	Monthly	12	0.01	0.01	0
Bendigo (Spring Gully)	Monthly	12	0.01	0.01	0
Big Hill	Monthly	12	0.01	0.01	0
Boort	Weekly	52	0.10	0.03	0
Bridgewater - Inglewood	Monthly	12	0.01	0.01	0
Castlemaine	Monthly	12	0.01	0.01	0
Cohuna	Weekly	52	<0.01	<0.01	0
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	Weekly	52	0.04	0.01	0
Elmore	Monthly	12	<0.01	<0.01	0
Epsom - Huntly	Monthly	12	0.01	0.01	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	Monthly	12	<0.01	<0.01	0
Guildford	Monthly	12	0.01	0.01	0
Gunbower	Weekly	52	<0.01	<0.01	0
Harcourt	Monthly	12	0.01	0.01	0
Heathcote	Weekly	52	<0.01	<0.01	0
Junortoun	Monthly	12	0.01	0.01	0
Korong Vale	Monthly	12	0.02	0.01	0
Kyneton	Monthly	12	0.01	0.01	0
Laanecoorie	Weekly	53	0.02	0.01	0
Leitchville	Weekly	52	<0.01	<0.01	0
Lockington	Monthly	12	<0.01	<0.01	0
Maiden Gully - Marong	Monthly	12	0.01	0.01	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	Monthly	12	0.01	0.01	0
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	Monthly	12	<0.01	<0.01	0
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	Weekly	52	<0.01	<0.01	0
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	Monthly	12	<0.01	<0.01	0
Strathfieldsaye	Monthly	12	0.01	0.01	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that iron sampling is not necessary to manage water quality risks.

Chlorine – WTP exit/storage points for 2020-21

Table 19: Chlorine results for WTP exit/storage points (ADWG health-based guideline value: 5.0mg/L)

Water Sampling Locality	Sampling frequency	Number of samples[1]	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	Weekly	52	3.1	1.2	0
Bealiba	Weekly	53	1.7	1.2	0
Bendigo (Northern)	n/a	n/a	n/a	n/a	n/a
Bendigo (Southern)	n/a	n/a	n/a	n/a	n/a
Bendigo (Spring Gully)	n/a	n/a	n/a	n/a	n/a
Big Hill	Weekly	104	1.7	1.0	0
Boort	Weekly	104	2.0	1.2	0
Bridgewater - Inglewood	Weekly	106	3.1	1.8	0
Castlemaine	Weekly	51[2]	1.4	0.7	0
Cohuna	Weekly	104	3.0	1.5	0
Dunolly	Weekly	53	2.1	1.2	0
Echuca	Weekly	104	1.9	1.4	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	n/a	n/a	n/a	n/a	n/a
Fryerstown	Weekly	52	2.1	1.2	0
Goornong	Weekly	104	2.1	0.8	0
Guildford	n/a	n/a	n/a	n/a	n/a
Gunbower	Weekly	104	1.8	1.3	0
Harcourt	Weekly	52	2.0	1.2	0
Heathcote	Weekly	52	2.3	1.8	0
Junortoun	n/a	n/a	n/a	n/a	
Korong Vale	Weekly	104	2.7	1.7	0
Kyneton	Weekly	53	1.8	1.4	0
Laanecoorie	Weekly	53	2.2	1.8	0
Leitchville	Weekly	52	2.1	1.6	0
Lockington	Weekly	52	3.2	1.9	0
Maiden Gully - Marong	n/a	n/a	n/a	n/a	n/a
Maldon	Weekly	52	1.2	0.9	0
Malmsbury	Weekly	53	1.7	1.2	0
Newstead	Weekly	52	1.8	1.0	0
Pyramid Hill	Weekly	52	2.2	1.6	0
Raywood	Weekly	52	2.6	1.2	0
Rochester	Weekly	52	2.1	1.5	0
Sebastian	Weekly	52	2.8	1.8	0
Serpentine	Weekly	52	2.1	1.7	0
Strathfieldsaye	n/a	n/a	n/a	n/a	n/a
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Weekly	53	2.0	1.1	0
Tooborac	Weekly	52	1.5	0.9	0
Trentham	Weekly	53	3.0	1.7	0
Tylden	Weekly	53	1.8	1.2	0
Wedderburn	Weekly	104	2.2	1.6	0

Note:

1 The number of samples will vary due to the different number of exit/storage samples within each locality

2 Tank off-line for a week, routine sampling put on hold. Non-routine sampling completed before coming back on-line.

n/a – sampling is not required as there is no definitive exit point into the water sampling locality from which a sample is collected.

Ammonia – WTP exit/storage points for 2020-21

Table 20: Ammonia results for WTP exit/storage points (ADWG aesthetic guideline value is 0.5 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples[1]	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	Fortnightly	26	0.260	0.140	0
Bendigo (Northern)	Weekly	52	0.420	0.150	0
Bendigo (Southern)	Weekly	52	0.420	0.150	0
Bendigo (Spring Gully)	Weekly	52	0.420	0.150	0
Big Hill	Weekly/Monthly	76	0.550	0.150	1[2]
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	Fortnightly/Monthly	38	0.290	0.140	0
Castlemaine	Weekly	52	0.130	0.020	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	Weekly	53	0.420	0.170	0
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Weekly	52	0.420	0.150	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Weekly	52	0.130	0.020	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Weekly	52	0.130	0.020	0
Heathcote	Fortnightly	26	0.250	0.140	0
Junortoun	Weekly	52	0.420	0.150	0
Korong Vale	Fortnightly	52	0.280	0.120	0
Kyneton	n/a	n/a	n/a	n/a	n/a
Laanecoorie	Fortnightly	26	0.170	0.090	0
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Weekly	52	0.420	0.150	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	n/a	n/a	n/a	n/a	n/a
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Weekly	52	0.420	0.150	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Weekly	53	0.410	0.180	0
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	Fortnightly	52	0.290	0.130	0

Note:

1 The number of samples will vary due to the different number of exit/storage samples within each locality.

2 Details of exceedance are located in Section 4.3.1.2.

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that ammonia sampling is not necessary to manage water quality risks.

Alkalinity – WTP exit/storage points for 2020-21

Table 21: Alkalinity results for WTP exit/storage points – whilst there is no ADWG guideline limit for alkalinity, it is monitored for operational purposes.

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)
Axedale	n/a	n/a	n/a	n/a
Bealiba	n/a	n/a	n/a	n/a
Bendigo (Northern)	Weekly	52	61	52
Bendigo (Southern)	Weekly	52	61	52
Bendigo (Spring Gully)	Weekly	52	61	52
Big Hill	Weekly	52	61	52
Boort	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a
Castlemaine	Weekly	52	79	59
Cohuna	n/a	n/a	n/a	n/a
Dunolly	n/a	n/a	n/a	n/a
Echuca	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a
Epsom - Huntly	Weekly	52	61	52
Fryerstown	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a
Guildford	Weekly	52	79	59
Gunbower	n/a	n/a	n/a	n/a
Harcourt	Weekly	52	79	59
Heathcote	n/a	n/a	n/a	n/a
Junortoun	Weekly	52	61	52
Korong Vale	n/a	n/a	n/a	n/a
Kyneton	Weekly	52	65	56
Laanecoorie	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Weekly	52	61	52
Maldon	n/a	n/a	n/a	n/a
Malmsbury	Weekly	52	65	56
Newstead	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a
Strathfieldsaye	Weekly	52	61	52
Taradale - Elphinstone	n/a	n/a	n/a	n/a
Tarnagulla	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a
Wedderburn	n/a	n/a	n/a	n/a

n/a – sampling is not required, either because there is no definitive exit point into the water sampling locality from which a sample could be collected, or Coliban Water's risk assessments has indicated that alkalinity sampling is not necessary to manage water quality risks.

4.4.2 Treated Water Results from Customer Tap Sample Points

Following are tables of sampling results for each parameter at customer tap sample points in each of the sampling localities**.**

Escherichia coli (E. coli) – Customer Tap Sites 2020-21

E. coli is monitored in all water sampling localities as it is an indicator of the potential presence of faecal contamination in water.

Table 22: E. coli results for customer tap sites (Schedule 2 Drinking water quality standards: No Escherichia coli per 100mL of drinking water, with the exception of any false positive sample^)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum detected (orgs/100mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met
Axedale	Weekly	52	0	0	0
Bealiba	Weekly	53	0	0	0
Bendigo (Northern)	Weekly	130	0	0	0
Bendigo (Southern)	Weekly	130	0	0	0
Bendigo (Spring Gully)	Weekly	78	0	0	0
Big Hill	Weekly	52	0	0	0
Boort	Weekly	52	0	0	0
Bridgewater-Inglewood	Weekly	53	0	0	0
Castlemaine	Weekly	64	0	0	0
Cohuna	Weekly	52	0	0	0
Dunolly	Weekly	53	0	0	0
Echuca	Weekly	78	0	0	0
Elmore	Weekly	52	0	0	0
Epsom - Huntly	Weekly	52	0	0	0
Fryerstown	Weekly	52	0	0	0
Goornong	Weekly	52	0	0	0
Guildford	Weekly	52	0	0	0
Gunbower	Weekly	52	0	0	0
Harcourt	Weekly	52	0	0	0
Heathcote	Weekly	52	0	0	0
Junortoun	Weekly	52	0	0	0
Korong Vale	Weekly	52	0	0	0
Kyneton	Weekly	53	0	0	0
Laanecoorie	Weekly	53	0	0	0
Leitchville	Weekly	52	0	0	0
Lockington	Weekly	52	0	0	0
Maiden Gully - Marong	Weekly	53	0	0	0
Maldon	Weekly	52	0	0	0
Malmsbury	Weekly	53	0	0	0
Newstead	Weekly	52	0	0	0
Pyramid Hill	Weekly	52	0	0	0
Raywood	Weekly	52	0	0	0
Rochester	Weekly	52	0	0	0
Sebastian	Weekly	52	0	0	0
Serpentine	Weekly	52	0	0	0
Strathfieldsaye	Weekly	52	0	0	0
Taradale - Elphinstone	Weekly	53	0	0	0
Tarnagulla	Weekly	53	0	0	0
Tooborac	Weekly	52	0	0	0

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum detected (orgs/100mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met
Trentham	Weekly	53	0	0	0
Tylden	Weekly	53	0	0	0
Wedderburn	Weekly	52	0	0	0

Note:
Localities with populations greater than 5,000 have additional sampling to the one sample per week (one additional sample per month for each 5,000 above 5,000 population in accordance with the Australian Drinking Water Guidelines (2011).

^ no false positive *E. coli* results were recorded during 2020-21.

Trihalomethanes (THM) – Customer Tap Sites 2020-21

Trihalomethanes are formed as a by-product, predominantly when chlorine is used to disinfect water for drinking. They represent one group of chemicals generally referred to as disinfection by-products.

Table 23: Trihalomethanes results for customer tap sites (Schedule 2 –Drinking water quality standards - Less than or equal to 0.25 mg/L of drinking water.)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	0.1400	0.0682	0
Bealiba	Monthly	12	0.1100	0.0849	0
Bendigo (Northern)	Monthly	12	0.1400	0.0346	0
Bendigo (Southern)	Monthly	12	0.1000	0.0236	0
Bendigo (Spring Gully)	Monthly	12	0.0830	0.0243	0
Big Hill	Monthly	12	0.1200	0.0289	0
Boort	Monthly	12	0.1400	0.1060	0
Bridgewater - Inglewood	Monthly	12	0.0260	0.0163	0
Castlemaine	Monthly	12	0.0890	0.0618	0
Cohuna	Monthly	12	0.0830	0.0504	0
Dunolly	Monthly	12	0.1600	0.1002	0
Echuca	Monthly	12	0.0780	0.0442	0
Elmore[1]	Monthly	6	<0.001	<0.001	0
Epsom - Huntly	Monthly	12	0.1500	0.0357	0
Fryerstown	Monthly	12	0.1300	0.1002	0
Goornong	Monthly	12	0.1600	0.1196	0
Guildford	Monthly	12	0.1100	0.0828	0
Gunbower	Monthly	12	0.0540	0.0388	0
Harcourt	Monthly	12	0.1300	0.0927	0
Heathcote	Monthly	12	0.1200	0.0788	0
Junortoun	Monthly	12	0.1400	0.0349	0
Korong Vale	Monthly	12	0.0150	0.0070	0
Kyneton	Monthly	12	0.0700	0.0564	0
Laanecoorie	Monthly	12	0.1800	0.1088	0
Leitchville	Monthly	12	0.0590	0.0368	0
Lockington	Monthly	12	0.0770	0.0426	0
Maiden Gully - Marong	Monthly	12	0.1100	0.0302	0
Maldon	Monthly	12	0.1200	0.0982	0
Malmsbury	Monthly	12	0.1000	0.0749	0
Newstead	Monthly	12	0.1200	0.0806	0
Pyramid Hill	Monthly	12	0.0600	0.0401	0
Raywood	Monthly	12	0.1800	0.0723	0
Rochester	Monthly	12	0.0450	0.0334	0
Sebastian	Monthly	12	0.1700	0.0668	0
Serpentine	Monthly	12	0.0870	0.0552	0
Strathfieldsaye	Monthly	12	0.0700	0.0217	0
Taradale - Elphinstone	Monthly	12	0.0960	0.0698	0
Tarnagulla	Monthly	12	0.1500	0.0969	0
Tooborac	Monthly	12	0.1000	0.0748	0
Trentham	Monthly	12	0.0550	0.0345	0
Tylden	Monthly	12	0.0800	0.0609	0
Wedderburn	Monthly	12	0.0110	0.0057	0

Note:

1 Chlorine is not used for disinfection at Elmore, but to align with Schedule 2 of the SDW Regulation 2015 THM sampling commenced in January 2021.

Turbidity – Customer Tap Sites 2020-21

Turbidity is a measure of the particulate matter in water and is monitored in all water sampling localities. High turbidity in the reticulation may indicate poor operation of the water treatment process and/or increased risk of microbiological contamination.

Table 24: Turbidity results for customer tap sites (Schedule 2 – Drinking water quality standards: 95th percentile of results over 12 month period must be ≤ 5.0 NTU)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum value (NTU)	95th percentile of results (NTU)	Number of 95th percentile of results above standard
Axedale	Weekly	52	0.7	0.1	0
Bealiba	Weekly	53	0.2	0.1	0
Bendigo (Northern)	Weekly	52	0.2	0.1	0
Bendigo (Southern)	Weekly	52	6.9[1]	0.1	0
Bendigo (Spring Gully)	Weekly	52	0.1	0.1	0
Big Hill	Weekly	52	0.2	0.1	0
Boort	Weekly	52	0.4	0.2	0
Bridgewater - Inglewood	Weekly	53	2.5	0.1	0
Castlemaine	Weekly	52	0.2	0.1	0
Cohuna	Weekly	52	0.4	0.1	0
Dunolly	Weekly	53	0.1	0.1	0
Echuca	Weekly	52	0.1	0.1	0
Elmore	Weekly	52	0.2	0.1	0
Epsom - Huntly	Weekly	52	0.2	0.1	0
Fryerstown	Weekly	52	0.2	0.1	0
Goornong	Weekly	52	0.2	0.2	0
Guildford	Weekly	52	0.1	0.1	0
Gunbower	Weekly	52	0.3	0.1	0
Harcourt	Weekly	52	0.1	0.1	0
Heathcote	Weekly	52	0.2	0.1	0
Junortoun	Weekly	52	0.1	0.1	0
Korong Vale	Weekly	52	0.4	0.3	0
Kyneton	Weekly	53	0.3	0.1	0
Laanecoorie	Weekly	53	0.4	0.2	0
Leitchville	Weekly	52	0.7	0.1	0
Lockington	Weekly	52	0.1	0.1	0
Maiden Gully - Marong	Weekly	53	1.5	0.1	0
Maldon	Weekly	52	0.1	0.1	0
Malmsbury	Weekly	53	0.3	0.1	0
Newstead	Weekly	52	0.2	0.1	0
Pyramid Hill	Weekly	52	0.2	0.1	0
Raywood	Weekly	52	0.2	0.1	0
Rochester	Weekly	52	0.1	0.1	0
Sebastian	Weekly	52	0.2	0.1	0
Serpentine	Weekly	52	0.7	0.3	0
Strathfieldsaye	Weekly	52	0.1	0.1	0
Taradale - Elphinstone	Weekly	53	0.5	0.1	0
Tarnagulla	Weekly	53	0.1	0.1	0
Tooborac	Weekly	52	0.7	0.1	0
Trentham	Weekly	53	0.6	0.1	0
Tylden	Weekly	53	0.2	0.1	0
Wedderburn	Weekly	52	2.0	0.5	0

Note:

1 Whilst this one high turbidity result did not exceed the 95th percentile standard it was investigated. There was no identified issue, but the water main was flushed and resample results were consistent with normal samples. There is a fireplug in the vicinity which may have been accessed.

