Greater Western Water

Drinking water quality report 2021–22

Acknowledgement of Country

The Greater Western Water region covers Bunurong, Wurundjeri, Wadawurrung, Dja Dja Wurrung and Taungurung Country.

We respectfully acknowledge the Kulin Nations as the Traditional Owners of the lands and waters upon which we work, operate and rely.

We acknowledge the continued cultural, social and spiritual connections that First Nations people have with Country.

We recognise and value that First Nations people have cared for and protected Country for thousands of generations. Country describes land, water, air, sky, people, animals and spirits to which First Nations people are connected.[1]

We are committed to working in partnership with local Traditional Owners and First Nations people, to harness collective wisdom to inform the future of the water management landscape while maintaining their cultural and spiritual connections to Country.

1 Source: Australian Institute of Aboriginal and Torres Strait Islander Studies website

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Message from the Managing Director

On behalf of Greater Western Water, I am pleased to present our first Drinking Water Quality annual report.

On 1 July 2021, Greater Western Water became the new water corporation for Melbourne's west, bringing together the areas previously serviced by Western Water and City West Water corporations. Our new service area covers Melbourne's CBD, the inner-west and north-west suburbs, through the Melton and Sunbury growth corridors to Bacchus Marsh, Myrniong and Macedon Ranges townships.

This report updates our customers and communities on the quality of bulk drinking water we supplied and the management of water quality at our local treatment plants during the period 1 July 2021 to 30 June 2022. It describes the sources of our drinking water, how it is managed from catchment to customer tap so that it is safe to consume, and the outcomes of assessment against relevant standards, codes of practice and national guideline values.

I am pleased to report that in 2021-22 Greater Western Water met its commitment to provide safe and efficient water services to enhance community resilience and liveability across our region.

We verified the quality of the drinking water supply via a comprehensive risk-based monitoring program that allows us to identify potential water quality issues and improvements to benefit our customers and community. Independent chemical and microbial testing showed that the quality of our drinking water supply continued to meet the water quality standards set out in Victoria's *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015.

In addition to the proactive management and monitoring of the quality of water supplied, feedback provided by customers to assist in identifying local issues is encouraged. This feedback is recorded as water quality related customer complaints. During 2021-22 we received 196 complaints per 100,000 customers, an eight per cent reduction on the previous year. Most complaints related to discoloured water, which occurs because of resuspension of natural sediment in our pipe network but does not impact on the safety of the water. During the year we successfully trialled a mains cleaning program and we will continue to develop the program in 2022-23.

Our annual customer satisfaction survey for 2021-22 indicated a water quality satisfaction level among our residential and non-residential customers of 93 per cent and 91 per cent respectively. We use this feedback to drive continuous improvement initiatives.

Our drinking water management systems and processes were endorsed through retention of drinking water risk management certification and compliance of our water quality risk management plan with Victoria's *Safe Drinking Water Act 2003*. We continue to progress opportunities for improvement identified from the auditing programs and to increase our drinking water quality knowledge base by supporting best practice learning for our people.

Greater Western Water is committed to continued excellence in delivering on our core purpose: 'Trusted water services for our communities and future generations'.

Our *2030 Strategy* states our vision for 'Thriving people and Country' and identifies the importance of delivering value to our customers, supporting communities to thrive, and healing and caring for Country. Delivering water services that are affordable, reliable and at a quality that meets the needs of our customers is important to us, to our customers and communities, and to our region.

Maree Lang
Managing Director

1. Overview

Greater Western Water (GWW) provides services to a population of 1.3 million people across an area of 3,700 square kilometres extending from Melbourne's central business district (CBD) and inner-west and north-west suburbs, through the Melton and Sunbury growth corridors to Bacchus Marsh, Myrniong and Macedon Ranges townships.

Table 1: Drinking water supply and assets

Data	**2021-22**
Residential	550,909
Non-residential	46,642
Connected water customers (total)	**597,551**
Residential	76,262
Non-residential	36,538
Water consumption ML (total)	**112,800**
Water losses (ML)	12,451
Total water supplied/delivered (ML)	**125,251**
Water filtration plants (number)	7
New drinking water mains (km)	144
Drinking water mains – total (km)	7,565
Drinking water network storage tanks (number)	46
Drinking water network pump stations (number)	47
Secondary chlorinators (number)	23
Carbon dioxide dosing units (number)	1
Water sampling localities (number)	34

1.1 2021-22 highlights

- Safely delivered 125 billion litres of drinking water to 597,551 customers
- Increased the size of our network by 144 kilometres of drinking water pipework
- Achieved water quality satisfaction levels of 93% for residential customers and 91% for non-residential customers
- Continued to implement actions from the successful completion of the Department of Health regulatory audit of our drinking water risk management plan
- Fully complied with the requirements of the *Safe Drinking Water Act 2003*
- Identified a partial non-compliance with the Safe Drinking Water Regulations 2015: a small number of samples were missed in comparison with the water quality monitoring program outlined in the GWW risk management plan (see section 6.6 for more information)
- Continued to provide essential water supply services to customers during the coronavirus (COVID-19) pandemic
- Successful delivery and independent audit of the newly built fluoride plant at the Merrimu Water Filtration Plant
- Established a drinking water executive committee supported by senior management
- Trialled a mains flushing program to inform future network programs to reduce discoloured water complaints and improve disinfection performance
- Developed a drinking water quality improvement program of works and a delivery plan for the next five years and continued to deliver continuous improvement activities as part of the improvement program
- Completed the first-year actions identified in our integration and transformation roadmap following the formation of Greater Western Water

1.2 Our commitment to quality

GWW is committed to managing the quality of drinking water provided to our customers from our bulk supply entitlement with Melbourne Water, local bulk supply entitlement with Southern Rural Water, and from our locally operated water sources. Our management of the water supply system and drinking water quality is critical to our purpose 'to enhance community resilience and liveability through safe and efficient water services' and to providing services that reflect public health considerations and community expectations.

Victoria's *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015 provide a comprehensive regulatory framework for the supply of drinking water to customers. The framework encompasses a risk-based approach to the management of drinking water from water catchment to the customer's tap, with links to the Australian Drinking Water Guidelines 2011 where applicable. We closely follow the risk management principles outlined in the *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015. This commitment to safeguarding drinking water quality has continued to be independently recognised through our consistent retention of the internationally recognised Hazard Analysis and Critical Control Point (HACCP) certification of our Drinking Water Quality Management System.

Melbourne Water provides GWW with a treated bulk drinking water supply and a wastewater treatment service and manages the water catchments, dams and primary treatment, as well as a network of large water mains that interconnect with our water supply network. This interconnection means that risks associated with water supply are shared between the wholesaler, Melbourne Water, and retailer, GWW. To manage these risks and clearly assign the rights and obligations of both parties, we have a contractual arrangement, a Bulk Water Supply Agreement, with Melbourne Water, as well as cross-business contingency plans and operational arrangements to enact during incidents.

GWW's *Drinking Water Quality Policy* sets out our approach and commitment to deliver safe, reliable and aesthetically acceptable drinking water to our customers, achieving our objectives and customer commitments for drinking water quality as part of our *Residential Customer Charter 2021-2023*. The policy applies to all GWW employees, suppliers, delivery partners and contractors responsible for the management, treatment, operations, maintenance and monitoring of our drinking water treatment and supply network from catchment to tap. A copy of this policy is available from the GWW website.

With this publicly available annual report, GWW complies with s. 23 of the *Safe Drinking Water Act 2003*, which requires public disclosure of all water quality monitoring information. Water quality results from our monitoring program are also given to customers on request. A copy of this report is provided to the Secretary of the Department of Health in compliance with s. 26 of the *Safe Drinking Water Act 2003*.

This first GWW annual drinking water quality report reflects the new organisation structure. Where required, data trends and comparison to previous year's performance refer to the previous water corporations (City West Water and Western Water). In addition to this report, water quality information is available to customers on the GWW website.

2. The water supply system

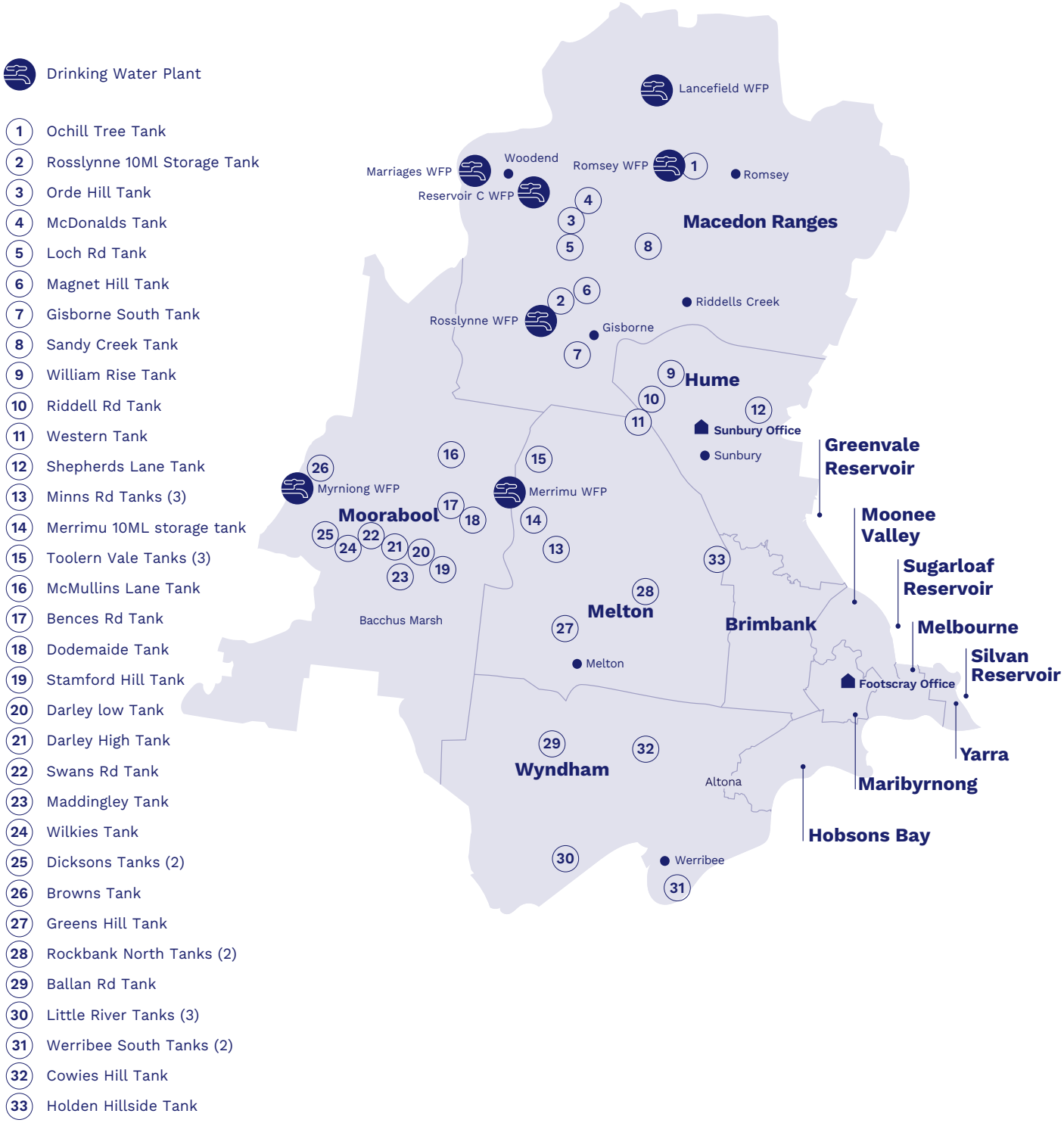
2.1 System features

GWW's service area covers 3,700 square kilometres from Melbourne's CBD and inner-west and north-west suburbs, through the Melton and Sunbury growth corridors to Bacchus Marsh, Myrniong and Macedon Ranges townships. Several towns in the west of our service region are connected to at least two drinking water sources; the Melbourne water system and the local supply system.

Our water quality is monitored at 34 water sampling localities, published by the Department of Health in the Victorian Government Gazette. Each locality is determined by the origin of the water, the location of treatment and storage facilities, and the associated delivery system. These localities form the basis of our water sampling program. In this reporting period there were no changes to water sampling locality names or boundaries from previous years. A variation was made via Gazette S 360 published 1 July 2021 to substitute the name City West Water (trading as Greater Western Water) for the name Western Water. This variation accommodates the formation of GWW. This name change did not change any locality names or boundaries. The bulk water transfer arrangements with Melbourne Water and Southern Rural Water are routinely varied for supply purposes to these localities. Refer to Appendix A for a map of GWW sampling localities and results from our water quality monitoring program.

The GWW drinking water supply network includes seven local water filtration plants; 46 water storage tanks, typically constructed of concrete or metal and are fully enclosed; 47 drinking water pump stations; 23 disinfection plants to provide secondary chlorination; and one chemical correction unit to adjust pH. As part of our broader Asset Management System, GWW regularly undertakes asset condition inspections at these sites to ensure continued water safety and security.

Figure 1: Our service area



2.2 Source water system

GWW manages drinking water via bulk supply agreements with Melbourne Water for a treated water supply and Southern Rural Water for an untreated water allocation. This untreated water allocation is treated by GWW at two locally operated water filtration plants. GWW also manages several smaller reservoirs, bores and basins that are treated at the remaining five water filtration plants that supply the local GWW system in the outer north west. There are nine water supply systems that deliver to the GWW service area: the bulk treated supply from Melbourne Water, bulk untreated Southern Rural Water supply to Rosslynne and Merrimu, and local GWW systems at Sunbury, Melton, Romsey, Lancefield, Woodend and Myrniong.