Chloroacetic Acid – Customer Tap Sites 2020-21

Table 25: Chloroacetic Acid results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.15 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.005	<0.005	0
Bealiba	Quarterly	4	<0.005	<0.005	0
Bendigo (Northern)	Quarterly	4	<0.005	<0.005	0
Bendigo (Southern)	Quarterly	4	<0.005	<0.005	0
Bendigo (Spring Gully)	Quarterly	4	<0.005	<0.005	0
Big Hill	Quarterly	4	<0.005	<0.005	0
Boort	Quarterly	4	<0.005	<0.005	0
Bridgewater - Inglewood	Quarterly	4	<0.005	<0.005	0
Castlemaine	Quarterly	4	<0.005	<0.005	0
Cohuna	Quarterly	4	<0.005	<0.005	0
Dunolly	Quarterly	4	<0.005	<0.005	0
Echuca	Quarterly	4	<0.005	<0.005	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Quarterly	4	<0.005	<0.005	0
Fryerstown	Quarterly	4	<0.005	<0.005	0
Goornong	Quarterly	4	<0.005	<0.005	0
Guildford	Quarterly	4	<0.005	<0.005	0
Gunbower	Quarterly	4	<0.005	<0.005	0
Harcourt	Quarterly	4	<0.005	<0.005	0
Heathcote	Quarterly	4	<0.005	<0.005	0
Junortoun	Quarterly	4	<0.005	<0.005	0
Korong Vale	Quarterly	4	<0.005	<0.005	0
Kyneton	Quarterly	4	<0.005	<0.005	0
Laanecoorie	Quarterly	4	<0.005	<0.005	0
Leitchville	Quarterly	4	<0.005	<0.005	0
Lockington	Quarterly	4	<0.005	<0.005	0
Maiden Gully - Marong	Quarterly	4	<0.005	<0.005	0
Maldon	Quarterly	4	<0.005	<0.005	0
Malmsbury	Quarterly	4	<0.005	<0.005	0
Newstead	Quarterly	4	<0.005	<0.005	0
Pyramid Hill	Quarterly	4	<0.005	<0.005	0
Raywood	Quarterly	4	<0.005	<0.005	0
Rochester	Quarterly	4	<0.005	<0.005	0
Sebastian	Quarterly	4	<0.005	<0.005	0
Serpentine	Quarterly	4	<0.005	<0.005	0
Strathfieldsaye	Quarterly	4	<0.005	<0.005	0
Taradale - Elphinstone	Quarterly	4	<0.005	<0.005	0
Tarnagulla	Quarterly	4	<0.005	<0.005	0
Tooborac	Quarterly	4	<0.005	<0.005	0
Trentham	Quarterly	4	<0.005	<0.005	0
Tylden	Quarterly	4	<0.005	<0.005	0
Wedderburn	Quarterly	4	<0.005	<0.005	0

Note:

1 Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Dichloroacetic Acid – Customer Tap Sites 2020-21

Table 26: Dichloroacetic Acid results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.1 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	0.011	0.009	0
Bealiba	Quarterly	4	0.020	0.010	0
Bendigo (Northern)	Quarterly	4	0.023	0.011	0
Bendigo (Southern)	Quarterly	4	0.011	0.005	0
Bendigo (Spring Gully)	Quarterly	4	0.024	0.010	0
Big Hill	Quarterly	4	0.005	0.003	0
Boort	Quarterly	4	0.014	0.010	0
Bridgewater - Inglewood	Quarterly	4	<0.005	<0.005	0
Castlemaine	Quarterly	4	0.026	0.016	0
Cohuna	Quarterly	4	0.030	0.022	0
Dunolly	Quarterly	4	0.015	0.011	0
Echuca	Quarterly	4	0.024	0.017	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Quarterly	4	0.023	0.010	0
Fryerstown	Quarterly	4	0.040	0.025	0
Goornong	Quarterly	4	0.014	0.005	0
Guildford	Quarterly	4	0.006	0.004	0
Gunbower	Quarterly	4	0.018	0.012	0
Harcourt	Quarterly	4	0.026	0.013	0
Heathcote	Quarterly	4	0.014	0.010	0
Junortoun	Quarterly	4	0.029	0.012	0
Korong Vale	Quarterly	4	0.005	0.003	0
Kyneton	Quarterly	4	0.024	0.021	0
Laanecoorie	Quarterly	4	0.012	0.007	0
Leitchville	Quarterly	4	0.018	0.014	0
Lockington	Quarterly	4	0.013	0.011	0
Maiden Gully - Marong	Quarterly	4	0.020	0.009	0
Maldon	Quarterly	4	<0.005	<0.005	0
Malmsbury	Quarterly	4	0.025	0.017	0
Newstead	Quarterly	4	0.021	0.012	0
Pyramid Hill	Quarterly	4	0.011	0.008	0
Raywood	Quarterly	4	0.012	0.010	0
Rochester	Quarterly	4	0.009	0.006	0
Sebastian	Quarterly	4	0.013	0.007	0
Serpentine	Quarterly	4	0.014	0.012	0
Strathfieldsaye	Quarterly	4	0.020	0.009	0
Taradale - Elphinstone	Quarterly	4	0.021	0.011	0
Tarnagulla	Quarterly	4	0.014	0.011	0
Tooborac	Quarterly	4	0.015	0.010	0
Trentham	Quarterly	4	0.011	0.008	0
Tylden	Quarterly	4	0.030	0.023	0
Wedderburn	Quarterly	4	0.007	0.005	0

Note:

1 Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Trichloroacetic Acid – Customer Tap Sites 2020-21

Table 27: Trichloroacetic Acid results for customer tap sites (Water quality standard - ADWG health-based guideline value 0.1 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	0.009	0.006	0
Bealiba	Quarterly	4	<0.005	<0.005	0
Bendigo (Northern)	Quarterly	4	0.016	0.006	0
Bendigo (Southern)	Quarterly	4	0.008	0.004	0
Bendigo (Spring Gully)	Quarterly	4	0.016	0.006	0
Big Hill	Quarterly	4	0.018	0.006	0
Boort	Quarterly	4	0.011	0.008	0
Bridgewater - Inglewood	Quarterly	4	<0.005	<0.005	0
Castlemaine	Quarterly	4	0.017	0.009	0
Cohuna	Quarterly	4	0.028	0.020	0
Dunolly	Quarterly	4	<0.005	<0.005	0
Echuca	Quarterly	4	0.025	0.017	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Quarterly	4	0.018	0.006	0
Fryerstown	Quarterly	4	0.026	0.016	0
Goornong	Quarterly	4	0.009	0.006	0
Guildford	Quarterly	4	0.019	0.011	0
Gunbower	Quarterly	4	0.016	0.011	0
Harcourt	Quarterly	4	0.016	0.012	0
Heathcote	Quarterly	4	0.008	0.004	0
Junortoun	Quarterly	4	0.019	0.007	0
Korong Vale	Quarterly	4	<0.005	<0.005	0
Kyneton	Quarterly	4	0.018	0.015	0
Laanecoorie	Quarterly	4	<0.005	<0.005	0
Leitchville	Quarterly	4	0.016	0.012	0
Lockington	Quarterly	4	0.008	0.006	0
Maiden Gully - Marong	Quarterly	4	0.014	0.005	0
Maldon	Quarterly	4	<0.005	<0.005	0
Malmsbury	Quarterly	4	0.020	0.017	0
Newstead	Quarterly	4	0.018	0.013	0
Pyramid Hill	Quarterly	4	0.007	0.004	0
Raywood	Quarterly	4	0.014	0.008	0
Rochester	Quarterly	4	0.006	0.004	0
Sebastian	Quarterly	4	0.019	0.007	0
Serpentine	Quarterly	4	0.008	0.006	0
Strathfieldsaye	Quarterly	4	0.013	0.005	0
Taradale - Elphinstone	Quarterly	4	0.019	0.013	0
Tarnagulla	Quarterly	4	<0.005	<0.005	0
Tooborac	Quarterly	4	0.010	0.006	0
Trentham	Quarterly	4	0.009	0.005	0
Tylden	Quarterly	4	0.022	0.016	0
Wedderburn	Quarterly	4	<0.005	<0.005	0

Note:

1 Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Bromate – Customer Tap Sites 2020-21

Table 28: Bromate results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.02 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	<0.005	<0.005	0
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	<0.005	<0.005	0
Bendigo (Southern)	Monthly	12	<0.005	<0.005	0
Bendigo (Spring Gully)	Monthly	12	<0.005	<0.005	0
Big Hill	Monthly	12	<0.005	<0.005	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a
Castlemaine	Quarterly	4	<0.005	<0.005	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	<0.005	<0.005	0
Fryerstown	Quarterly	4	<0.005	<0.005	0
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Quarterly	4	<0.005	<0.005	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Quarterly	4	<0.005	<0.005	0
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	Monthly	12	<0.005	<0.005	0
Korong Vale	n/a	n/a	n/a	n/a	n/a
Kyneton	Quarterly	4	<0.005	<0.005	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Monthly	12	<0.005	<0.005	0
Maldon	Quarterly	4	<0.005	<0.005	0
Malmsbury	Quarterly	4	<0.005	<0.005	0
Newstead	Quarterly	4	<0.005	<0.005	0
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	Monthly	12	<0.005	<0.005	0
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	Monthly	12	<0.005	<0.005	0
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Monthly	12	<0.005	<0.005	0
Taradale - Elphinstone	Quarterly	4	<0.005	<0.005	0
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	Quarterly	4	<0.005	<0.005	0
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

Bromate is monitored in localities where ozone is used in treatment, as ozone can result in the production of this by-products in drinking water.

Ozone is used at the Bendigo, Castlemaine and Kyneton Water Treatment Plants. Review of historical data has identified sampling localities supplied from Castlemaine and Kyneton WTP's as low risk, therefore monitoring is quarterly in those localities.

Ozone-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been ozonated.

Formaldehyde – Customer Tap Sites 2020-21

Table 29: Formaldehyde results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.5 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	0.1	0.0	0
Bealiba	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.1	0.0	0
Bendigo (Southern)	Monthly	12	<0.05	<0.05	0
Bendigo (Spring Gully)	Monthly	12	<0.05	<0.05	0
Big Hill	Monthly	12	<0.05	<0.05	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a
Castlemaine	Quarterly	4	<0.05	<0.05	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	n/a	n/a	n/a	n/a	n/a
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	<0.05	<0.05	0
Fryerstown	Quarterly	4	<0.05	<0.05	0
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Quarterly	4	<0.05	<0.05	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Quarterly	4	<0.05	<0.05	0
Heathcote	n/a	n/a	n/a	n/a	n/a
Junortoun	Monthly	12	<0.05	<0.05	0
Korong Vale	n/a	n/a	n/a	n/a	n/a
Kyneton	Quarterly	4	<0.05	<0.05	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Monthly	12	<0.05	<0.05	0
Maldon	Quarterly	4	<0.05	<0.05	0
Malmsbury	Quarterly	4	<0.05	<0.05	0
Newstead	Quarterly	4	<0.05	<0.05	0
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	Monthly	12	<0.05	<0.05	0
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	Monthly	12	<0.05	<0.05	0
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Monthly	12	<0.05	<0.05	0
Taradale - Elphinstone	Quarterly	4	<0.05	<0.05	0
Tarnagulla	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	Quarterly	4	<0.05	<0.05	0
Wedderburn	n/a	n/a	n/a	n/a	n/a

Note:

Formaldehyde is monitored in localities where ozone is used in treatment, as ozone can result in the production of this by-products in drinking water.

Ozone is used at the Bendigo, Castlemaine and Kyneton Water Treatment Plants. Review of historical data has identified sampling localities supplied from Castlemaine and Kyneton WTP's as low risk, therefore monitoring is quarterly in those localities

Ozone-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been ozonated.

Fluoride – Customer Tap Sites 2020-21

Table 30: Fluoride results for customer tap sites *(Water quality standard - ADWG health-based guideline value: 1.5 mg/L)*

Water Sampling Locality	Sampling Frequency	Number of Samples	Target optimum operating fluoride concentration (mg/L)	Max (mg/L)	Min (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	0.9	0.960	0.390	0.850	0
Bealiba	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bendigo (Northern)	Monthly	12	0.9	0.950	0.840	0.887	0
Bendigo (Southern)	Monthly	12	0.9	0.980	0.320	0.841	0
Bendigo (Spring Gully)	Monthly	12	0.9	0.970	0.780	0.883	0
Big Hill	Monthly	12	0.9	0.920	0.790	0.875	0
Boort	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Castlemaine	Monthly	12	0.9	0.940	0.780	0.873	0
Cohuna	Weekly	9[1]	0.8	0.830	0.340	0.701	0
Dunolly	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Echuca	Weekly	52	0.8	0.900	<0.05	0.702	0
Elmore	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Monthly	12	0.9	0.990	0.810	0.893	0
Fryerstown	Monthly	12	0.9	0.920	0.810	0.875	0
Goornong	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Guildford	Monthly	12	0.9	0.910	0.790	0.862	0
Gunbower	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Harcourt	Monthly	12	0.9	0.920	0.740	0.851	0
Heathcote	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Junortoun	Monthly	12	0.9	0.960	0.770	0.876	0
Korong Vale	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kyneton	Weekly	53	0.9	0.970	0.770	0.882	0
Laanecoorie	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Leitchville	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Monthly	12	0.9	0.960	0.800	0.876	0
Maldon	Monthly	12	0.9	0.910	0.730	0.854	0
Malmsbury	Weekly	53	0.9	0.990	0.720	0.882	0
Newstead	Monthly	12	0.9	0.940	0.830	0.866	0
Pyramid Hill	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Raywood	Monthly	12	0.9	0.950	0.140	0.823	0
Rochester	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sebastian	Monthly	12	0.9	0.920	0.170	0.816	0
Serpentine	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Monthly	12	0.9	0.920	0.080	0.812	0
Taradale - Elphinstone	Monthly	12	0.9	0.970	0.760	0.878	0
Tarnagulla	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tooborac	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tylden	Weekly	53	0.9	0.980	0.740	0.880	0
Wedderburn	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note:

1 Cohuna WTP fluoride system commenced operation at end of April 2021, with weekly customer tap sampling.

Arsenic – Customer Tap Sites 2020-21

Table 31: Arsenic results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.01 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.001	<0.001	0
Bealiba	Quarterly	4	<0.001	<0.001	0
Bendigo (Northern)	Quarterly	4	<0.001	<0.001	0
Bendigo (Southern)	Quarterly	4	<0.001	<0.001	0
Bendigo (Spring Gully)	Quarterly	4	<0.001	<0.001	0
Big Hill	Quarterly	4	<0.001	<0.001	0
Boort	Quarterly	4	<0.001	<0.001	0
Bridgewater - Inglewood	Quarterly	4	<0.001	<0.001	0
Castlemaine	Quarterly	4	<0.001	<0.001	0
Cohuna	Quarterly	4	<0.001	<0.001	0
Dunolly	Quarterly	4	<0.001	<0.001	0
Echuca	Quarterly	4	<0.001	<0.001	0
Elmore	Quarterly	4	<0.001	<0.001	0
Epsom - Huntly	Quarterly	4	<0.001	<0.001	0
Fryerstown	Quarterly	4	<0.001	<0.001	0
Goornong	Quarterly	4	<0.001	<0.001	0
Guildford	Quarterly	4	<0.001	<0.001	0
Gunbower	Quarterly	4	<0.001	<0.001	0
Harcourt	Quarterly	4	<0.001	<0.001	0
Heathcote	Quarterly	4	<0.001	<0.001	0
Junortoun	Quarterly	4	<0.001	<0.001	0
Korong Vale	Quarterly	4	<0.001	<0.001	0
Kyneton	Quarterly	4	<0.001	<0.001	0
Laanecoorie	Quarterly	4	<0.001	<0.001	0
Leitchville	Quarterly	4	<0.001	<0.001	0
Lockington	Quarterly	4	<0.001	<0.001	0
Maiden Gully - Marong	Quarterly	4	<0.001	<0.001	0
Maldon	Quarterly	4	<0.001	<0.001	0
Malmsbury	Quarterly	4	<0.001	<0.001	0
Newstead	Quarterly	4	<0.001	<0.001	0
Pyramid Hill	Quarterly	4	<0.001	<0.001	0
Raywood	Quarterly	4	<0.001	<0.001	0
Rochester	Quarterly	4	<0.001	<0.001	0
Sebastian	Quarterly	4	<0.001	<0.001	0
Serpentine	Quarterly	4	<0.001	<0.001	0
Strathfieldsaye	Quarterly	4	<0.001	<0.001	0
Taradale - Elphinstone	Quarterly	4	<0.001	<0.001	0
Tarnagulla	Quarterly	4	<0.001	<0.001	0
Tooborac	Quarterly	4	<0.001	<0.001	0
Trentham	Quarterly	4	<0.001	<0.001	0
Tylden	Quarterly	4	<0.001	<0.001	0
Wedderburn	Quarterly	4	<0.001	<0.001	0

Cadmium – Customer Tap Sites 2020-21

Table 32: Cadmium results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.002 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.0002	<0.0002	0
Bealiba	Quarterly	4	<0.0002	<0.0002	0
Bendigo (Northern)	Quarterly	4	<0.0002	<0.0002	0
Bendigo (Southern)	Quarterly	4	<0.0002	<0.0002	0
Bendigo (Spring Gully)	Quarterly	4	<0.0002	<0.0002	0
Big Hill	Quarterly	4	<0.0002	<0.0002	0
Boort	Quarterly	4	<0.0002	<0.0002	0
Bridgewater - Inglewood	Quarterly	4	<0.0002	<0.0002	0
Castlemaine	Quarterly	4	<0.0002	<0.0002	0
Cohuna	Quarterly	4	<0.0002	<0.0002	0
Dunolly	Quarterly	4	<0.0002	<0.0002	0
Echuca	Quarterly	4	<0.0002	<0.0002	0
Elmore	Quarterly	4	<0.0002	<0.0002	0
Epsom - Huntly	Quarterly	4	<0.0002	<0.0002	0
Fryerstown	Quarterly	4	<0.0002	<0.0002	0
Goornong	Quarterly	4	<0.0002	<0.0002	0
Guildford	Quarterly	4	<0.0002	<0.0002	0
Gunbower	Quarterly	4	<0.0002	<0.0002	0
Harcourt	Quarterly	4	<0.0002	<0.0002	0
Heathcote	Quarterly	4	<0.0002	<0.0002	0
Junortoun	Quarterly	4	<0.0002	<0.0002	0
Korong Vale	Quarterly	4	<0.0002	<0.0002	0
Kyneton	Quarterly	4	<0.0002	<0.0002	0
Laanecoorie	Quarterly	4	<0.0002	<0.0002	0
Leitchville	Quarterly	4	<0.0002	<0.0002	0
Lockington	Quarterly	4	<0.0002	<0.0002	0
Maiden Gully - Marong	Quarterly	4	<0.0002	<0.0002	0
Maldon	Quarterly	4	<0.0002	<0.0002	0
Malmsbury	Quarterly	4	<0.0002	<0.0002	0
Newstead	Quarterly	4	<0.0002	<0.0002	0
Pyramid Hill	Quarterly	4	<0.0002	<0.0002	0
Raywood	Quarterly	4	<0.0002	<0.0002	0
Rochester	Quarterly	4	<0.0002	<0.0002	0
Sebastian	Quarterly	4	<0.0002	<0.0002	0
Serpentine	Quarterly	4	<0.0002	<0.0002	0
Strathfieldsaye	Quarterly	4	<0.0002	<0.0002	0
Taradale - Elphinstone	Quarterly	4	<0.0002	<0.0002	0
Tarnagulla	Quarterly	4	<0.0002	<0.0002	0
Tooborac	Quarterly	4	<0.0002	<0.0002	0
Trentham	Quarterly	4	<0.0002	<0.0002	0
Tylden	Quarterly	4	<0.0002	<0.0002	0
Wedderburn	Quarterly	4	<0.0002	<0.0002	0

Chlorine – Customer Tap Sites 2020-21

Table 33: Chlorine results for customer tap sites (Water quality standard - ADWG health-based guideline value: 5 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Weekly	52	3.10	1.01	0
Bealiba	Weekly	53	1.57	1.14	0
Bendigo (Northern)	Weekly	130	2.14	1.29	0
Bendigo (Southern)	Weekly	130	2.30	1.37	0
Bendigo (Spring Gully)	Weekly	78	2.14	1.37	0
Big Hill	Weekly	52	2.50	0.75	0
Boort	Weekly	52	1.53	0.65	0
Bridgewater - Inglewood	Weekly	53	2.90	1.76	0
Castlemaine	Weekly	64	1.92	1.09	0
Cohuna	Weekly	52	2.40	1.40	0
Dunolly	Weekly	53	1.57	1.14	0
Echuca	Weekly	78	1.89	1.33	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Weekly	52	1.89	1.35	0
Fryerstown	Weekly	52	1.71	0.71	0
Goornong	Weekly	52	1.59	0.75	0
Guildford	Weekly	52	0.90	0.31	0
Gunbower	Weekly	52	1.79	1.20	0
Harcourt	Weekly	52	1.60	0.63	0
Heathcote	Weekly	52	2.03	1.46	0
Junortoun	Weekly	52	1.93	0.83	0
Korong Vale	Weekly	52	2.70	1.56	0
Kyneton	Weekly	53	2.16	1.60	0
Laanecoorie	Weekly	53	1.84	1.13	0
Leitchville	Weekly	52	1.90	1.40	0
Lockington	Weekly	52	1.90	1.30	0
Maiden Gully - Marong	Weekly	53	2.16	1.65	0
Maldon	Weekly	52	0.89	0.70	0
Malmsbury	Weekly	53	1.63	0.87	0
Newstead	Weekly	52	1.41	0.70	0
Pyramid Hill	Weekly	52	1.71	1.06	0
Raywood	Weekly	52	2.02	0.91	0
Rochester	Weekly	52	2.01	1.28	0
Sebastian	Weekly	52	1.61	0.57	0
Serpentine	Weekly	52	1.91	0.92	0
Strathfieldsaye	Weekly	52	2.11	1.59	0
Taradale - Elphinstone	Weekly	53	1.83	0.85	0
Tarnagulla	Weekly	53	1.47	1.01	0
Tooborac	Weekly	52	1.45	0.54	0
Trentham	Weekly	53	2.07	1.38	0
Tylden	Weekly	53	2.04	1.26	0
Wedderburn	Weekly	52	2.05	1.47	0

Localities with populations greater than 5,000 have additional sampling to the one sample per week (one additional sample per month for each 5,000 above 5,000 population in accordance with the Australian Drinking Water Guidelines (2011).

Note:

1 Chlorine is not used for disinfection at Elmore.

Chromium – Customer Tap Sites 2020-21

Table 34: Chromium results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.05 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.001	<0.001	0
Bealiba	Quarterly	4	<0.001	<0.001	0
Bendigo (Northern)	Quarterly	4	<0.001	<0.001	0
Bendigo (Southern)	Quarterly	4	<0.001	<0.001	0
Bendigo (Spring Gully)	Quarterly	4	<0.001	<0.001	0
Big Hill	Quarterly	4	<0.001	<0.001	0
Boort	Quarterly	4	<0.001	<0.001	0
Bridgewater - Inglewood	Quarterly	4	<0.001	<0.001	0
Castlemaine	Quarterly	4	<0.001	<0.001	0
Cohuna	Quarterly	4	<0.001	<0.001	0
Dunolly	Quarterly	4	<0.001	<0.001	0
Echuca	Quarterly	4	<0.001	<0.001	0
Elmore	Quarterly	4	<0.001	<0.001	0
Epsom - Huntly	Quarterly	4	<0.001	<0.001	0
Fryerstown	Quarterly	4	<0.001	<0.001	0
Goornong	Quarterly	4	<0.001	<0.001	0
Guildford	Quarterly	4	<0.001	<0.001	0
Gunbower	Quarterly	4	<0.001	<0.001	0
Harcourt	Quarterly	4	<0.001	<0.001	0
Heathcote	Quarterly	4	<0.001	<0.001	0
Junortoun	Quarterly	4	<0.001	<0.001	0
Korong Vale	Quarterly	4	<0.001	<0.001	0
Kyneton	Quarterly	4	<0.001	<0.001	0
Laanecoorie	Quarterly	4	<0.001	<0.001	0
Leitchville	Quarterly	4	<0.001	<0.001	0
Lockington	Quarterly	4	<0.001	<0.001	0
Maiden Gully - Marong	Quarterly	4	<0.001	<0.001	0
Maldon	Quarterly	4	<0.001	<0.001	0
Malmsbury	Quarterly	4	<0.001	<0.001	0
Newstead	Quarterly	4	<0.001	<0.001	0
Pyramid Hill	Quarterly	4	<0.001	<0.001	0
Raywood	Quarterly	4	<0.001	<0.001	0
Rochester	Quarterly	4	<0.001	<0.001	0
Sebastian	Quarterly	4	<0.001	<0.001	0
Serpentine	Quarterly	4	<0.001	<0.001	0
Strathfieldsaye	Quarterly	4	<0.001	<0.001	0
Taradale - Elphinstone	Quarterly	4	<0.001	<0.001	0
Tarnagulla	Quarterly	4	<0.001	<0.001	0
Tooborac	Quarterly	4	<0.001	<0.001	0
Trentham	Quarterly	4	<0.001	<0.001	0
Tylden	Quarterly	4	<0.001	<0.001	0
Wedderburn	Quarterly	4	<0.001	<0.001	0

Cyanide – Customer Tap Sites 2020-21

Table 35: Cyanide results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.08 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.005	<0.005	0
Bealiba	Quarterly	4	<0.005	<0.005	0
Bendigo (Northern)	Quarterly	4	<0.005	<0.005	0
Bendigo (Southern)	Quarterly	4	<0.005	<0.005	0
Bendigo (Spring Gully)	Quarterly	4	<0.005	<0.005	0
Big Hill	Quarterly	4	<0.005	<0.005	0
Boort	Quarterly	4	<0.005	<0.005	0
Bridgewater - Inglewood	Quarterly	4	<0.005	<0.005	0
Castlemaine	Quarterly	4	<0.005	<0.005	0
Cohuna	Quarterly	4	<0.005	<0.005	0
Dunolly	Quarterly	4	<0.005	<0.005	0
Echuca	Quarterly	4	<0.005	<0.005	0
Elmore	Quarterly	4	<0.005	<0.005	0
Epsom - Huntly	Quarterly	4	<0.005	<0.005	0
Fryerstown	Quarterly	4	<0.005	<0.005	0
Goornong	Quarterly	4	<0.005	<0.005	0
Guildford	Quarterly	4	<0.005	<0.005	0
Gunbower	Quarterly	4	<0.005	<0.005	0
Harcourt	Quarterly	4	<0.005	<0.005	0
Heathcote	Quarterly	4	<0.005	<0.005	0
Junortoun	Quarterly	4	<0.005	<0.005	0
Korong Vale	Quarterly	4	<0.005	<0.005	0
Kyneton	Quarterly	4	<0.005	<0.005	0
Laanecoorie	Quarterly	4	<0.005	<0.005	0
Leitchville	Quarterly	4	<0.005	<0.005	0
Lockington	Quarterly	4	<0.005	<0.005	0
Maiden Gully - Marong	Quarterly	4	<0.005	<0.005	0
Maldon	Quarterly	4	<0.005	<0.005	0
Malmsbury	Quarterly	4	<0.005	<0.005	0
Newstead	Quarterly	4	<0.005	<0.005	0
Pyramid Hill	Quarterly	4	<0.005	<0.005	0
Raywood	Quarterly	4	<0.005	<0.005	0
Rochester	Quarterly	4	<0.005	<0.005	0
Sebastian	Quarterly	4	<0.005	<0.005	0
Serpentine	Quarterly	4	<0.005	<0.005	0
Strathfieldsaye	Quarterly	4	<0.005	<0.005	0
Taradale - Elphinstone	Quarterly	4	<0.005	<0.005	0
Tarnagulla	Quarterly	4	<0.005	<0.005	0
Tooborac	Quarterly	4	<0.005	<0.005	0
Trentham	Quarterly	4	<0.005	<0.005	0
Tylden	Quarterly	4	<0.005	<0.005	0
Wedderburn	Quarterly	4	<0.005	<0.005	0

Mercury – Customer Tap Sites 2020-21

Table 36: Mercury results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.001 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.0001	<0.0001	0
Bealiba	Quarterly	4	<0.0001	<0.0001	0
Bendigo (Northern)	Quarterly	4	<0.0001	<0.0001	0
Bendigo (Southern)	Quarterly	4	<0.0001	<0.0001	0
Bendigo (Spring Gully)	Quarterly	4	<0.0001	<0.0001	0
Big Hill	Quarterly	4	<0.0001	<0.0001	0
Boort	Quarterly	4	<0.0001	<0.0001	0
Bridgewater - Inglewood	Quarterly	4	<0.0001	<0.0001	0
Castlemaine	Quarterly	4	0.00010	0.00006	0
Cohuna	Quarterly	4	<0.0001	<0.0001	0
Dunolly	Quarterly	4	<0.0001	<0.0001	0
Echuca	Quarterly	4	<0.0001	<0.0001	0
Elmore	Quarterly	4	<0.0001	<0.0001	0
Epsom - Huntly	Quarterly	4	<0.0001	<0.0001	0
Fryerstown	Quarterly	4	<0.0001	<0.0001	0
Goornong	Quarterly	4	<0.0001	<0.0001	0
Guildford	Quarterly	4	<0.0001	<0.0001	0
Gunbower	Quarterly	4	<0.0001	<0.0001	0
Harcourt	Quarterly	4	<0.0001	<0.0001	0
Heathcote	Quarterly	4	<0.0001	<0.0001	0
Junortoun	Quarterly	4	<0.0001	<0.0001	0
Korong Vale	Quarterly	4	<0.0001	<0.0001	0
Kyneton	Quarterly	4	<0.0001	<0.0001	0
Laanecoorie	Quarterly	4	<0.0001	<0.0001	0
Leitchville	Quarterly	4	<0.0001	<0.0001	0
Lockington	Quarterly	4	<0.0001	<0.0001	0
Maiden Gully - Marong	Quarterly	4	<0.0001	<0.0001	0
Maldon	Quarterly	4	<0.0001	<0.0001	0
Malmsbury	Quarterly	4	<0.0001	<0.0001	0
Newstead	Quarterly	4	<0.0001	<0.0001	0
Pyramid Hill	Quarterly	4	<0.0001	<0.0001	0
Raywood	Quarterly	4	<0.0001	<0.0001	0
Rochester	Quarterly	4	<0.0001	<0.0001	0
Sebastian	Quarterly	4	<0.0001	<0.0001	0
Serpentine	Quarterly	4	<0.0001	<0.0001	0
Strathfieldsaye	Quarterly	4	<0.0001	<0.0001	0
Taradale - Elphinstone	Quarterly	4	<0.0001	<0.0001	0
Tarnagulla	Quarterly	4	<0.0001	<0.0001	0
Tooborac	Quarterly	4	<0.0001	<0.0001	0
Trentham	Quarterly	4	<0.0001	<0.0001	0
Tylden	Quarterly	4	<0.0001	<0.0001	0
Wedderburn	Quarterly	4	<0.0001	<0.0001	0