2.3 Melbourne Water supplies

The majority of water supply to GWW is sourced from forested, protected water supply catchments and reservoir systems (Upper Yarra, Thomson and the Yarra Valley tributaries) that lie primarily to the east of Melbourne and extend as far as Thomson Reservoir, approximately 120 kilometres from our service area. These larger catchments and tributaries feed into three major storages that service GWW: Silvan, Sugarloaf and Greenvale.

Table 2: 2021-22 Summary of GWW supply systems, source water and treatment plants

Supply system	Source water	Catchment/storage	Treatment plant
Bulk treated water supply			
Melbourne system *(consisting of bulk treated water supplies from Melbourne Water Systems Greenvale, Silvan (including Desalinated Water) & Winneke*			
Greenvale	Transfer from Silvan Reservoir (after treatment at Silvan) or from Winneke water treatment plant. See Silvan and Winneke water supply systems		Greenvale St Albans Greenvale-Yuroke
Silvan	Thomson Catchment Upper Yarra Catchment O'Shannassy Catchment		Silvan-Olinda Silvan-Preston Silvan-Waverley
	Treated water from desalination plant via Cardinia		Victorian Desalination Plant via Cardinia transfer to Silvan (including transfer from treatment plant Silvan to Greenvale Reservoir)
Winneke	Transfer from Maroondah Reservoir, Yarra River	Sugarloaf Reservoir	
Local supply systems			
Rosslynne system (includes Sunbury system)	Rosslynne Reservoir	Upper Maribyrnong Catchment, Jacksons Creek Catchment	Rosslynne Water Filtration Plant (WFP)
Merrimu system (includes Melton system)	Merrimu Reservoir	Lerderderg River, Goodman Creek, Pyrites Creek Catchment	Merrimu WFP
	Djerriwarrh Reservoir	Djerriwarrh Catchment	

Supply system	Source water	Catchment/storage	Treatment plant
Lancefield system	Garden Hut Reservoir Kerrie Reservoir	Deep Creek Catchment Upper Bolinda Creek	Lancefield WFP
	Monument Creek Weir	Monument Creek Catchment	
	Bore No. 3 Romsey Bore	Local aquifer	
Woodend system	Campaspe Reservoir	Campaspe River Catchment	Marriages WFP
	Graham Brock Reservoir and Reservoir C	Falls/Smokers Creek and Graham Brock Reservoir and Reservoir C catchments	Reservoir C WFP
Myrniong system	Pykes Creek Reservoir	Werribee River and Pykes Creek Catchment	Myrniong WFP
Romsey system	Kerrie Reservoir	Upper Bolinda Creek	Romsey WFP
	Romsey Bore	Local aquifer	

2.3.1 Silvan, Sugarloaf and Greenvale reservoirs

Bulk drinking water is supplied to GWW from three major storages within the Melbourne Water managed system:

- Silvan Reservoir (near Mount Dandenong)
- Sugarloaf Reservoir (near Yarra Glen)
- Greenvale Reservoir, which is filled by transfer of water from Silvan or Winneke System (north, near Somerton).

The relative proportion of water supplied from the three storages can vary, depending on factors such as local water demand, weather conditions, maintenance works and longer-term population changes. The supply from Silvan Reservoir comes from protected, natural catchments where activities such as industry, farming, urbanisation and tourism (which could pollute the water supply) are highly restricted. Silvan Reservoir received inflows from Thomson Reservoir, Upper Yarra Reservoir, O'Shannassy Reservoir and other small tributaries to the Yarra River. During 2021-22, Greenvale Reservoir, which does not have a catchment, received all its water supply from transfers from Silvan Reservoir after treatment at Silvan or from Winneke Water Treatment Plant.

During 2021-22, GWW bulk supply from Melbourne Water reservoirs was Sugarloaf (62%), Silvan (11%) and Greenvale (27%). Table 3 contains the percentage of drinking water supplied by Melbourne Water's three main reservoirs to the former City West Water (CWW) and former Western Water (WW) from 2012-2013 to 2020-2021.

Table 3: Melbourne reservoirs and local supplies last nine years %

	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
CWW									
Silvan Reservoir	9%	20%	26%	23%	24%	15%	14%	10%	12%
Greenvale Reservoir	13%	22%	24%	15%	14%	12%	20%	12%	15%
Sugarloaf Reservoir	78%	58%	50%	62%	62%	73%	66%	78%	73%
WW									
Greenvale Reservoir (WW)	26%	2%	39%	76%	65%	67%	64%	73%	72%
Rosslynne Reservoir	17%	37%	35%	7%	14%	8%	5%	6%	0.1%
Merrimu Reservoir	50%	53%	24%	11%	15%	15%	15%	15%	11%
Local supplies*	7%	8%	2%	6%	6%	10%	16%	6%	16.9%

* Local supplies were used to supplement local areas of the Woodend , Myrniong, Lancefield and Romsey regions, refer to table 2.

Long storage periods (ranging between months and years) in these pristine reservoirs enhance water quality. As a result, the only active water treatment process that is applied to this water is chlorination (chlorine gas at Silvan; sodium hypochlorite at Greenvale) and pH correction with lime. Sugarloaf Reservoir draws most of its water from the mid-point of the Yarra River where the catchment is unprotected, containing urban areas, light industry and agricultural activities. A smaller proportion also comes from Maroondah Reservoir via the Maroondah Aqueduct. On average, the source waters pumped into Sugarloaf Reservoir are stored for months before being treated (via aluminium-based coagulation and flocculation, sand filtration, sodium hypochlorite chlorination and pH correction with lime) at Melbourne Water's Winneke Water Treatment Plant.

2.3.2 Desalinated water supply

Between 1 July 2021 and 30 June 2022, a blend of desalinated water from the Victorian Desalination Plant and water from Melbourne Water's Cardinia Reservoir was pumped into Silvan Reservoir. The proportion of desalinated water in Silvan Reservoir reached a peak concentration of 24% in July and September 2021. In turn, the percentage of desalinated water in Greenvale Reservoir reached a peak concentration of 15% in the months of September and October 2021. The Department of Environment Land, Water and Planning manages the contract with the plant's operator, Aquasure. The desalinated water is ordered by the Minister for Water and provided to Melbourne Water, where it mixes with water from Melbourne Water's catchments in Cardinia Reservoir.

2.4 Melbourne supply system

Drinking water comes into our network in various locations that have a range of controls, such as disinfection at Greenvale Reservoir and Kew.

The water is distributed to GWW's customers through an extensive network of over 7,565 kilometres of water mains, 47 pumping stations, 46 water storage tanks and 23 secondary chlorinators. This network encompasses central and western Melbourne, including inner suburbs such as Fitzroy, Collingwood, Richmond and the CBD, and outer western suburbs as far west as Little River. Water supplies from Greenvale Reservoir also feed the GWW Sunbury/Rosslynne supply system and the Merrimu/Melton supply system. Details of supply systems for all localities are provided in tables 2, 4 and 6.

The supply network is fully enclosed and pressurised, protecting the water from possible contamination during its delivery to customers.

Table 4: 2021-22 GWW water sampling localities supply system

Water sampling locality	Population supplied (2021 census)	Supply system
Altona	143,150	Melbourne
Bulla	590	Melbourne
		Rosslynne
Caroline Springs	106,810	Melbourne
Darley	5,420	Melbourne
		Merrimu
Deer Park	84,790	Melbourne
Diggers Rest	5,630	Melbourne
		Rosslynne
East Keilor	42,650	Melbourne
Eynesbury	2,830	Melbourne
		Merrimu
Gisborne	12,730	Melbourne
		Rosslynne
Lancefield	2,270	Lancefield
		Melbourne
		Rosslynne
Lerderderg	8,500	Melbourne
		Merrimu
Little River	640	Melbourne
Macedon	2,440	Melbourne
		Rosslynne
Maddingley	8,890	Melbourne
		Merrimu
Maribyrnong	123,360	Melbourne
Melton South	56,790	Melbourne
		Merrimu
Merrimu	18,420	Melbourne
		Merrimu
Moonee Ponds	74,720	Melbourne
Mount Macedon	710	Melbourne
		Rosslynne
Myrniong	290	Myrniong
		Melbourne (when carting)
		Merrimu (when carting)
Parkville	169,190	Melbourne
Richmond	25,330	Melbourne
Riddells Creek	4,420	Melbourne
		Rosslynne
Rockbank	16,300	Melbourne
		Merrimu
Romsey	5,560	Romsey
		Melbourne
		Rosslynne
Strathmore	8,270	Melbourne
Sunbury	38,930	Melbourne
		Rosslynne
Taylors Lakes	72,670	Melbourne
Toolern Vale	450	Melbourne
		Merrimu
Tullamarine	11,680	Melbourne
Werribee	158,690	Melbourne
Werribee South	2,300	Melbourne
Williamstown	47,530	Melbourne
Woodend	6,190	Melbourne
		Rosslynne
		Woodend Marriages
		Woodend Res C

2.5 Local supply systems

Most towns in the outer north-western service region are connected to at least two drinking water sources; the Melbourne water supply system and a local reservoir. The largest local reservoirs are managed by Southern Rural Water and include Rosslynne Reservoir near Gisborne, Pykes Creek Reservoir near Myrniong and Merrimu Reservoir near Bacchus Marsh. In addition, a number of smaller local reservoirs and bores supply water to some towns in the Macedon Ranges.

Local water sources are used for drinking water supply whenever possible but are insufficient to meet the demands of the region's growing population. As a result, 72.5% of drinking water supplied to the outer parts of our service area this financial year was sourced from the Melbourne supply system. The ongoing impacts of climate change and sustained population growth mean that the region's future water supply security is dependent on GWW maintaining access to Melbourne water supplies.

Woodend, Romsey, Lancefield and Myrniong each have their own local supply systems with additional water supplemented from bulk entitlements in nearby systems. In times of drought, water from the Melbourne supply system can supplement these local supplies via an interconnected water transfer network.

2.5.1 Rosslynne system

Gisborne, Riddells Creek, Macedon and Mount Macedon typically receive treated water from the Rosslynne Water Filtration Plant, which is supplied from Rosslynne Reservoir. In 2021-22, the plant did not run at full capacity; it produced 19ML of drinking water blended with Melbourne water supply. This was due to significant inflow events in winter 2021 that caused high manganese levels that the plant was not capable of treating. 2.46GL of Melbourne water was supplied all year round through the Sunbury transfer system.

2.5.2 Merrimu system

Bacchus Marsh, Merrimu and Toolern Vale receive treated water from the Merrimu Water Filtration Plant, which is supplied from Merrimu Reservoir. During 2021-22, 2.01GL was supplied from the Merrimu Reservoir. In October and November 2021, Bacchus Marsh was supplied from Melbourne water supply through the Melton system as the Merrimu Filtration Plant couldn't treat taste and odour issues in the raw water from the Merrimu Reservoir. This totalled 313ML.

2.5.3 Woodend

Woodend receives treated water from two local sources: Campaspe Reservoir via the Marriages Water Filtration Plant, near Woodend, and the Graham Brock Reservoir via Reservoir C Water Filtration Plant on Mt Macedon.

During 2021-22, Woodend was supplied with 184ML from Campaspe Reservoir and 355ML from Graham Brock Reservoir, which received 274.9ML from the Macedon bulk entitlement. Woodend can also receive a potable supply from the Rosslynne system during times of low local storages or water quality events. During the year, 19ML was supplied from the Rosslynne system.

2.5.4 Romsey

Romsey receives treated water from the Romsey Water Filtration Plant, which is supplied with water from Kerrie Reservoir. Supplementary water can be sourced from Wright Reservoir in Riddells Creek. In the past year, Romsey Filtration Plant received 458ML from Kerrie Reservoir. Extra inflows were sent to Romsey from the Riddells Creek and Maribyrnong bulk entitlements this year and bore water (approximately 47.4ML) was used to supplement surface water storages for Romsey.

2.5.5 Lancefield

The Lancefield Water Filtration Plant can receive and treat surface water, bore water or a mixture of both. In 2021-22, 209ML of water was produced from Lancefield Water Filtration Plant, where approximately 12.8ML of bore water was used with the rest of the source water taken from Garden Hut Reservoir at Lancefield. The transfer network from Romsey to Lancefield also allowed for water to be transferred from the Romsey, Riddells Creek and Maribyrnong bulk entitlements during the year.

2.5.6 Myrniong

Myrniong receives its water supply from Pykes Creek Reservoir after treatment at the Myrniong Water Filtration Plant. A total of 43ML was taken from the storage during the reporting period in compliance with its bulk entitlement. Significant inflows had resulted in a storage increase during the year.

2.6 Source water monitoring

The quality of the bulk water supply is monitored by Melbourne Water before it enters GWW's distribution system. This monitoring has two components:

- Sites upstream of treatment, comprising rivers, streams, aqueducts and reservoirs. These sites are monitored at varying frequencies, largely to characterise overall long-term background water quality and to monitor for seasonal and possible longer-term changes. Parameters tested include organic chemicals, nutrients and microbes.
- Sites downstream of water treatment, where the monitoring is more intense than at upstream sites and is focused on verifying the quality of post-treatment product water. Frequencies of this monitoring ranged between continuous at chlorine dosing points and daily or weekly, depending on the sites and parameters measured (for example, testing for water clarity and purity, as well as microbial levels).