Nitrate – Customer Tap Sites 2020-21

Table 37: Nitrate results for customer tap sites (Water quality standard - ADWG health-based guideline value: 50 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale[2]	Quarterly	4	4.2	3.3	0
Bealiba[1]	Fortnightly	26	2.6	1.2	0
Bendigo (Northern) [1]	Fortnightly	26	2.3	1.4	0
Bendigo (Southern) [1]	Fortnightly	26	3.0	1.4	0
Bendigo (Spring Gully) [1]	Fortnightly	26	21.2	2.1	0
Big Hill[1]	Fortnightly	26	2.5	1.7	0
Boort[2]	Quarterly	4	0.8	0.4	0
Bridgewater-Inglewood[1]	Fortnightly	27	0.8	0.3	0
Castlemaine[2]	Quarterly	4	0.7	0.6	0
Cohuna[2]	Quarterly	4	0.2	0.1	0
Dunolly[1]	Fortnightly	26	1.6	0.6	0
Echuca[2]	Quarterly	4	0.8	0.2	0
Elmore[2]	Quarterly	4	7.5	5.8	0
Epsom - Huntly[1]	Fortnightly	26	2.1	1.3	0
Fryerstown[2]	Quarterly	4	1.0	0.8	0
Goornong[2]	Quarterly	4	2.2	0.7	0
Guildford[2]	Quarterly	4	1.0	0.7	0
Gunbower[2]	Quarterly	4	0.8	0.3	0
Harcourt[2]	Quarterly	4	0.6	0.5	0
Heathcote[1]	Fortnightly	26	4.9	0.7	0
Junortoun[1]	Fortnightly	26	3.8	1.7	0
Korong Vale[1]	Fortnightly	26	1.0	0.3	0
Kyneton[2]	Quarterly	4	1.5	1.4	0
Laanecoorie[1]	Fortnightly	26	1.5	0.6	0
Leitchville[2]	Quarterly	4	2.3	0.7	0
Lockington[2]	Quarterly	4	0.1	0.1	0
Maiden Gully - Marong[1]	Fortnightly	26	2.8	1.4	0
Maldon[2]	Quarterly	4	0.8	0.6	0
Malmsbury[2]	Quarterly	4	1.9	1.6	0
Newstead[2]	Quarterly	4	0.7	0.6	0
Pyramid Hill[2]	Quarterly	4	0.2	0.1	0
Raywood[2]	Quarterly	4	4.3	3.3	0
Rochester[2]	Quarterly	4	0.9	0.4	0
Sebastian[2]	Quarterly	4	6.6	3.2	0
Serpentine[2]	Quarterly	4	1.1	0.9	0
Strathfieldsaye[1]	Fortnightly	26	1.7	1.2	0
Taradale – Elphinstone[2]	Quarterly	4	0.8	0.7	0
Tarnagulla[1]	Fortnightly	27	1.7	0.6	0
Tooborac[2]	Quarterly	4	3.0	2.0	0
Trentham[2]	Quarterly	4	6.6	5.4	0
Tylden[2]	Quarterly	4	1.9	1.6	0
Wedderburn[1]	Fortnightly	26	2.0	0.4	0

Note:

1 Chloraminated systems are sampled fortnightly, to assist in monitoring for nitrification.

2 Chlorinated systems are sampled quarterly.

Selenium – Customer Tap Sites 2020-21

Table 38: Selenium results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.01 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	<0.001	<0.001	0
Bealiba	Quarterly	4	<0.001	<0.001	0
Bendigo (Northern)	Quarterly	4	<0.001	<0.001	0
Bendigo (Southern)	Quarterly	4	<0.001	<0.001	0
Bendigo (Spring Gully)	Quarterly	4	<0.001	<0.001	0
Big Hill	Quarterly	4	<0.001	<0.001	0
Boort	Quarterly	4	<0.001	<0.001	0
Bridgewater - Inglewood	Quarterly	4	<0.001	<0.001	0
Castlemaine	Quarterly	4	<0.001	<0.001	0
Cohuna	Quarterly	4	<0.001	<0.001	0
Dunolly	Quarterly	4	<0.001	<0.001	0
Echuca	Quarterly	4	<0.001	<0.001	0
Elmore	Quarterly	4	<0.001	<0.001	0
Epsom - Huntly	Quarterly	4	<0.001	<0.001	0
Fryerstown	Quarterly	4	<0.001	<0.001	0
Goornong	Quarterly	4	<0.001	<0.001	0
Guildford	Quarterly	4	<0.001	<0.001	0
Gunbower	Quarterly	4	<0.001	<0.001	0
Harcourt	Quarterly	4	<0.001	<0.001	0
Heathcote	Quarterly	4	<0.001	<0.001	0
Junortoun	Quarterly	4	<0.001	<0.001	0
Korong Vale	Quarterly	4	<0.001	<0.001	0
Kyneton	Quarterly	4	<0.001	<0.001	0
Laanecoorie	Quarterly	4	<0.001	<0.001	0
Leitchville	Quarterly	4	<0.001	<0.001	0
Lockington	Quarterly	4	<0.001	<0.001	0
Maiden Gully - Marong	Quarterly	4	<0.001	<0.001	0
Maldon	Quarterly	4	<0.001	<0.001	0
Malmsbury	Quarterly	4	<0.001	<0.001	0
Newstead	Quarterly	4	<0.001	<0.001	0
Pyramid Hill	Quarterly	4	<0.001	<0.001	0
Raywood	Quarterly	4	<0.001	<0.001	0
Rochester	Quarterly	4	<0.001	<0.001	0
Sebastian	Quarterly	4	<0.001	<0.001	0
Serpentine	Quarterly	4	<0.001	<0.001	0
Strathfieldsaye	Quarterly	4	<0.001	<0.001	0
Taradale - Elphinstone	Quarterly	4	<0.001	<0.001	0
Tarnagulla	Quarterly	4	<0.001	<0.001	0
Tooborac	Quarterly	4	<0.001	<0.001	0
Trentham	Quarterly	4	<0.001	<0.001	0
Tylden	Quarterly	4	<0.001	<0.001	0
Wedderburn	Quarterly	4	<0.001	<0.001	0

Sulphate – Customer Tap Sites 2020-21

Table 39: Sulphate results for customer tap sites (Water quality standard - ADWG health-based guideline value 500 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	6.000	4.750	0
Bealiba	Quarterly	4	78.000	62.500	0
Bendigo (Northern)	Quarterly	4	7.000	4.500	0
Bendigo (Southern)	Quarterly	4	6.000	4.250	0
Bendigo (Spring Gully)	Quarterly	4	6.000	4.250	0
Big Hill	Quarterly	4	9.000	5.500	0
Boort	Quarterly	4	54.000	46.000	0
Bridgewater - Inglewood	Quarterly	4	6.000	4.500	0
Castlemaine	Quarterly	4	5.000	4.750	0
Cohuna	Quarterly	4	40.000	31.000	0
Dunolly	Quarterly	4	90.000	76.500	0
Echuca	Quarterly	4	34.000	24.750	0
Elmore	Quarterly	4	12.000	9.500	0
Epsom - Huntly	Quarterly	4	5.000	4.500	0
Fryerstown	Quarterly	4	7.000	5.500	0
Goornong	Quarterly	4	81.000	66.000	0
Guildford	Quarterly	4	6.000	5.000	0
Gunbower	Quarterly	4	3.000	2.500	0
Harcourt	Quarterly	4	5.000	4.750	0
Heathcote	Quarterly	4	62.000	54.500	0
Junortoun	Quarterly	4	5.000	4.000	0
Korong Vale	Quarterly	4	17.000	11.500	0
Kyneton	Quarterly	4	5.000	4.250	0
Laanecoorie	Quarterly	4	96.000	78.250	0
Leitchville	Quarterly	4	30.000	24.000	0
Lockington	Quarterly	4	5.000	3.500	0
Maiden Gully - Marong	Quarterly	4	6.000	4.500	0
Maldon	Quarterly	4	5.000	5.000	0
Malmsbury	Quarterly	4	4.000	4.000	0
Newstead	Quarterly	4	5.000	5.000	0
Pyramid Hill	Quarterly	4	30.000	20.250	0
Raywood	Quarterly	4	8.000	5.250	0
Rochester	Quarterly	4	37.000	27.000	0
Sebastian	Quarterly	4	6.000	4.250	0
Serpentine	Quarterly	4	25.000	23.500	0
Strathfieldsaye	Quarterly	4	6.000	4.500	0
Taradale - Elphinstone	Quarterly	4	6.000	5.250	0
Tarnagulla	Quarterly	4	80.000	72.250	0
Tooborac	Quarterly	4	74.000	60.000	0
Trentham	Quarterly	4	1.000	0.750	0
Tylden	Quarterly	4	4.000	3.250	0
Wedderburn	Quarterly	4	16.000	12.250	0

Manganese – Customer Tap Sites 2020-21

Table 40: Manganese results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.5 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	13	0.003	0.001	0
Bealiba	Monthly	12	0.004	0.002	0
Bendigo (Northern)	Monthly	12	0.001	0.001	0
Bendigo (Southern)	Monthly	12	<0.001	<0.001	0
Bendigo (Spring Gully)	Monthly	12	<0.001	<0.001	0
Big Hill	Monthly	12	0.001	0.001	0
Boort	Monthly	12	0.016	0.004	0
Bridgewater - Inglewood	Monthly	12	0.005	0.001	0
Castlemaine	Monthly	12	0.002	0.001	0
Cohuna	Monthly	12	0.006	0.003	0
Dunolly	Monthly	12	0.009	0.003	0
Echuca	Monthly	12	0.003	0.001	0
Elmore	Monthly	12	<0.001	<0.001	0
Epsom - Huntly	Monthly	12	0.001	0.001	0
Fryerstown	Monthly	12	0.005	0.001	0
Goornong	Monthly	12	0.004	0.002	0
Guildford	Monthly	12	0.003	0.001	0
Gunbower	Monthly	12	<0.001	<0.001	0
Harcourt	Monthly	12	0.005	0.001	0
Heathcote	Monthly	12	0.051	0.009	0
Junortoun	Monthly	12	<0.001	<0.001	0
Korong Vale	Monthly	12	0.003	0.001	0
Kyneton	Monthly	12	0.001	0.001	0
Laanecoorie	Monthly	12	0.034	0.008	0
Leitchville	Monthly	12	0.007	0.002	0
Lockington	Monthly	12	<0.001	<0.001	0
Maiden Gully - Marong	Monthly	12	0.008	0.001	0
Maldon	Monthly	12	0.003	0.001	0
Malmsbury	Monthly	12	<0.001	<0.001	0
Newstead	Monthly	12	0.004	0.001	0
Pyramid Hill	Monthly	12	0.003	0.001	0
Raywood	Monthly	12	0.001	0.001	0
Rochester	Monthly	12	0.002	0.002	0
Sebastian	Monthly	12	0.001	0.001	0
Serpentine	Monthly	12	0.012	0.004	0
Strathfieldsaye	Monthly	12	<0.001	<0.001	0
Taradale - Elphinstone	Monthly	12	0.005	0.001	0
Tarnagulla	Monthly	12	0.006	0.002	0
Tooborac	Monthly	12	0.013	0.003	0
Trentham	Monthly	12	<0.001	<0.001	0
Tylden	Monthly	12	<0.001	<0.001	0
Wedderburn	Monthly	12	0.004	0.001	0

Copper – Customer Tap Sites 2020-21

Table 41: Copper results for customer tap sites (Water quality standard - ADWG health-based guideline value: 2.0 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	0.02	0.01	0
Bealiba	Monthly	12	0.01	0.00	0
Bendigo (Northern)	Monthly	12	0.02	0.01	0
Bendigo (Southern)	Monthly	12	0.01	0.01	0
Bendigo (Spring Gully)	Monthly	12	0.04	0.01	0
Big Hill	Monthly	12	0.01	0.00	0
Boort	Monthly	12	0.02	0.01	0
Bridgewater - Inglewood	Monthly	12	0.00	0.00	0
Castlemaine	Monthly	12	0.09	0.03	0
Cohuna	Monthly	12	0.01	0.00	0
Dunolly	Monthly	12	0.01	0.00	0
Echuca	Monthly	12	0.01	0.00	0
Elmore	Monthly	12	0.02	0.01	0
Epsom - Huntly	Monthly	12	0.13	0.02	0
Fryerstown	Monthly	12	0.08	0.03	0
Goornong	Monthly	12	0.00	0.00	0
Guildford	Monthly	12	0.04	0.01	0
Gunbower	Monthly	12	0.01	0.00	0
Harcourt	Monthly	12	0.05	0.03	0
Heathcote	Monthly	12	0.02	0.01	0
Junortoun	Monthly	12	0.04	0.02	0
Korong Vale	Monthly	12	0.01	0.00	0
Kyneton	Monthly	12	0.03	0.01	0
Laanecoorie	Monthly	12	0.01	0.00	0
Leitchville	Monthly	12	0.01	0.00	0
Lockington	Monthly	12	0.00	0.00	0
Maiden Gully - Marong	Monthly	12	0.02	0.01	0
Maldon	Monthly	12	0.05	0.03	0
Malmsbury	Monthly	12	0.03	0.02	0
Newstead	Monthly	12	0.06	0.02	0
Pyramid Hill	Monthly	12	0.01	0.00	0
Raywood	Monthly	12	0.02	0.01	0
Rochester	Monthly	12	0.01	0.00	0
Sebastian	Monthly	12	0.02	0.01	0
Serpentine	Monthly	12	0.03	0.01	0
Strathfieldsaye	Monthly	12	0.07	0.02	0
Taradale - Elphinstone	Monthly	12	0.08	0.03	0
Tarnagulla	Monthly	12	0.02	0.01	0
Tooborac	Monthly	12	0.02	0.01	0
Trentham	Monthly	12	0.03	0.01	0
Tylden	Monthly	12	0.15	0.05	0
Wedderburn	Monthly	12	0.01	0.00	0