One of the key components of GWW's drinking water risk management plan is the source water monitoring program, part of the water quality sampling program required under regulation 8(1)(d) of the Safe Drinking Water Regulations 2015. The source water quality monitoring program is aimed at increasing the understanding of the source water quality in GWW-managed reservoirs, bores and basins. The program involves identifying and monitoring hazards, sources and events that could compromise drinking water quality in a catchment to consumer, multiple barrier approach. In 2021-22, a comprehensive source water and treated water quality monitoring program was undertaken through an independent National Authority of Testing Association (NATA) accredited laboratory. Appendix A provides an overview of the parameters tested and the frequency of testing at each sampling location for chemicals (organics and in-organics), metals and physical parameters and their results.

2.6.1 Microbiological monitoring

In addition to the source water monitoring conducted by an independent NATA-accredited laboratory, source water samples at various sampling locations were taken routinely for physical microbiological analysis by specialist biological scientists. This involves the determination of any flagellates, diatoms, algae and cyanobacteria (blue-green algae) that were present in the source water samples. General observations provided by these assessments in relation to any water discolouration, the levels of detritus and the presence of any odour in the source water provided valuable information in assessing the quality of the source water at various times during 2021-22. This information allows GWW to monitor the changes in conditions of source water supplies and assess their potential impacts on drinking water quality.

2.6.2 Blue-green algae

For Merrimu, Rosslynne and Pykes Creek reservoirs, blue-green algae monitoring was conducted by GWW and data was shared with water storage manager Southern Rural Water. Regular results for the three reservoirs allowed for the timely assessment of adverse impacts and our ability to treat and provide safe drinking water to customers. Monthly water quality reports were provided by Melbourne Water for algae monitoring at Greenvale Reservoir, including information on algal populations.

Melbourne Water is required to notify GWW of any major changes in treated water quality for supplies from the Melbourne system. That includes any changes that have potential to impact on our ability to supply safe drinking water to customers and meet the Australian Drinking Water Guidelines.

2.6.3 Assessment of water quality data

GWW has collected an extensive history of water quality data at water source, treatment plants and customer taps. Data collected from the water quality monitoring programs informs operational responses and activities, strategies and projects to maintain and supply safe drinking water. See section 5 for further details on the water quality monitoring programs implemented by GWW.

3. Preventative measures and multiple barrier risk management approach

GWW operates its drinking water supply systems under the Victorian *Safe Drinking Water Act 2003*, administered by Department of Health. GWW manages health risks associated with drinking water, effectively monitors the water and is subject to annual audits of our management systems.

Several processes have been adopted to ensure delivery of safe, high quality drinking water supplies to customers. This is achieved through the multiple barrier approach from catchment to tap, including various water treatment methods which are covered within the HACCP risk management system. The most recent independent external audit of water quality risk management plans took place in 2020 and confirmed former City West Water and former Western Water corporations were fully compliant with the *Safe Drinking Water Act 2003* risk management plan requirements. Further details on the risk management plan audit process and progress of actions are in section 9.1.

The adoption of preventative strategies for the protection of drinking water supplies is one of the key elements of the Framework for Management of Drinking Water Quality, developed under the Australian Drinking Water Guidelines. A key aspect of this risk-based approach to the production of safe drinking water is the use of multiple water treatment and protection practices, also known as the multiple barrier approach. At GWW, drinking water provided to customers is subject to a multiple barrier approach to ensure safe and aesthetically acceptable drinking water supplies. This demands a highly skilled workforce and requires constant vigilance and attention to detail. Each water quality barrier in place at GWW is discussed in detail below.

3.1 Catchment protection

GWW works with water storage managers, Southern Rural Water and Melbourne Water, to support effective water quality management from catchment to customer. Protected reservoirs and storage tanks are crucial in this process. The amount of time water is held in surface water supply reservoirs is a key element to maintaining good water quality as longer detention time allows sediment to settle. This improves water clarity and enables longer exposure to solar radiation, which aids in the disinfection process.

In addition to the bulk water supplied by Melbourne Water, GWW's three major storage reservoirs – Rosslynne, Merrimu and Pykes Creek (managed by Southern Rural Water) – also provide drinking water to our customers. We manage 17 smaller storages, most of which are in or near the Macedon Ranges. Except for Pykes Creek, our storages are protected through restricted access.

Water quality at reservoirs is also monitored to ensure safety. Our treated water storage tanks are covered and protected from public access to ensure that drinking water quality is maintained.

3.2 Alternative sources of supply

GWW's extensive interconnection to the Melbourne supply system ensures there is capacity in all the region's towns to access alternate water supply sources through the bulk entitlement with Melbourne Water. In the case of any issues for Myrniong's supply, carting water would be required as an alternative supply.

3.3 Bulk water treatment

GWW manages the security and quality of drinking water supply through bulk supply agreements with Melbourne Water for a treated water supply and Southern Rural Water for access to a local raw water supply. The local raw water supply is treated by GWW-operated plants and covered in section 3.4.

Treated water provided by Melbourne Water is stored, monitored and distributed by GWW to our customers. Table 5 summarises the water treatment processes applied by Melbourne Water on the bulk water. Refer to Melbourne Water's annual water quality report for further details.

3.3.1 Fluoridation

Melbourne Water adds fluoride to all of GWW's bulk water, in line with the requirements of the *Victorian Health (Fluoridation) Act 1973*. This is in the form of fluorosilicic acid at both the Silvan Reservoir supply and Winneke Water Treatment Plant.

3.3.2 Chemical treatment and disinfection

Melbourne source water comes from highly protected catchments which have a long detention time in storage reservoirs. As a result, disinfection alone is sufficient to ensure the quality of the water. Melbourne Water carries out primary disinfection of the bulk water supply by chlorination. Additional secondary chlorine dosing (using liquid sodium hypochlorite) is undertaken within the GWW service area by:

- Melbourne Water, with four secondary chlorinators servicing the water sampling localities of Werribee, Deer Park, Caroline Springs and Altona
- GWW, with a total of 23 secondary chlorinators, of which:
  - five service the water sampling localities of East Keilor, Little River, Richmond, Werribee and Werribee South
  - five service Sunbury, Bulla, Diggers Rest, Rockbank, Melton South and Eynesbury
  - 13 service the Merrimu and Rosslynne networks.

3.3.3 pH correction

The local water supply at Little River is dosed with gaseous carbon dioxide to help maintain neutral pH levels.

Table 5: Drinking water treatment process - bulk drinking water supply from Melbourne Water

Water sampling locality	Treatment plant	Treatment process[1]	Added substances	Comments
Altona Bulla* Caroline Springs Darley* Diggers Rest* Deer Park East Keilor Eynesbury* Gisborne* Lancefield* Lerderderg* Little River Macedon* Maddingley* Melton South* Merrimu* Mount Macedon* Myrniong* Riddells Creek* Rockbank* Romsey* Strathmore Sunbury* Taylors Lakes Toolern Vale* Tullamarine Werribee Werribee South Woodend*	Greenvale (transfer from treatment plant Silvan to Greenvale Reservoir)	Disinfection • Chlorination	Sodium Hypochlorite	No additional fluoridation at Greenvale as it receives fluoridated water from Silvan (refer section 2.3.1).
Altona Deer Park East Keilor Little River Maribyrnong Moonee Ponds Parkville Richmond Werribee Werribee South Williamstown	Silvan	Disinfection • Chlorination Other • pH correction • Fluoridation	Chlorine gas[2] Lime Fluorosilicic acid	

Water sampling locality	Treatment plant	Treatment process[1]	Added substances	Comments
Altona Caroline Springs Deer Park East Keilor Little River Maribyrnong Moonee Ponds Parkville Richmond Strathmore Taylors Lakes Tullamarine Werribee Werribee South Williamstown	Winneke	Clarification • Coagulation & flocculation Filtration • Sand filtration Disinfection • Chlorination Other • pH correction • Fluoridation	Polymer Alum Sodium hypochlorite Lime Fluorosilicic acid	
Altona Caroline Springs Deer Park East Keilor Little River Maribyrnong Moonee Ponds Parkville Richmond Strathmore Taylors Lakes Tullamarine Werribee Werribee South Williamstown	Victorian Desalination Plant via Silvan (treated water via desalination plant via Cardinia to Silvan Reservoir transfer and including transfer from treatment plant Silvan to Greenvale Reservoir)	Clarification • Coagulation & flocculation Filtration • Drum screens • Dual media pressure filters • Cartridge filters • Reverse Osmosis Remineralisation Disinfection • Chlorination Other • pH correction • Fluoridation • Sludge Handling	Ferric sulphate/ Sulphuric acid/ Polydadmac Antiscalant, Sodium hydroxide, Sodium bisulfite, Membrane cleaning chemicals (caustic, detergent, acid) Hydrated lime Carbon dioxide Chlorine gas Lime Fluorosilicic acid Polymer	Between 1 July 2021 and 30 June 2022, a blend of desalinated water from the Victorian Desalination Plant and water from Melbourne Water's Cardinia Reservoir was pumped into Silvan Reservoir (refer section 2.3)

* indicates the localities in the western service region that are connected to at least two drinking water sources – Melbourne Water supplies from Greenvale Reservoir and local reservoirs.

1. Chemicals added by Melbourne Water for treatment, chlorination and fluoridation, refer to the Melbourne Water annual drinking water quality report for details
2. Occasional use of sodium hypochlorite when required as additional disinfection residual or when chlorine gas dosing is offline, refer to Melbourne Water's annual drinking water quality report for details

3.4 Local source water treatment

Drinking water sourced from unprotected catchments, such as the local source water storages available to GWW, requires both filtration and disinfection due to the surrounding agricultural and urban activity. To ensure the provision of safe drinking water at customer taps, all water is disinfected at the point where it enters the supply system and again at specified points along the delivery system.

3.4.1 Filtration

GWW operates seven water filtration plants. Five of these plants employ a Dissolved Air Flotation Filtration (DAFF) treatment process; Merrimu Water Filtration Plant uses the traditional sedimentation-filtration process; and Romsey Water Filtration Plant uses microfiltration via membranes. Each treatment process efficiently removes potential pathogens and, coupled with disinfection, maintains a healthy drinking water supply with minimal impact on taste and odour. In addition, all filtration processes deliver high aesthetic water quality with minimal chemicals added. Typically, the filtration treatment provides water quality turbidity values of ≤0.3 nephelometric turbidity units (NTUs) and true colour of ≤5 platinum cobalt units (PCU), well below the guideline values in the Australian Drinking Water Guidelines.

3.4.2 Chemical treatment and disinfection

Chlorination and chloramination are both used to disinfect local treated water supplies. The method used depends on the supply system. This process kills any bacteria or viruses and provides disinfection residual to maintain water quality as it travels from the water filtration plant through the distribution system to the customer. Melbourne Water adds chemicals to the bulk treated supply from the Melbourne system to GWW's supply network. Lime, carbon dioxide or sodium carbonate may also be added to the water to adjust the pH level of the treated water to maintain it to neutral levels. Powder Activated Carbon is also used to combat taste and odours in the treated water produced by high concentrations of naturally occurring organic carbon. Drinking water sourced from the Melbourne system and the local system is disinfected by 18 of the 23 GWW secondary chlorinators, as it enters the local network.

3.4.3 Fluoridation

Fluoride is a naturally occurring element that is found in rocks, soils, water and plants. One milligram of fluoride for every litre of water has been shown to provide maximum dental benefits to the community and this is the 'optimal' level for temperate climates such as Victoria. GWW supplied fluoridated local water from both Merrimu and Rosslynne water filtration plants (dosed as sodium hexafluorosilicate or fluorosilicic acid). None of GWW's smaller water filtration plants currently add fluoride to their water supply. Fluoride (dosed as fluorosilicic acid) is added by Melbourne Water before delivery to GWW's supply region in line with the requirements of the *Health (Fluoridation) Act 1973*.

Table 6 lists the localities that receive a fluoridated supply. Supplies to Lancefield, Myrniong, Romsey and Woodend are only fluoridated when local supplies are supplemented with water from Melbourne, Merrimu or Rosslynne supplies. During the reporting period, some water from Rosslynne and Melbourne supply system was used to top up local supplies for Woodend, Romsey and Lancefield, resulting in low levels of fluoride in their water supply.

Table 6: Fluoridated and non-fluoridated water supply by water sampling localities

Fluoridated water supply	Non-fluoridated water supply
Altona, Bulla, Caroline Springs, Deer Park, Darley, Diggers Rest, East Keilor, Eynesbury, Gisborne, Lerderderg, Little River, Macedon, Maddingley, Maribyrnong, Melton South, Merrimu, Mount Macedon, Moonee Ponds, Parkville, Richmond, Riddells Creek, Rockbank, Strathmore, Sunbury, Taylors Lakes, Toolern Vale, Tullamarine, Werribee, Werribee South, Williamstown	Lancefield[1] Myrniong[2] Romsey[1] Woodend[1]

1. Lancefield, Woodend and Romsey received a small proportion of fluoridated water during 2021-22 when Melbourne supply and Rosslynne Reservoir water was mixed with local water supplies to ensure supply security
2. Myrniong received a small proportion of fluoridated water during 2021-22 when maintenance works were performed on the Browns Storage Tank

3.3.4 pH correction

Acidity in water is corrected to provide a neutral pH at different stages of the treatment process to ensure added chemicals are effective and that there are minimal impacts on pipes and associated fittings within the distribution network. Water's pH level may be corrected by adding lime and carbon dioxide or sodium carbonate at the start of the treatment process to assist with coagulation. The pH may be adjusted again at the end of the process to ensure effective disinfection and limit final water corrosiveness. The average pH of water should be maintained within the Australian Drinking Water Guidelines specified range of 6.5-8.5 pH units for aesthetic purposes.