Lead – Customer Tap Sites 2020-21

Table 42: Lead results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.01 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	<0.001	<0.001	0
Bealiba	Monthly	12	<0.001	<0.001	0
Bendigo (Northern)	Monthly	12	<0.001	<0.001	0
Bendigo (Southern)	Monthly	12	<0.001	<0.001	0
Bendigo (Spring Gully)	Monthly	12	<0.001	<0.001	0
Big Hill	Monthly	12	<0.001	<0.001	0
Boort	Monthly	12	<0.001	<0.001	0
Bridgewater - Inglewood	Monthly	12	<0.001	<0.001	0
Castlemaine	Monthly	12	0.0020	0.0007	0
Cohuna	Monthly	12	<0.001	<0.001	0
Dunolly	Monthly	12	<0.001	<0.001	0
Echuca	Monthly	12	<0.001	<0.001	0
Elmore	Monthly	12	0.0030	0.0007	0
Epsom - Huntly	Monthly	12	<0.001	<0.001	0
Fryerstown	Monthly	12	0.0010	0.0006	0
Goornong	Monthly	12	<0.001	<0.001	0
Guildford	Monthly	12	0.0020	0.0007	0
Gunbower	Monthly	12	<0.001	<0.001	0
Harcourt	Monthly	12	0.0010	0.0006	0
Heathcote	Monthly	12	0.0020	0.0007	0
Junortoun	Monthly	12	0.0010	0.0006	0
Korong Vale	Monthly	12	0.0020	0.0007	0
Kyneton	Monthly	12	0.0010	0.0005	0
Laanecoorie	Monthly	12	<0.001	<0.001	0
Leitchville	Monthly	12	<0.001	<0.001	0
Lockington	Monthly	12	<0.001	<0.001	0
Maiden Gully - Marong	Monthly	12	<0.001	<0.001	0
Maldon	Monthly	12	0.0030	0.0007	0
Malmsbury	Monthly	12	<0.001	<0.001	0
Newstead	Monthly	12	0.0020	0.0007	0
Pyramid Hill	Monthly	12	<0.001	<0.001	0
Raywood	Monthly	12	<0.001	<0.001	0
Rochester	Monthly	12	<0.001	<0.001	0
Sebastian	Monthly	12	<0.001	<0.001	0
Serpentine	Monthly	12	<0.001	<0.001	0
Strathfieldsaye	Monthly	12	<0.001	<0.001	0
Taradale - Elphinstone	Monthly	12	0.0030	0.0013	0
Tarnagulla	Monthly	12	<0.001	<0.001	0
Tooborac	Monthly	12	0.0020	0.0007	0
Trentham	Monthly	12	<0.001	<0.001	0
Tylden	Monthly	12	0.0010	0.0005	0
Wedderburn	Monthly	12	0.0030	0.0008	0

Nickel – Customer Tap Sites 2020-21

Table 43: Nickel results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.02 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Monthly	12	0.00	0.00	0
Bealiba	Monthly	12	0.00	0.00	0
Bendigo (Northern)	Monthly	12	0.00	0.00	0
Bendigo (Southern)	Monthly	12	0.00	0.00	0
Bendigo (Spring Gully)	Monthly	12	0.00	0.00	0
Big Hill	Monthly	12	0.00	0.00	0
Boort	Monthly	12	<0.001	<0.001	0
Bridgewater - Inglewood	Monthly	12	<0.001	<0.001	0
Castlemaine	Monthly	12	0.00	0.00	0
Cohuna	Monthly	12	<0.001	<0.001	0
Dunolly	Monthly	12	0.00	0.00	0
Echuca	Monthly	12	<0.001	<0.001	0
Elmore	Monthly	12	<0.001	<0.001	0
Epsom - Huntly	Monthly	12	<0.001	<0.001	0
Fryerstown	Monthly	12	0.00	0.00	0
Goornong	Monthly	12	0.00	0.00	0
Guildford	Monthly	12	<0.001	<0.001	0
Gunbower	Monthly	12	<0.001	<0.001	0
Harcourt	Monthly	12	<0.001	<0.001	0
Heathcote	Monthly	12	0.00	0.00	0
Junortoun	Monthly	12	<0.001	<0.001	0
Korong Vale	Monthly	12	<0.001	<0.001	0
Kyneton	Monthly	12	<0.001	<0.001	0
Laanecoorie	Monthly	12	0.01	0.00	0
Leitchville	Monthly	12	<0.001	<0.001	0
Lockington	Monthly	12	<0.001	<0.001	0
Maiden Gully - Marong	Monthly	12	0.00	0.00	0
Maldon	Monthly	12	<0.001	<0.001	0
Malmsbury	Monthly	12	<0.001	<0.001	0
Newstead	Monthly	12	<0.001	<0.001	0
Pyramid Hill	Monthly	12	<0.001	<0.001	0
Raywood	Monthly	12	<0.001	<0.001	0
Rochester	Monthly	12	<0.001	<0.001	0
Sebastian	Monthly	12	<0.001	<0.001	0
Serpentine	Monthly	12	<0.001	<0.001	0
Strathfieldsaye	Monthly	12	0.00	0.00	0
Taradale - Elphinstone	Monthly	12	0.00	0.00	0
Tarnagulla	Monthly	12	0.00	0.00	0
Tooborac	Monthly	12	0.00	0.00	0
Trentham	Monthly	12	<0.001	<0.001	0
Tylden	Monthly	12	<0.001	<0.001	0
Wedderburn	Monthly	12	<0.001	<0.001	0

Alpha Count – Customer Tap Sites 2020-21

Table 44: Alpha count results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.5 bq/L)

Water Sampling Locality	Sampling frequency	Number of samples	Value (bq/L)	Number of samples where standard was not met
Axedale	Annual	1	<0.05	0
Bealiba	Annual	1	<0.05	0
Bendigo (Northern)	Annual	1	<0.05	0
Bendigo (Southern)	Annual	1	<0.05	0
Bendigo (Spring Gully)	Annual	1	<0.05	0
Big Hill	Annual	1	<0.05	0
Boort	Annual	1	<0.05	0
Bridgewater - Inglewood	Annual	1	<0.10	0
Castlemaine	Annual	1	<0.05	0
Cohuna	Annual	1	<0.05	0
Dunolly	Annual	1	<0.05	0
Echuca	Annual	1	<0.05	0
Elmore	Annual	1	0.06	0
Epsom - Huntly	Annual	1	<0.05	0
Fryerstown	Annual	1	<0.05	0
Goornong	Annual	1	<0.05	0
Guildford	Annual	1	<0.05	0
Gunbower	Annual	1	<0.05	0
Harcourt	Annual	1	<0.05	0
Heathcote	Annual	1	<0.05	0
Junortoun	Annual	1	<0.05	0
Korong Vale	Annual	1	<0.05	0
Kyneton	Annual	1	<0.05	0
Laanecoorie	Annual	1	<0.05	0
Leitchville	Annual	1	<0.05	0
Lockington	Annual	1	<0.05	0
Maiden Gully - Marong	Annual	1	<0.05	0
Maldon	Annual	1	<0.05	0
Malmsbury	Annual	1	<0.05	0
Newstead	Annual	1	<0.05	0
Pyramid Hill	Annual	1	<0.06	0
Raywood	Annual	1	<0.05	0
Rochester	Annual	1	<0.05	0
Sebastian	Annual	1	<0.05	0
Serpentine	Annual	1	<0.05	0
Strathfieldsaye	Annual	1	<0.05	0
Taradale - Elphinstone	Annual	1	<0.05	0
Tarnagulla	Annual	1	<0.05	0
Tooborac	Annual	1	<0.05	0
Trentham	Annual	1	<0.05	0
Tylden	Annual	1	<0.05	0
Wedderburn	Annual	1	<0.05	0

Beta Count – Customer Tap Sites 2020-21

Table 45: Beta count results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.5 bq/L)

Water Sampling Locality	Sampling frequency	Number of samples	Value (bq/L)	Number of samples where standard was not met
Axedale	Annual	1	<0.10	0
Bealiba	Annual	1	<0.10	0
Bendigo (Northern)	Annual	1	<0.10	0
Bendigo (Southern)	Annual	1	<0.1	0
Bendigo (Spring Gully)	Annual	1	<0.1	0
Big Hill	Annual	1	<0.10	0
Boort	Annual	1	<0.10	0
Bridgewater - Inglewood	Annual	1	<0.19	0
Castlemaine	Annual	1	<0.1	0
Cohuna	Annual	1	<0.10	0
Dunolly	Annual	1	<0.10	0
Echuca	Annual	1	<0.1	0
Elmore	Annual	1	<0.1	0
Epsom - Huntly	Annual	1	<0.1	0
Fryerstown	Annual	1	<0.10	0
Goornong	Annual	1	<0.10	0
Guildford	Annual	1	<0.10	0
Gunbower	Annual	1	<0.10	0
Harcourt	Annual	1	<0.10	0
Heathcote	Annual	1	<0.10	0
Junortoun	Annual	1	<0.10	0
Korong Vale	Annual	1	<0.1	0
Kyneton	Annual	1	<0.10	0
Laanecoorie	Annual	1	<0.10	0
Leitchville	Annual	1	<0.10	0
Lockington	Annual	1	<0.10	0
Maiden Gully - Marong	Annual	1	<0.10	0
Maldon	Annual	1	<0.10	0
Malmsbury	Annual	1	<0.10	0
Newstead	Annual	1	<0.10	0
Pyramid Hill	Annual	1	<0.10	0
Raywood	Annual	1	<0.1	0
Rochester	Annual	1	<0.10	0
Sebastian	Annual	1	<0.1	0
Serpentine	Annual	1	<0.1	0
Strathfieldsaye	Annual	1	<0.1	0
Taradale - Elphinstone	Annual	1	<0.1	0
Tarnagulla	Annual	1	<0.1	0
Tooborac	Annual	1	<0.1	0
Trentham	Annual	1	<0.1	0
Tylden	Annual	1	<0.1	0
Wedderburn	Annual	1	<0.1	0

Nitrite – Customer Tap Sites 2020-21

Table 46: Nitrite Results for customer tap sites (Water quality standard - ADWG health-based guideline value: 3.0 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	Fortnightly	26	0.43	0.13	0
Bendigo (Northern)	Fortnightly	26	1.38	0.30	0
Bendigo (Southern)	Fortnightly	26	0.79	0.11	0
Bendigo (Spring Gully)	Fortnightly	26	0.92	0.15	0
Big Hill	Fortnightly	26	0.85	0.19	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	Fortnightly	27	0.13	0.03	0
Castlemaine	n/a	n/a	n/a	n/a	n/a
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	Fortnightly	26	0.49	0.06	0
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Fortnightly	26	1.51	0.23	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	n/a	n/a	n/a	n/a	n/a
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	n/a	n/a	n/a	n/a	n/a
Heathcote	Fortnightly	26	0.07	0.02	0
Junortoun	Fortnightly	26	1.45	0.55	0
Korong Vale	Fortnightly	26	0.36	0.05	0
Kyneton	n/a	n/a	n/a	n/a	n/a
Laanecoorie	Fortnightly	26	0.13	0.03	0
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Fortnightly	26	0.79	0.13	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	n/a	n/a	n/a	n/a	n/a
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Fortnightly	26	0.30	0.05	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Fortnightly	27	0.85	0.13	0
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	Fortnightly	26	0.08	0.03	0

NDMA – Customer Tap Sites 2020-21

Table 47: NDMA Results for customer tap sites (Water quality standard - ADWG health-based guideline value: 0.1 ug/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (ug/L)	Average (ug/L)	Number of samples where standard was not met
Axedale	Quarterly	4	0.0070	0.0041	0
Bealiba	Quarterly	4	0.2100	0.0620	1[1]
Bendigo (Northern)	Quarterly	4	0.0080	0.0054	0
Bendigo (Southern)	Quarterly	4	0.0050	0.0041	0
Bendigo (Spring Gully)	Quarterly	4	0.0070	0.0039	0
Big Hill	Quarterly	4	0.0040	0.0021	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	Quarterly	4	0.0130	0.0123	0
Castlemaine	Quarterly	4	<0.003	<0.003	0
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	Quarterly	4	0.0190	0.0090	0
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Quarterly	3[2]	0.0080	0.0048	0
Fryerstown	Quarterly	4	0.0050	0.0028	0
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	Quarterly	4	0.0130	0.0050	0
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	Quarterly	4	0.0030	0.0023	0
Heathcote	Quarterly	4	0.0090	0.0063	0
Junortoun	Quarterly	4	0.0080	0.0049	0
Korong Vale	Quarterly	4	0.0070	0.0051	0
Kyneton	n/a	n/a	n/a	n/a	n/a
Laanecoorie	Quarterly	4	0.0190	0.0100	0
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Quarterly	4	0.0050	0.0033	0
Maldon	Quarterly	4	0.0040	0.0021	0
Malmsbury	n/a	n/a	n/a	n/a	n/a
Newstead	Quarterly	4	0.0040	0.0025	0
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	Quarterly	4	0.0050	0.0030	0
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	Quarterly	4	0.0050	0.0030	0
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Quarterly	4	0.0070	0.0038	0
Taradale - Elphinstone	Quarterly	4	0.0100	0.0036	0
Tarnagulla	Quarterly	4	0.0250	0.0145	0
Tooborac	Quarterly	4	0.0140	0.0098	0
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	Quarterly	4	0.0100	0.0061	0

Note:

1 Refer to section 4.3.1.1 for details on exceedances.

2 Quarterly sample was not required during free chlorination project.

Localities where chloramination is not part of the treatment process have not had NDMA included in their monitoring program.

pH – Customer Tap Sites 2020-21

Table 48: pH results for customer tap sites (operating range: 6.5 - 8.5 pH Units)

Water Sampling Locality	Sampling frequency	Number of samples	Minimum	Maximum
Axedale	Monthly	12	7.6	8.1
Bealiba[1]	Monthly	12	8.5	9.0
Bendigo (Northern)	Monthly	12	7.4	8.0
Bendigo (Southern)	Monthly	12	7.4	8.0
Bendigo (Spring Gully)	Monthly	12	7.5	8.0
Big Hill	Monthly	12	7.5	8.0
Boort	Monthly	12	7.2	8.1
Bridgewater - Inglewood[1]	Monthly	12	7.8	9.1
Castlemaine	Monthly	12	7.1	7.9
Cohuna	Monthly	12	7.2	7.9
Dunolly[1]	Monthly	12	8.6	8.9
Echuca	Monthly	12	7.2	7.7
Elmore	Monthly	12	7.1	8.0
Epsom - Huntly	Monthly	12	7.4	8.0
Fryerstown	Monthly	12	7.2	8.1
Goornong[1]	Monthly	12	7.1	8.8
Guildford	Monthly	12	7.3	7.8
Gunbower[1]	Monthly	12	7.2	9.1
Harcourt	Monthly	12	7.3	8.0
Heathcote	Monthly	12	7.7	8.2
Junortoun	Monthly	12	7.5	8.1
Korong Vale[1]	Monthly	12	7.6	10.2
Kyneton	Monthly	12	7.3	7.9
Laanecoorie	Monthly	12	7.9	8.4
Leitchville	Monthly	12	7.4	7.9
Lockington	Monthly	12	7.1	8.0
Maiden Gully - Marong	Monthly	12	7.4	8.0
Maldon	Monthly	12	7.4	8.1
Malmsbury	Monthly	12	7.4	8.1
Newstead	Monthly	12	7.3	8.0
Pyramid Hill	Monthly	12	7.1	7.7
Raywood	Monthly	12	7.5	8.1
Rochester	Monthly	12	6.9	7.7
Sebastian	Monthly	12	7.5	8.3
Serpentine[1]	Monthly	12	7.2	9.3
Strathfieldsaye	Monthly	12	7.5	8.0
Taradale - Elphinstone	Monthly	12	7.4	7.9
Tarnagulla[1]	Monthly	12	8.5	8.8
Tooborac[1]	Monthly	12	8.0	9.1
Trentham[1]	Monthly	12	7.4	9.0
Tylden	Monthly	12	7.4	7.7
Wedderburn[1]	Monthly	12	8.0	9.6

Note:

1 Refer to section 4.3.1.2 for details on exceedances.

Aluminium – Customer Tap Sites 2020-21

Table 49: Aluminium results for customer tap sites (ADWG aesthetic guideline value: 0.2 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met
Axedale	Quarterly	4	0.03	0.03	0
Bealiba	Quarterly	4	0.02	0.02	0
Bendigo (Northern)	Quarterly	4	0.03	0.03	0
Bendigo (Southern)	Quarterly	4	0.04	0.03	0
Bendigo (Spring Gully)	Quarterly	4	0.03	0.03	0
Big Hill	Quarterly	4	0.03	0.03	0
Boort	Quarterly	4	0.02	0.02	0
Bridgewater - Inglewood	Quarterly	4	0.20	0.08	0
Castlemaine	Quarterly	4	0.04	0.02	0
Cohuna	Quarterly	4	0.03	0.01	0
Dunolly	Quarterly	4	0.02	0.02	0
Echuca	Quarterly	4	0.06	0.04	0
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Quarterly	4	0.04	0.03	0
Fryerstown	Quarterly	4	0.02	0.02	0
Goornong	Quarterly	4	0.08	0.05	0
Guildford	Quarterly	4	0.02	0.02	0
Gunbower	Quarterly	4	0.03	0.02	0
Harcourt	Quarterly	4	0.02	0.02	0
Heathcote	Quarterly	4	0.02	0.02	0
Junortoun	Quarterly	4	0.03	0.03	0
Korong Vale	Quarterly	4	0.04	0.03	0
Kyneton	Quarterly	4	0.03	0.03	0
Laanecoorie	Quarterly	4	0.02	0.02	0
Leitchville	Quarterly	4	0.01	0.01	0
Lockington	Quarterly	4	0.18	0.10	0
Maiden Gully - Marong	Quarterly	4	0.04	0.03	0
Maldon	Quarterly	4	0.02	0.02	0
Malmsbury	Quarterly	4	0.03	0.02	0
Newstead	Quarterly	4	0.02	0.02	0
Pyramid Hill	Quarterly	4	0.06	0.03	0
Raywood	Quarterly	4	0.04	0.03	0
Rochester	Quarterly	4	<0.01	<0.01	0
Sebastian	Quarterly	4	0.04	0.03	0
Serpentine	Quarterly	4	0.03	0.02	0
Strathfieldsaye	Quarterly	4	0.03	0.03	0
Taradale - Elphinstone	Quarterly	4	0.03	0.02	0
Tarnagulla	Quarterly	4	0.03	0.02	0
Tooborac	Quarterly	4	0.02	0.01	0
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	Quarterly	4	0.03	0.02	0
Wedderburn	Quarterly	4	0.04	0.03	0

Note:

1 An aluminium based product is not used for coagulation at Elmore or Trentham, and therefore aluminium is not deemed to be a significant risk in this water supply.