Table 7: Drinking water treatment local water supplies

Water sampling locality	Treatment plant	Treatment process	Added substances	Comments
Lancefield	Lancefield Water Filtration Plant (WFP) Rosslynne WFP Greenvale Water Treatment Plant (WTP)	Coagulation pH Correction Filtration Dissolved Air Flotation Chlorination Fluoridation by Rosslynne[5] Fluoridation by Melbourne Water[5,7]	Aluminium Chlorohydrate (as required), Polyelectrolyte, Sodium Hydroxide (Caustic Soda), Potassium Permanganate, Powdered Activated Carbon (PAC), Sodium Hypochlorite Sodium, Fluorosilicic Acid	Drinking water is supplied from Garden Hut Reservoir and local groundwater. The Lancefield system is also connected to Romsey via a source water pipeline which allows transfer of water from Kerrie Reservoir into the Lancefield Basin.
Melton South Lerderderg Maddingley Darley Merrimu Rockbank Toolern Vale Eynesbury	Merrimu WFP Greenvale WTP	Coagulation Clarification/ filtration Fluoridation Chlorination Additional chlorination by secondary chlorinators along reticulation system as required[2] Fluoridation and primary chlorination by Melbourne Water[7] Secondary chlorination at Hillside Pump Station[1] Additional chlorination by secondary chlorinators along reticulation system as required[2]	Aluminium Chlorohydrate, Polyelectrolyte, Chlorine gas, Sodium Hexafluorosilicate, Sodium Hypochlorite Fluorosilicic Acid, Sodium Hypochlorite	Melton and Melton South have been supplied with Melbourne water since June 2016. Other towns in the Bacchus Marsh area of the Merrimu system have been supplied from Merrimu Reservoir. Booster chlorinators exist in Melton South, Rockbank, Merrimu, Darley, Maddingley and Lerderderg localities.

Water sampling locality	Treatment plant	Treatment process	Added substances	Comments
Myrniong	Myrniong WFP Greenvale WTP Merrimu WFP	Coagulation Oxidation pH correction Dissolved Air Floatation Filtration Chlorination Additional chlorination by secondary chlorinators along reticulation system as required[2 4] Fluoridation by Melbourne Water[7] or Merrimu WFP[6]	Powdered Activated Carbon (as required), Potassium Permanganate, Aluminium Sulphate, Polyelectrolyte, Sodium Carbonate ('Soda Ash'), Chlorine gas, Sodium Hypochlorite, Sodium Hexafluorosilicate, Fluorosilicic Acid	Drinking water is supplied from Pykes Creek Reservoir. When necessary, additional water can be carted to Myrniong from Bacchus Marsh (Lerderderg locality).
Romsey	Romsey WFP Greenvale WTP Rosslynne WFP	Microfiltration Chloramination Fluoridation by Melbourne Water[7] Additional chlorination by secondary chlorinators along reticulation system as required[2 4]	Poly Aluminium Chlorohydrate (as required), Sodium Hypochlorite, Sodium Hydroxide, Aqueous Ammonia Sodium, Fluorosilicic Acid	Drinking water is supplied from Kerrie Reservoir and Wright Reservoir and local groundwater. If required, Romsey's untreated water supply can be sourced from Rosslynne or Melbourne during dry periods.
Gisborne Macedon Mount Macedon Riddells Creek	Rosslynne WFP Greenvale WTP	Oxidation, Absorption Coagulation, pH correction, Dissolved Air Flotation Filtration, Fluoridation, Chlorination, Additional chlorination by secondary chlorinators along reticulation system as required[2 3]	Aluminium Sulphate, Potassium Permanganate (as required), Powder Activated Carbon, Polyelectrolyte, Lime, Carbon Dioxide, Fluorosilicic Acid, Chlorine Gas, Sodium Hypochlorite	During 2021-22 Rosslynne treated water was supplied to Gisborne, Riddells Creek, Macedon and Mt Macedon.
Sunbury Bulla Diggers Rest	Rosslynne WFP Greenvale WTP	Fluoridation and primary chlorination by Melbourne Water[7] or at Rosslynne WFP Secondary disinfection (chlorination) at Loemans Rd Pump Station[1] Additional chlorination by secondary chlorinators along reticulation system as required[2]	Aluminium Sulphate, Potassium Permanganate (as required), Powder Activated Carbon, Polyelectrolyte, Lime, Carbon Dioxide, Fluorosilicic Acid, Chlorine Gas, Sodium Hypochlorite Fluorosilicic Acid	Sunbury, Bulla and Diggers Rest remain on Melbourne water supply

Water sampling locality	Treatment plant	Treatment process	Added substances	Comments
Woodend	Marriages WFP Res C WFP Rosslynne WFP Greenvale WTP	Coagulation pH correction Dissolved Air Flotation Filtration Chlorination Fluoridation by Rosslynne Fluoridation by Melbourne Water[7]	Powdered Activated Carbon (as required at Marriages WFP), Aluminium Sulphate, Polyelectrolyte, Sodium Carbonate ('Soda Ash'), Sodium Hypochlorite, Sodium, Fluorosilicic Acid	Drinking water is supplied from two ends of the system – the Marriages Basin and Reservoir C Contact tank. Supply is fully treated at the Marriages WFP and Reservoir C WFP. If required, Woodend's water supply can be sourced from Rosslynne or Melbourne during dry periods.

1. Chemicals added by GWW for additional disinfection at entry point from Melbourne Water mains via Greenvale
2. Chemicals added by GWW throughout the distribution system to increase chlorine residual levels
3. When receiving water from the Mount Macedon system, and that water has been supplemented with Melbourne Water via Greenvale or Rosslynne Reservoir
4. When receiving water from Melbourne Water Greenvale supply or Rosslynne system through transfer to Wright Reservoir
5. When receiving water from the Romsey/Lancefield pipeline, and that water has been supplemented with Melbourne Water Greenvale supply or Rosslynne system water supply via Wright Reservoir
6. When receiving water from Melbourne Water through water carting from Bacchus Marsh (Merrimu System, supplied by Merrimu Treatment Plant or supplemented with Melbourne Water Greenvale supply)
7. For further details on the treatment process and chemicals added by Melbourne Water refer to the Melbourne Water Annual Drinking Water Quality report

3.5 Operational procedures and process control

Formal operational procedures are critical to ensure the consistent delivery of quality drinking water across the region. Standard operating procedures and work instructions can be used and referenced for maintenance tasks, specific or more complex tasks, or may exist as a standalone single reference for the agreed best practice for undertaking routine operational tasks. Whenever necessary, standard operating procedures were reviewed and updated in line with risk management requirements.