Hardness – Customer Tap Sites 2020-21

To minimise undesirable build-up of scale in hot water systems, total hardness (as calcium carbonate) in drinking water should not exceed 200 mg/L.

Table 50: Hardness results for customer tap sites (ADWG aesthetic guideline limit: 200mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	Quarterly	4	80	73	0
Bealiba	Quarterly	4	170	155	0
Bendigo (Northern)	Quarterly	4	76	67	0
Bendigo (Southern)	Quarterly	4	76	67	0
Bendigo (Spring Gully)	Quarterly	4	76	70	0
Big Hill	Quarterly	4	71	66	0
Boort	Quarterly	4	94	86	0
Bridgewater - Inglewood	Quarterly	4	24	22	0
Castlemaine	Quarterly	4	85	74	0
Cohuna	Quarterly	4	20	18	0
Dunolly	Quarterly	4	170	163	0
Echuca	Quarterly	4	17	17	0
Elmore	Quarterly	4	120	109	0
Epsom - Huntly	Quarterly	4	69	64	0
Fryerstown	Quarterly	4	77	74	0
Goornong	Quarterly	4	130	118	0
Guildford	Quarterly	4	74	70	0
Gunbower	Quarterly	4	18	17	0
Harcourt	Quarterly	4	76	72	0
Heathcote	Quarterly	4	130	120	0
Junortoun	Quarterly	4	74	65	0
Korong Vale	Quarterly	4	25	20	0
Kyneton	Quarterly	4	72	67	0
Laanecoorie	Quarterly	4	160	155	0
Leitchville	Quarterly	4	19	18	0
Lockington	Quarterly	4	31	26	0
Maiden Gully - Marong	Quarterly	4	71	67	0
Maldon	Quarterly	4	77	72	0
Malmsbury	Quarterly	4	70	68	0
Newstead	Quarterly	4	78	71	0
Pyramid Hill	Quarterly	4	42	37	0
Raywood	Quarterly	4	75	69	0
Rochester	Quarterly	4	22	21	0
Sebastian	Quarterly	4	73	68	0
Serpentine	Quarterly	4	38	33	0
Strathfieldsaye	Quarterly	4	73	65	0
Taradale - Elphinstone	Quarterly	4	78	74	0
Tarnagulla	Quarterly	4	170	165	0
Tooborac	Quarterly	4	130	130	0
Trentham	Quarterly	4	51	42	0
Tylden	Quarterly	4	69	68	0
Wedderburn	Quarterly	4	21	20	0

Iron – Customer Tap Sites 2020-21

The samples taken for analysis were obtained from the reticulation system. Iron levels may be higher at customers' internal taps, where galvanised iron pipes have been used in customers' plumbing.

Table 51: Iron results for customer tap sites (ADWG aesthetic guideline limit: 0.3 mg/L)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	Monthly	12	0.05	0.01	0
Bealiba	Monthly	12	0.04	0.01	0
Bendigo (Northern)	Monthly	12	0.02	0.01	0
Bendigo (Southern)	Monthly	12	0.02	0.01	0
Bendigo (Spring Gully)	Monthly	12	0.01	0.01	0
Big Hill	Monthly	12	0.02	0.01	0
Boort	Monthly	12	0.04	0.02	0
Bridgewater - Inglewood	Monthly	12	0.03	0.01	0
Castlemaine	Monthly	12	0.03	0.01	0
Cohuna	Monthly	12	0.05	0.02	0
Dunolly	Monthly	12	<0.01	<0.01	0
Echuca	Monthly	12	0.01	0.01	0
Elmore	Monthly	12	0.01	0.01	0
Epsom - Huntly	Monthly	12	0.02	0.01	0
Fryerstown	Monthly	12	0.03	0.02	0
Goornong	Monthly	12	0.08	0.02	0
Guildford	Monthly	12	0.02	0.01	0
Gunbower	Monthly	12	0.01	0.01	0
Harcourt	Monthly	12	0.03	0.01	0
Heathcote	Monthly	12	0.05	0.02	0
Junortoun	Monthly	12	0.03	0.01	0
Korong Vale	Monthly	12	0.24	0.08	0
Kyneton	Monthly	12	0.02	0.01	0
Laanecoorie	Monthly	12	0.03	0.01	0
Leitchville	Monthly	12	<0.01	<0.01	0
Lockington	Monthly	12	0.01	0.01	0
Maiden Gully - Marong	Monthly	12	0.03	0.01	0
Maldon	Monthly	12	0.01	0.01	0
Malmsbury	Monthly	12	0.02	0.01	0
Newstead	Monthly	12	0.04	0.01	0
Pyramid Hill	Monthly	12	0.01	0.01	0
Raywood	Monthly	12	0.02	0.01	0
Rochester	Monthly	12	0.04	0.01	0
Sebastian	Monthly	12	0.02	0.01	0
Serpentine	Monthly	12	0.06	0.02	0
Strathfieldsaye	Monthly	12	0.02	0.01	0
Taradale - Elphinstone	Monthly	12	0.04	0.01	0
Tarnagulla	Monthly	12	0.01	0.01	0
Tooborac	Monthly	12	0.03	0.01	0
Trentham	Monthly	12	<0.01	<0.01	0
Tylden	Monthly	12	0.02	0.01	0
Wedderburn	Monthly	12	0.21	0.04	0

True Colour – Customer Tap Sites 2020-21

Based on aesthetic considerations, true colour in drinking water should not exceed 15 HU.

Table 52: True Colour results for customer tap sites (ADWG aesthetic guideline limit: 15 HU)

Water Sampling Locality	Sampling frequency	Number of samples[1]	Maximum (HU)	Average (HU)	Number of samples where guideline was not met
Axedale	Monthly	12	2	1	0
Bealiba	Monthly	12	2	1	0
Bendigo (Northern)	Monthly	12	2	1	0
Bendigo (Southern)	Monthly	12	2	1	0
Bendigo (Spring Gully)	Monthly	12	2	1	0
Big Hill	Monthly	12	2	1	0
Boort	Monthly	12	4	1	0
Bridgewater - Inglewood	Monthly	12	2	1	0
Castlemaine	Monthly	12	2	1	0
Cohuna	Monthly	12	2	1	0
Dunolly	Monthly	12	4	2	0
Echuca	Monthly	12	2	1	0
Elmore	Monthly	12	2	1	0
Epsom - Huntly	Monthly	12	2	1	0
Fryerstown	Monthly	12	2	1	0
Goornong	Monthly	12	4	2	0
Guildford	Monthly	12	2	1	0
Gunbower	Monthly	12	2	1	0
Harcourt	Monthly	12	2	1	0
Heathcote	Monthly	12	4	2	0
Junortoun	Monthly	12	2	1	0
Korong Vale	Monthly	12	4	3	0
Kyneton	Monthly	12	<2	<2	0
Laanecoorie	Monthly	12	4	2	0
Leitchville	Monthly	12	2	1	0
Lockington	Monthly	12	<2	<2	0
Maiden Gully - Marong	Monthly	12	2	1	0
Maldon	Monthly	12	2	1	0
Malmsbury	Monthly	12	2	1	0
Newstead	Monthly	12	2	1	0
Pyramid Hill	Monthly	12	2	1	0
Raywood	Monthly	12	2	1	0
Rochester	Monthly	12	2	1	0
Sebastian	Monthly	12	2	1	0
Serpentine	Monthly	12	2	1	0
Strathfieldsaye	Monthly	12	2	1	0
Taradale - Elphinstone	Monthly	12	2	1	0
Tarnagulla	Monthly	12	4	1	0
Tooborac	Monthly	12	4	2	0
Trentham	Monthly	12	2	1	0
Tylden	Monthly	12	<2	<2	0
Wedderburn	Monthly	12	4	2	0

Electrical Conductivity – Customer Tap Sites 2020-21

Based on taste, total dissolved solids in drinking water should not exceed 600 mg/L, equivalent to approximately 1,200 µS/cm in electrical conductivity.

Table 53: Electrical Conductivity results for customer tap sites (ADWG aesthetic guideline limit: 1,200 µS/cm)

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (µS/cm)	Average (µS/cm)	Number of samples where guideline was not met
Axedale	Monthly	12	330	266	0
Bealiba	Monthly	12	860	836	0
Bendigo (Northern)	Monthly	12	280	247	0
Bendigo (Southern)	Monthly	12	270	240	0
Bendigo (Spring Gully)	Monthly	12	270	245	0
Big Hill	Monthly	12	280	243	0
Boort	Monthly	12	500	450	0
Bridgewater - Inglewood	Monthly	12	140	128	0
Castlemaine	Monthly	12	280	254	0
Cohuna	Monthly	12	170	143	0
Dunolly	Monthly	12	890	828	0
Echuca	Monthly	12	160	131	0
Elmore	Monthly	12	760	663	0
Epsom - Huntly	Monthly	12	280	248	0
Fryerstown	Monthly	12	280	256	0
Goornong	Monthly	12	670	656	0
Guildford	Monthly	12	260	253	0
Gunbower	Monthly	12	130	98	0
Harcourt	Monthly	12	270	262	0
Heathcote	Monthly	12	720	667	0
Junortoun	Monthly	12	280	248	0
Korong Vale	Monthly	12	150	127	0
Kyneton	Monthly	12	230	220	0
Laanecoorie	Monthly	12	880	818	0
Leitchville	Monthly	12	160	122	0
Lockington	Monthly	12	150	138	0
Maiden Gully - Marong	Monthly	12	270	244	0
Maldon	Monthly	12	270	263	0
Malmsbury	Monthly	12	230	223	0
Newstead	Monthly	12	260	253	0
Pyramid Hill	Monthly	12	210	183	0
Raywood	Monthly	12	300	261	0
Rochester	Monthly	12	200	150	0
Sebastian	Monthly	12	300	259	0
Serpentine	Monthly	12	190	170	0
Strathfieldsaye	Monthly	12	270	239	0
Taradale - Elphinstone	Monthly	12	260	254	0
Tarnagulla	Monthly	12	860	824	0
Tooborac	Monthly	12	740	695	0
Trentham	Monthly	12	170	135	0
Tylden	Monthly	12	230	221	0
Wedderburn	Monthly	12	140	126	0

Sodium – Customer Tap Sites 2020-21

Based on aesthetic considerations (taste), the concentration of sodium in drinking water should not exceed 180 mg/L.

Table 54: Sodium results for customer tap sites (ADWG aesthetic guideline limit: 180mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	Quarterly	4	29	24	0
Bealiba	Quarterly	4	94	91	0
Bendigo (Northern)	Quarterly	4	23	19	0
Bendigo (Southern)	Quarterly	4	22	19	0
Bendigo (Spring Gully)	Quarterly	4	22	19	0
Big Hill	Quarterly	4	24	19	0
Boort	Quarterly	4	46	42	0
Bridgewater - Inglewood	Quarterly	4	14	13	0
Castlemaine	Quarterly	4	18	17	0
Cohuna	Quarterly	4	22	19	0
Dunolly	Quarterly	4	94	89	0
Echuca	Quarterly	4	21	16	0
Elmore	Quarterly	4	96	86	0
Epsom - Huntly	Quarterly	4	21	18	0
Fryerstown	Quarterly	4	19	18	0
Goornong	Quarterly	4	73	70	0
Guildford	Quarterly	4	19	18	0
Gunbower	Quarterly	4	14	12	0
Harcourt	Quarterly	4	18	17	0
Heathcote	Quarterly	4	76	70	0
Junortoun	Quarterly	4	23	18	0
Korong Vale	Quarterly	4	14	13	0
Kyneton	Quarterly	4	16	15	0
Laanecoorie	Quarterly	4	96	90	0
Leitchville	Quarterly	4	17	14	0
Lockington	Quarterly	4	14	13	0
Maiden Gully - Marong	Quarterly	4	23	20	0
Maldon	Quarterly	4	19	17	0
Malmsbury	Quarterly	4	15	15	0
Newstead	Quarterly	4	18	17	0
Pyramid Hill	Quarterly	4	21	18	0
Raywood	Quarterly	4	26	22	0
Rochester	Quarterly	4	21	19	0
Sebastian	Quarterly	4	23	21	0
Serpentine	Quarterly	4	20	18	0
Strathfieldsaye	Quarterly	4	25	19	0
Taradale - Elphinstone	Quarterly	4	19	18	0
Tarnagulla	Quarterly	4	91	88	0
Tooborac	Quarterly	4	79	76	0
Trentham	Quarterly	4	9	8	0
Tylden	Quarterly	4	15	15	0
Wedderburn	Quarterly	4	14	14	0

Chloride – Customer Tap Sites 2020-21

Based on aesthetic consideration, the chloride concentration in drinking water should not exceed 250 mg/L.

Table 55: Chloride results for customer tap sites (ADWG aesthetic guideline limit: 250mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	Quarterly	4	64	50	0
Bealiba	Quarterly	4	220	185	0
Bendigo (Northern)	Quarterly	4	54	43	0
Bendigo (Southern)	Quarterly	4	48	41	0
Bendigo (Spring Gully)	Quarterly	4	48	40	0
Big Hill	Quarterly	4	110	58	0
Boort	Quarterly	4	94	90	0
Bridgewater - Inglewood	Quarterly	4	27	25	0
Castlemaine	Quarterly	4	43	41	0
Cohuna	Quarterly	4	19	12	0
Dunolly	Quarterly	4	190	175	0
Echuca	Quarterly	4	13	9	0
Elmore	Quarterly	4	160	135	0
Epsom - Huntly	Quarterly	4	49	41	0
Fryerstown	Quarterly	4	41	40	0
Goornong	Quarterly	4	150	145	0
Guildford	Quarterly	4	48	41	0
Gunbower	Quarterly	4	24	16	0
Harcourt	Quarterly	4	41	40	0
Heathcote	Quarterly	4	150	143	0
Junortoun	Quarterly	4	54	42	0
Korong Vale	Quarterly	4	22	20	0
Kyneton	Quarterly	4	33	31	0
Laanecoorie	Quarterly	4	190	175	0
Leitchville	Quarterly	4	14	11	0
Lockington	Quarterly	4	26	24	0
Maiden Gully - Marong	Quarterly	4	48	42	0
Maldon	Quarterly	4	46	42	0
Malmsbury	Quarterly	4	31	30	0
Newstead	Quarterly	4	43	41	0
Pyramid Hill	Quarterly	4	30	27	0
Raywood	Quarterly	4	54	46	0
Rochester	Quarterly	4	25	19	0
Sebastian	Quarterly	4	51	46	0
Serpentine	Quarterly	4	21	18	0
Strathfieldsaye	Quarterly	4	49	41	0
Taradale - Elphinstone	Quarterly	4	41	39	0
Tarnagulla	Quarterly	4	180	173	0
Tooborac	Quarterly	4	160	153	0
Trentham	Quarterly	4	14	13	0
Tylden	Quarterly	4	31	29	0
Wedderburn	Quarterly	4	20	20	0

Zinc – Customer Tap Sites 2020-21

Based on aesthetic consideration (taste), the concentration of zinc in drinking water should not exceed 3 mg/L.

Table 56: Zinc results for customer tap sites (ADWG aesthetic guideline limit: 3 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	Monthly	12	0.012	0.005	0
Bealiba	Monthly	12	0.006	0.004	0
Bendigo (Northern)	Monthly	12	0.003	0.001	0
Bendigo (Southern)	Monthly	12	0.002	0.001	0
Bendigo (Spring Gully)	Monthly	12	0.003	0.001	0
Big Hill	Monthly	12	0.004	0.002	0
Boort	Monthly	12	0.019	0.009	0
Bridgewater - Inglewood	Monthly	12	0.002	0.001	0
Castlemaine	Monthly	12	0.047	0.009	0
Cohuna	Monthly	12	0.009	0.004	0
Dunolly	Monthly	12	0.004	0.002	0
Echuca	Monthly	12	0.003	0.001	0
Elmore	Monthly	12	0.012	0.005	0
Epsom - Huntly	Monthly	12	0.002	0.001	0
Fryerstown	Monthly	12	0.019	0.010	0
Goornong	Monthly	12	0.008	0.002	0
Guildford	Monthly	12	0.016	0.008	0
Gunbower	Monthly	12	0.004	0.002	0
Harcourt	Monthly	12	0.007	0.005	0
Heathcote	Monthly	12	0.006	0.004	0
Junortoun	Monthly	12	0.004	0.003	0
Korong Vale	Monthly	12	0.023	0.006	0
Kyneton	Monthly	12	0.009	0.005	0
Laanecoorie	Monthly	12	0.014	0.007	0
Leitchville	Monthly	12	0.006	0.003	0
Lockington	Monthly	12	<0.001	<0.001	0
Maiden Gully - Marong	Monthly	12	0.017	0.002	0
Maldon	Monthly	12	0.007	0.004	0
Malmsbury	Monthly	12	0.018	0.011	0
Newstead	Monthly	12	0.014	0.006	0
Pyramid Hill	Monthly	12	0.009	0.003	0
Raywood	Monthly	12	0.004	0.002	0
Rochester	Monthly	12	0.007	0.003	0
Sebastian	Monthly	12	0.009	0.004	0
Serpentine	Monthly	12	0.010	0.006	0
Strathfieldsaye	Monthly	12	0.016	0.004	0
Taradale - Elphinstone	Monthly	12	0.037	0.013	0
Tarnagulla	Monthly	12	0.005	0.003	0
Tooborac	Monthly	12	0.013	0.008	0
Trentham	Monthly	12	0.010	0.005	0
Tylden	Monthly	12	0.010	0.006	0
Wedderburn	Monthly	12	0.700	0.065	0

Ammonia – Customer Tap Sites 2020-21

Table 57: Ammonia results for customer tap sites (ADWG aesthetic guideline limit: 0.5 mg/L)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)	Number of samples where guideline was not met
Axedale	n/a	n/a	n/a	n/a	n/a
Bealiba	Fortnightly	26	0.37	0.15	0
Bendigo (Northern)	Fortnightly	26	0.33	0.17	0
Bendigo (Southern)	Fortnightly	26	0.31	0.14	0
Bendigo (Spring Gully)	Fortnightly	26	0.35	0.18	0
Big Hill	Fortnightly	26	0.29	0.12	0
Boort	n/a	n/a	n/a	n/a	n/a
Bridgewater - Inglewood	Fortnightly	27	0.34	0.17	0
Castlemaine	n/a	n/a	n/a	n/a	n/a
Cohuna	n/a	n/a	n/a	n/a	n/a
Dunolly	Fortnightly	26	0.39	0.18	0
Echuca	n/a	n/a	n/a	n/a	n/a
Elmore	n/a	n/a	n/a	n/a	n/a
Epsom - Huntly	Fortnightly	26	0.36	0.19	0
Fryerstown	n/a	n/a	n/a	n/a	n/a
Goornong	n/a	n/a	n/a	n/a	n/a
Guildford	n/a	n/a	n/a	n/a	n/a
Gunbower	n/a	n/a	n/a	n/a	n/a
Harcourt	n/a	n/a	n/a	n/a	n/a
Heathcote	Fortnightly	26	0.31	0.18	0
Junortoun	Fortnightly	26	0.34	0.10	0
Korong Vale	Fortnightly	26	0.28	0.13	0
Kyneton	n/a	n/a	n/a	n/a	n/a
Laanecoorie	Fortnightly	26	0.44	0.17	0
Leitchville	n/a	n/a	n/a	n/a	n/a
Lockington	n/a	n/a	n/a	n/a	n/a
Maiden Gully - Marong	Fortnightly	26	0.28	0.16	0
Maldon	n/a	n/a	n/a	n/a	n/a
Malmsbury	n/a	n/a	n/a	n/a	n/a
Newstead	n/a	n/a	n/a	n/a	n/a
Pyramid Hill	n/a	n/a	n/a	n/a	n/a
Raywood	n/a	n/a	n/a	n/a	n/a
Rochester	n/a	n/a	n/a	n/a	n/a
Sebastian	n/a	n/a	n/a	n/a	n/a
Serpentine	n/a	n/a	n/a	n/a	n/a
Strathfieldsaye	Fortnightly	26	0.28	0.16	0
Taradale - Elphinstone	n/a	n/a	n/a	n/a	n/a
Tarnagulla	Fortnightly	27	0.32	0.17	0
Tooborac	n/a	n/a	n/a	n/a	n/a
Trentham	n/a	n/a	n/a	n/a	n/a
Tylden	n/a	n/a	n/a	n/a	n/a
Wedderburn	Fortnightly	26	0.27	0.14	0

Alkalinity – Customer Tap Sites 2020-21

Table 58: Alkalinity results for customer tap sites- whilst there is no ADWG guideline value for alkalinity it is monitored for operational purposes

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum (mg/L)	Average (mg/L)
Axedale	Quarterly	4	56	53
Bealiba	Quarterly	4	93	86
Bendigo (Northern)	Quarterly	4	57	52
Bendigo (Southern)	Quarterly	4	57	53
Bendigo (Spring Gully)	Quarterly	4	57	54
Big Hill	Quarterly	4	57	53
Boort	Quarterly	4	43	39
Bridgewater - Inglewood	Quarterly	4	24	20
Castlemaine	Quarterly	4	76	63
Cohuna	Quarterly	4	19	18
Dunolly	Quarterly	4	93	89
Echuca	Quarterly	4	21	20
Elmore	Quarterly	4	160	145
Epsom - Huntly	Quarterly	4	57	53
Fryerstown	Quarterly	4	61	60
Goornong	Quarterly	4	60	52
Guildford	Quarterly	4	63	60
Gunbower	Quarterly	4	25	21
Harcourt	Quarterly	4	65	62
Heathcote	Quarterly	4	62	59
Junortoun	Quarterly	4	56	52
Korong Vale	Quarterly	4	23	17
Kyneton	Quarterly	4	58	57
Laanecoorie	Quarterly	4	90	85
Leitchville	Quarterly	4	20	19
Lockington	Quarterly	4	31	27
Maiden Gully - Marong	Quarterly	4	57	52
Maldon	Quarterly	4	69	65
Malmsbury	Quarterly	4	60	57
Newstead	Quarterly	4	70	62
Pyramid Hill	Quarterly	4	34	26
Raywood	Quarterly	4	58	53
Rochester	Quarterly	4	22	18
Sebastian	Quarterly	4	56	52
Serpentine	Quarterly	4	32	29
Strathfieldsaye	Quarterly	4	55	52
Taradale - Elphinstone	Quarterly	4	64	61
Tarnagulla	Quarterly	4	88	82
Tooborac	Quarterly	4	64	61
Trentham	Quarterly	4	53	42
Tylden	Quarterly	4	59	58
Wedderburn	Quarterly	4	18	17

Apparent Colour – Customer Tap Sites 2020-21

Table 59: Apparent Colour results for customer tap sites -whilst there is no ADWG guideline value for apparent colour it is monitored for operational purposes

Water Sampling Locality	Sampling frequency	Number of samples	Maximum (HU)	Average (HU)
Axedale	Monthly	12	4	1
Bealiba	Monthly	12	4	2
Bendigo (Northern)	Monthly	12	4	1
Bendigo (Southern)	Monthly	12	4	2
Bendigo (Spring Gully)	Monthly	12	4	1
Big Hill	Monthly	12	2	1
Boort	Monthly	12	6	2
Bridgewater - Inglewood	Monthly	12	2	1
Castlemaine	Monthly	12	4	1
Cohuna	Monthly	12	4	2
Dunolly	Monthly	12	6	3
Echuca	Monthly	12	4	1
Elmore	Monthly	12	2	1
Epsom - Huntly	Monthly	12	2	1
Fryerstown	Monthly	12	2	1
Goornong	Monthly	12	6	3
Guildford	Monthly	12	2	1
Gunbower	Monthly	12	2	1
Harcourt	Monthly	12	2	1
Heathcote	Monthly	12	6	3
Junortoun	Monthly	12	4	1
Korong Vale	Monthly	12	14	6
Kyneton	Monthly	12	1	1
Laanecoorie	Monthly	12	8	3
Leitchville	Monthly	12	4	1
Lockington	Monthly	12	1	1
Maiden Gully - Marong	Monthly	12	4	1
Maldon	Monthly	12	2	1
Malmsbury	Monthly	12	2	1
Newstead	Monthly	12	2	1
Pyramid Hill	Monthly	12	2	1
Raywood	Monthly	12	2	1
Rochester	Monthly	12	4	2
Sebastian	Monthly	12	2	1
Serpentine	Monthly	12	4	2
Strathfieldsaye	Monthly	12	2	1
Taradale - Elphinstone	Monthly	12	4	1
Tarnagulla	Monthly	12	4	2
Tooborac	Monthly	12	6	2
Trentham	Monthly	12	4	1
Tylden	Monthly	12	1	1
Wedderburn	Monthly	12	6	3

5 Complaints Relating to Water Quality

5.1 Complaints and Responses

Customer queries/complaints relating to drinking water quality are recorded and followed up using a customer response management (CRM) system. Generally, water quality queries are managed at the time of the enquiry, while complaints are forwarded to Coliban Water's Water Quality Performance team, or Lendlease (the corporation's operational partner managing the water distribution network), depending on the type of complaint. The complaint is reviewed and actioned as appropriate.

Some of the actions that can be initiated are:

- Flushing of the main supplying the customer and or flushing of the customer's meter.
- Advisory phone call from Water Quality Performance team to the customer.
- A visit to the property by a Water Quality Performance team member.
- A written response to the customer from the Water Quality Performance Team.

Table 60 summarises the water quality complaints received by Coliban Water in each category as recorded in CRM system between 1 July 2020 and 30 June 2021, and compared to the previous two years.

Complaints recorded fall into five categories, "Alleged illness", "Discoloured Water", "Taste/Odour", "Air in Water", and "Other".

Table 60: Complaints related to Water Quality by Classification.

Types of Complaints	Number of Complaints			Comparison with previous reporting periods	Comments
	2020/21	2019/20	2018/19		
Alleged illness	10	12	19	Consistent with previous year	The calls were all unrelated. Complaints were generally related to health conditions, such as a rash/skin irritation, or upset stomach. Water quality was verified after each contact to confirm that the drinking water supplied did not pose an unacceptable health risk.
Discoloured Water	105	122	151	Reduction compared to previous two years.	A mains repair in Marong triggered twelve calls, which further flushing resolved. No other events triggered clusters of calls for discoloured water.
Taste or Odour	102	76	60	Increase to past years	28 calls related to the free chlorination project in the Bendigo area, with only six being complaints, other calls were as a result of proactive communications ahead of the change. No consistency with the other calls.
Air in Water	15	8	23	Increase to last year while in line with 18/19.	Five calls of cloudy water (air in water) related to mains repair in Marong. No consistency with the other calls.
Other	0	0	0	Consistently minimal	All water quality complaints were able to be allocated to the other four categories.
Total	232	218	253		

Table 61: Complaints related to water quality by water sampling locality 2020/21

Water sampling locality	Types of complaints					Total complaints
	Alleged illness	Discoloured water	Taste or Odour	Air in Water	Other	
Axedale	0	0	1	0	0	1
Bealiba	0	0	0	0	0	0
Bendigo Northern	1	9	20	1	0	31
Bendigo Southern	1	21	14	2	0	38
Bendigo Spring Gully	0	4	4	3	0	11
Big Hill	0	0	0	0	0	0
Boort	0	1	0	0	0	1
Bridgewater-Inglewood	1	1	0	0	0	2
Castlemaine	1	6	10	1	0	18
Cohuna	1	5	4	0	0	10
Dunolly	0	0	2	0	0	2
Echuca	0	13	3	0	0	16
Elmore	0	5	0	0	0	5
Epsom / Huntly	0	3	4	1	0	8
Fryerstown	0	0	0	0	0	0
Goornong	0	1	0	0	0	1
Guildford	0	0	0	1	0	1
Gunbower	0	0	0	0	0	0
Harcourt	0	1	3	0	0	4
Heathcote	0	4	6	0	0	10
Junortoun	0	6	0	1	0	7
Korong Vale	0	0	0	0	0	0
Kyneton	1	4	5	0	0	10
Laanecoorie	0	0	0	0	0	0
Leitchville	0	1	2	0	0	3
Lockington	0	0	2	0	0	2
Maiden Gully / Marong	0	13	5	5	0	23
Maldon	0	2	2	0	0	4
Malmsbury	0	1	1	0	0	2
Newstead	0	0	0	0	0	0
Pyramid Hill	0	0	0	0	0	0
Raywood	2	0	6	0	0	8
Rochester	0	1	0	0	0	1
Sebastian	0	0	0	0	0	0
Serpentine	0	1	0	0	0	1
Strathfieldsaye	0	1	3	0	0	4
Taradale-Elphinstone	0	0	0	0	0	0
Tarnagulla	0	0	0	0	0	0
Tooborac	1	0	0	0	0	1
Trentham	0	0	4	0	0	4
Tylden	0	0	1	0	0	1
Wedderburn	1	1	0	0	0	2
Total Complaints	10	105	102	15	0	232

6 Risk Management Plan Audit Results

6.1 Outcome of the Most Recent Audit

The Secretary to the Department of Health (DH) gave notice for our drinking water quality risk management plan to be audited between 1 November 2019 and 31 May 2020. Due to the impact of the COVID-19 pandemic, DH extended the audit timeframe until 28 August 2020, and the audit was undertaken between 28 July 2020 to 31 July 2020. Coliban Water's Drinking Water Quality Risk Management Plan (DWQRMP) was found to be compliant, with thirteen opportunities for improvement identified. Table 62 below lists the opportunities for improvement and action plan for addressing these OFI.

The prior audit was completed in May 2018, and Coliban Water's Drinking Water Quality Risk Management Plan (DWQRMP) was found to be compliant with the requirements outlined in Section 7 of the Act, and with identified opportunities for improvement. All identified opportunities for improvement from the 2018 audit have been completed.

6.2 Findings and Action Plan for Audit Completed in July 2020

There were thirteen opportunities for improvement (OFI) identified during the audit. Below is the action plan for addressing the OFI, including timeframes, noting some actions have already been completed. OFI that are interconnected, (OFI 1,2,3,5,6,11,12 & 13) have been grouped together, with actions planned to cover this group as a whole.

Table 62: Opportunities for improvement (OFI) from the 2020 regulatory audit of Coliban Water's Drinking Water Quality Risk Management Plan.

OFI No.	Description of OFI	Action	Timeframe
1	It is recommended to expand the risk source assessment hazardous events in the DWQRMP Table 6.1.4-1 to cover clear water storage tanks, and booster chlorination systems within networks. This would then also require updating the DWQRMP and HACCP for these hazardous events.	Review and update as necessary DWQRMP Table 6.1.4-1, and other tables as appropriate. Any changes in DWQRMP Tables to be reflected in the Risk Register.	Completed Completed
2	The network booster chlorination system and associated network storage tanks descriptions and schematics with their operational philosophy should be added to the DWQRMP. This would raise awareness and highlight the importance of networks and the delivery of safe water.	Review booster chlorinator and tank descriptions and schematics and update as necessary in the DWQRMP, including review the Inglewood Basin chlorine dosing system and consider if it should be a CCP or QCP.	In progress 30 March 2022
3	Add booster chlorination systems and basins/ tanks as a risk area to the Drinking Water Quality System Risk Register. Please add an event category that addresses the risk for booster chlorination and network storages. Review the CCPs for all chlorination systems.		
5	It is recommended to revise the Inglewood basin booster chlorination schematic and provide further detail with an operational explanation. See also OFI 2.	Expand the Risk Register to enable each basin/tank to be individually risk assessed, which will include booster chlorinators where appropriate, instead of as a group.	
6	Review the Risk Assessment/ HACCP assessment for Inglewood chlorine dosing system and consider the Inglewood Basin chlorination system as a CCP point. This would provide further focus on managing this critical asset that is used for maintaining chlorine residual.		Completed

OFI No.	Description of OFI	Action	Timeframe
11	Coliban Water to review the approach and documentation for the Inglewood chlorination point, and consider having it a CCP, as the nomination of a CCP point doesn't mean that it requires to be monitored online. It does mean that this is the last barrier and control point to maintain an identified hazard i.e. water quality aspect. CCP HACCP decision tree Question 3: Is the process step specifically designed to eliminate or reduce the hazard to an acceptable level? Yes – CCP (see OFI 3 & 6).	Booster Chlorinators: • Review risk assessment • Review CCP's	31 May 2022
12	It is recommended to review the CCP target, alert and critical limits for all booster chlorination stations. Targets should be meaningful for the management of overdosing and the underdosing risks. Both have potential water quality risk associated with them. Review the risk assessment for the Booster chlorination CCPs.	Risk Register changes to be risk rated as required.	30 Nov 2021
13	It is recommended that an operational philosophy and more detail documentation is added to the DWQRMP that shows the operational philosophy, the reticulation system and the chlorination system, as per the SCADA screen for all Booster chlorination systems. This will provide clarity about the assets and their operation.	Consider how operational philosophy/management plan could be referenced in the DWQRMP.	30 June 2022
4	When work orders are initiated in Hanson, previous works and inspection reports are not provided. It would be an advantage to the inspection personnel to view what works have been identified as part of previous visits and to see a condition report for the inspected side. This would help elimination of leaks, contamination or other water quality risk exposure and help justify the replacement of assets.	Review current asset management system process and consider if possible/practical access to historic information in the field.	30 March 2022
7	Coliban Water to develop a "transition" plan to work under the Covid-19 requirement as part of "business-as-usual". This will require the business to carry out all maintenance, service delivery and training activities in the world of Covid-19 without compromising safety and operations. The aim is to continue critical operation in a safe environment.	Ensure Coliban Water and Strategic Partners all have a COVID 19 'Business as Usual' plans in place.	Completed
8	The WQ Surveillance rationale is a spreadsheet that identifies monitoring requirements. Recent changes, however, haven't been noted in the "change log" tab. Coliban Water to review the document control process for spreadsheets like the WQ Surveillance rationale and note what changes are made, when they are made and by whom.	Include the 'Rationale' information into the WQ Surveillance Monitoring Program spreadsheet. Changes to the 'Rationale' and Monitoring Program are all captured in one 'change log' tab.	Completed
9	Provide training on obligations under the SDW Act and CW commitment to all managers, executive staff, as a refresher and whenever someone moves internal roles, as well as for new starters. A general training schedule should be included for all CW personnel and further training for all involved in the delivery of the DWQRMP.	Develop presentation and schedule. Verify all new starters are viewing the presentation that is included in their induction. Consider annual general refresher on Water Quality overview for all staff.	1 March 2022

OFI No.	Description of OFI	Action	Timeframe
10	Ensure all business units focus on providing training and that training is not put on hold during the Covid-19 pandemic. It is of upmost importance that operational staff have the skills to operate all sites and can cover work tasks for each other.	Training has resumed.	Completed

7 Regulated Water

Regulated water is water that is not intended for use as drinking water, but which could be reasonably mistaken for drinking water. Regulated water is non-potable, not suitable for human consumption and generally does not receive any form of treatment. The Minister for Health may declare a water supply as a regulated water supply under Section 6 of the Act. On 2 January 2006, the Minister for Health declared the following water supply systems as regulated water supplies: Borung, Dingee, Jarklin, Macorna, Mitiamo, Mysia and Wychitella

Coliban Water currently:

- Verifies signage is located at publicly-accessible water supply points (e.g. toilet blocks) advising that the water supply is not suitable for drinking purposes, and this is done on an annual basis.
- Notifies customers on a regular basis that the water is not for drinking and household with 'Do not drink' symbol on their quarterly accounts.
- Coliban Water website has information for each town, and advises water is non-potable.

Table 63: Regulated Water Systems in 2020/21

Area where regulated water is supplied	Source water	Date of publication of gazette notice	Estimated population supplied with regulated water
Borung	Grampians Wimmera Mallee Water (GWMW) Pipeline	19/01/2006	40
Dingee	Goulburn-Murray Water (GMW) Channel	19/01/2006	70
Jarklin	GMW Pipeline	19/01/2006	10
Macorna	GMW Channel	19/01/2006	20
Mitiamo	GMW Channel	19/01/2006	90
Mysia	GMW Pipeline	19/01/2006	20
Wychitella	GWMW Pipeline	19/01/2006	30

8 Further Information

Section 23 of the Act requires Coliban Water to make available for inspection by the public the results of any water quality monitoring program conducted by Coliban Water on any of the drinking water supplied by Coliban Water. Customers and members of the public may access drinking water quality data by contacting Coliban Water on the details provided below:

Telephone: 1300 363 200

Website: www.coliban.com.au

A list of glossary and terms is attached in Appendix A.

Appendix A – Glossary of Terms

Australian Drinking Water Guidelines (2011) (ADWG)

A publication by National Health and Medical Research Council that details a framework for the management of drinking water supply systems and provides information on a range of potential contaminants of water systems.

BAC Filtration

Biological activated carbon filtration is a unit process, similar to GAC filtration, which has the additional capability of removing dissolved organics by microorganisms that develop on the surface of the carbon granules.

Critical Control Point (CCP)

A point, step or procedure at which control can be applied and which is essential to prevent or eliminate a hazard or reduce it to an acceptable level.

Chloramination

The addition of chlorine compounds (e.g. chlorine gas and sodium hypochlorite) to aid the breakdown of organic matters and the inactivation harmful microorganisms -: the process is modified with the addition of ammonia gas to improve total chlorine residual in the distribution network.

Chlorination

The addition of chlorine compounds (e.g. chlorine gas and sodium hypochlorite) to aid the breakdown of organic matter and the inactivation harmful microorganisms.

Clarification

A unit operation where seeds of floc are allowed to grow and settle. Clarification is usually enhanced with the addition of polymer (e.g. polyelectrolyte) to increase the size of floc and increase their settling velocities.

Coagulation

A unit process involves addition of positively charged coagulant (e.g. aluminium chlorohydrate or aluminium sulphate) and rapid mixing, causing coalescing of suspended particles, or seeds of flocs.

DELWP

Department of Environment, Land, Water and Planning.

Dissolved Air Flotation & Filtration (DAFF)

A combination of dissolved air flotation and sand filtration. Dissolved air flotation is a unit operation where fine suspended particles and floc are removed by rising bubbles in the treatment vessel.

Desalination

A unit operation where virtually all dissolved substances and suspended materials are removed by reverse osmosis and only water molecules are allowed to pass through the membranes.

Dual-media filtration

A unit operation using both anthracite coal and sand to retain floc by both adhesion and physical sieving.

Drinking Water Quality Management System (DWQMS)

A term used interchangeably with Drinking Water Quality Risk Management Plan.

Drinking Water Quality Risk Management Plan (DWQRMP)

A risk management plan relating to water supply is a document that:

- contains a detailed description of the water system
- identifies the risks to the quality of the water and the risks posed by the quality of water
- assess those risks
- set out the steps required to manage those risks, including the development and implementation of preventative strategies
- contains other matters as required by the Safe Drinking Water Regulations 2015

Fluoridation

The addition of fluorine compounds (e.g. Hydrofluorosilicic Acid) into drinking water to improve the dental health of consumers.

GAC Filtration

A unit operation where floc is removed by granular activated carbon (GAC) by adhesion. GAC is fabricated to have a high surface area and hence improved efficiency for adhesion.

GMW

Goulburn-Murray Water Corporation.

GWMW

Grampians Wimmera Mallee Water Corporation.

Microfiltration/Ultrafiltration

A unit operation where fine suspended solid particles are retained by the pores of a filter membrane.

MIEX

Magnetic Ions Exchange is a unit operation where organic matter is attracted to, and removed by a MIEX resin. MIEX reduces the requirements for chemical dosage during the coagulation process, improves the efficiency of disinfection and improves the aesthetic properties of drinking water.

Minor Non-Conformance

A minor non-conformance is defined as a non-compliance with one or more auditable elements, legislative requirements or risk management activities where the potential impact of the non-conformance is not likely to be a serious or imminent risk to public health.

MoU

Memorandum of Understanding.

Opportunity for Improvement (OFI)

A conforming or non-conforming clause of the RMP or DWQMS system that does not contravene a legislative requirement. It is not itself a non-conformance. It may include opportunities for improvement, comments that may be relevant to the next audit or against best practice considerations, or incidental or isolated discrepancies.

Ozonation

A unit process that uses ozone to aid the breakdown of organic matter and the inactivation harmful microorganisms.

pH Correction

The adjustment of the pH of drinking water to get it into the recommended range, by the addition of carbon dioxide, sulphuric acid, lime, soda ash or caustic soda.

Sand Filtration

A unit operation where suspended solid particles are retained by the pores of a filter media (in this case, sand).

Supervisory Control and Data Acquisition (SCADA)

A SCADA system consists of human-machine interface, computerised logics, telemetry communication system, electronically actuated instruments and sensors. SCADA allows remote control and monitor of all key process parameters.

UV Disinfection

A unit operation where ultra violet light is impinged onto drinking water to inactive harmful microorganisms.

Water Treatment Plant (WTP)

A facility where raw water is directed through various treatment processes and produces treated water fit for human consumption.

Signature of approved auditor: Date: 19/ 08/ 2020

Risk Management Plan Audit Certificate

Safe Drinking Water Regulations 2015

Certificate Number: CW – 2020-001

Audit period: 22/05/2018 – 31/07/2020

To: Carmel Cumming, Coliban Regional Water Corporation,
37-45 Bridge Street, Bendigo, Vic 3554

Australian Business Number (ABN): 96 549 082 360

I, **Therese Maria O'Brien** (Lead WQMS Auditor, 109505),
after conducting a risk management plan audit of the water supplied by
Coliban Regional Water Corporation, am of the opinion that –

Coliban Regional Water Corporation
has complied with the obligations imposed by section 7(1) of the
Safe Drinking Water Act 2003 during the audit period.

Signature of approved auditor: Date: 19/ 08/ 2020

Appendix C – List of Treatment Processes and Added Substances

Water Treatment Plant	Water Sampling Locality	Treatment Process														Added Substances						
			Clarification		Filtration		Disinfection and or Oxidation						Other									
		Coagulation & Flocculation	Sedimentation / Clarification	Dissolved Air Floatation	Granular Media Filtration	Membrane Filtration	Chlorine Gas	Chlorine Dioxide	Sodium Hypochlorite	Calcium Hypochlorite	Ultraviolet (UV)	Ozone	Activated Carbon (PAC/GAC/BAC)	Ion Exchange	Reverse Osmosis	Sludge Thickening / Dewatering	Lime / Soda Ash / Caustic Soda / Carbon Dioxide / Sulphuric Acid /	Aluminium-based Coagulants	Iron-based Coagulants	Polymers	Chlorine	Ammonia	Fluoride Compound
Bendigo	Axedale	x				x	x					x	x			x	x	x		x	x	x	x
	Bendigo Northern																						
	Bendigo Southern																						
	Bendigo Spring Gully																						
	Big Hill																						
	Epsom - Huntly																						
	Junortoun																						
	Maiden Gully - Marong																						
	Raywood																						
	Sebastian																						
	Strathfieldsaye																						
Boort	Boort	x	x		x		x						x				x	x		x	x		
Bridgewater	Bridgewater - Inglewood	x	x		x		x				x		x		x[1]			x		x	x	x	
Castlemaine	Castlemaine	x				x	x					x	x			x	x	x		x	x		x
	Fryerstown																						
	Guildford																						
	Harcourt																						
	Maldon																						
	Newstead																						
	Taradale - Elphinstone																						
Cohuna	Cohuna	x	x		x		x		x				x				x	x		x	x		x
Echuca	Echuca	x	x		x		x		x				x				x	x		x	x		x
Elmore	Elmore										x						x						
Goornong	Goornong	x	x		x				x				x				x	x					

Water Treatment Plant	Water Sampling Locality	Treatment Process															Added Substances						
			Clarification		Filtration		Disinfection and or Oxidation						Other										
		Coagulation & Flocculation	Sedimentation / Clarification	Dissolved Air Floatation	Granular Media Filtration	Membrane Filtration	Chlorine Gas	Chlorine Dioxide	Sodium Hypochlorite	Calcium Hypochlorite	Ultraviolet (UV)	Ozone	Activated Carbon (PAC/GAC/BAC)	Ion Exchange	Reverse Osmosis	Sludge Thickening / Dewatering	Lime / Soda Ash / Caustic Soda / Carbon Dioxide / Sulphuric Acid /	Aluminium-based Coagulants	Iron-based Coagulants	Polymers	Chlorine	Ammonia	Fluoride Compound
Gunbower	Gunbower	x	x			x	x				x		x	x			x	x			x		
Heathcote	Heathcote	x	x		x		x		x		x		x			x	x	x		x	x	x	
	Tooborac																						
Korong Vale	Korong Vale	x	x		x		x						x			x	x	x		x	x	x	
	Wedderburn																						
Kyneton	Kyneton	x				x	x					x	x			x	x	x		x	x		x
	Malmsbury																						
	Tylden																						
Laanecoorie	Bealiba	x	x		x		x		x		x		x				x	x		x	x	x	
	Dunolly																						
	Laanecoorie																						
	Tarnagulla																						
Leitchville	Leitchville	x	x			x	x				x		x				x	x		x	x		
Lockington	Lockington	x		x	x					x			x				x	x		x	x		
Pyramid Hill	Pyramid Hill	x	x		x		x						x			x	x	x		x	x		
Rochester	Rochester	x	x			x	x						x				x	x		x	x		
Serpentine	Serpentine	x	x		x		x						x			x	x	x		x	x		
Trentham	Trentham					x	x						x			x				x	x		

Note:

1 RO currently not being used.