3.5.1 Operational monitoring and process control

Operational monitoring was conducted at all water filtration plants. Section 6 and Appendix A detail the results of treated water quality monitoring in 2021-22. Online equipment monitors chlorine, fluoride, electrical conductivity turbidity and pH water quality parameters. All water filtration plants use fully automated, continuously operating SCADA technology to remotely monitor and control the treatment processes. Alert and critical limits obtained from HACCP plans were integrated into treatment plant control systems. This results in plants automatically shutting down and triggering alarms to plant operators if water quality fails critical limits.

3.6 Water distribution network

The maintenance of the water distribution network, particularly pipes and tanks, is essential to ensure water quality from source to customer taps.

3.6.1 Distribution mains cleaning and maintenance program

In 2021-22, GWW supplied 597,551 connected properties with drinking water through 7,565 kilometres of water mains.

The extensive reticulation system is maintained through renewals, repairs and operational actions such as valve exercising, mains flushing, mains cleaning, and flow and condition monitoring and assessment. These actions help reduce water losses through leakage and bursts and maintain water quality.

A flushing program was performed from July to October 2021 covering approximately 170 locations around Bacchus Marsh, Darley and Maddingley townships. This was a routine maintenance program to clean the water mains around the area. There were no customer complaints due to the associated change in taste and smell of delivered drinking water as a result of the maintenance clean.

A successful mains cleaning program started at the end of October 2021 and completed mid-November 2021 in the Taylors Lakes sampling locality, serviced by the Holden high level area tank. In 2020-21 this area received 147 discoloured water complaints for the year. Customer complaint data after the network flushing program was analysed and a decreasing trend in the number of discoloured complaints was observed. For 2021-22, the Taylors Lakes discoloured water complaints were 99; this is a 67% reduction.

3.6.2 Storage tank cleaning and integrity inspection program

GWW has a routine cleaning program for storage tanks in the distribution system involving the use of specialised underwater cleaning equipment to remove sediment accumulated at the bottom of the tanks. All storage tanks are covered and checked regularly to minimise contamination from birds or animals as well as dirt, leaves and other matter.

3.7 Issues

During 2021-22, there were no issues from the application of treatment process applied by Melbourne Water in the treatment of the bulk water supplied that required a response from GWW. No adverse water treatment issues originated from secondary water treatment of bulk water supplied within GWW's service area during 2021-22. GWW works closely with Melbourne Water on any issues related to the treatment of the bulk water supply. For further details about bulk water supply treatment issues during 2021-22, refer to the Melbourne Water Annual Drinking Water Quality Report[2].

There were no treatment application issues at the GWW-operated local treatment plants during 2021-22. Issues and impacts related to increased rainfall in the Southern Rural Water managed catchments are presented in section 4. Alternative sources of water supply from the Melbourne system were implemented by GWW to supply customers serviced by the Rosslynne and Merrimu systems. For further information on the Southern Rural Water operated local reservoirs, refer to the Southern Rural Water Annual Report[3].

2. A copy of Melbourne Water's Annual Water Quality Report can be found on their website at https://www.melbournewater.com.au/about/strategies-and-reports/water-quality-annual-report

3. A copy of Southern Rural Water's annual report can be found on their website at https://www.srw.com.au/more/publications

4. Emergency, incident and event management

This section reports on emergencies, incidents and events related to drinking water quality. Water quality information is reported monthly and quarterly to the GWW Board and Board committees. This includes events that may have led to known or suspected contamination of the drinking water supply, including those that were reported to Department of Health in line with s 22 of the *Safe Drinking Water Act 2003*.

4.1 Known or suspected contamination reported under s 22 *Safe Drinking Water Act 2003*

Three reports were made to the Department of Health under s 22; two reports were related to the investigation of *E. coli* results from our water monitoring program. After investigation by GWW, and in line with the requirements of paragraph (c) of the *E. coli* drinking water quality standard in Schedule 2 of Safe Drinking Water Regulations 2015, it was concluded that each of three detections of *E. coli* in drinking water samples collected were not representative of the water supplied with both the routine samples determined as a 'false positive sample'. Under the Safe Drinking Water Regulations 2015, a false positive sample for *E. coli* is not considered a failure of the *E. coli* water quality standard. A false positive sample for *E. coli* is where there is an *E. coli* detection in a routine water quality sample that is considered to be non-representative of the water supplied to customers following an investigation and the investigation was conducted and reported in accordance with the Secretary's guidelines. The details of the three reports made to the Department of Health are provided here.

4.1.1 *E. coli* detection in non-routine sample, Werribee South (January 2022)

On Thursday 27 January 2022, GWW verbally reported to the Department of Health that there had been an *E. coli* detection (1 orgs/100mL) in an investigative non-routine sample related to a customer complaint from a sample tap in the Werribee South locality on 25 January 2022. The sample also contained 0.32mg/L of free chlorine, 0.41mg/L total chlorine, 1 orgs/ml coliform, pH 7.75 and turbidity of 0.2NTU. Environmental conditions, design and location of the sample tap at the time of sampling were identified as the source of contamination. In line with Schedule 2 of Safe Drinking Water Regulations 2015, the following key actions were taken to investigate and determine if the result of the analysis was representative of the water in the Werribee South sampling locality:

- confirmed quality of the source water
- confirmed no upstream water treatment plant or water quality issues
- undertook resample and follow-up samples at the sample location and confirmed they were free from any microbial contamination.

Findings from the investigation identified improvements for internal notification and review processes as current processes resulted in a delay in reporting this event to the Department of Health.

The investigation concluded that the results of the analysis conducted by the accredited laboratory were not representative of the water in Werribee South sampling locality. The investigation established that the *E. coli* standard criteria (i), (ii), (iii) and (iv) of paragraph 3a(c) Regulation 12, had been met with no evidence, apart from the initial *E. coli* detection, to support that the Werribee South water supply has been contaminated.

4.1.2 *E. coli* detection in routine sample, Richmond (March 2022)

On Friday 11 March 2022, an *E. coli* detection of 1 orgs/100mL was reported by the external laboratory from a routine sample at the Richmond sampling locality. Other results taken on the day included coliform results of 3 orgs/mL, 0.20mg/L of free chlorine and 0.31mg/L total chlorine. The *E. coli* detection was reported to the Department of Health and a rapid risk assessment, which included resampling by the external accredited laboratory, was undertaken. The assessment considered the operational status of the water supply system, the recent water quality results from the surrounding area, and the environmental conditions at the time of sample collection. The resampling results returned no *E. coli* detections and so a detailed investigation was performed over several days. In line with Schedule 2 of the Safe Drinking Water Regulations 2015, the following key actions were undertaken to investigate and determine if the result of the analysis was representative of the water in the Richmond sampling locality:

- initiated resampling at the impacted sample tap and designated sampling points within the Richmond locality
- reviewed the integrity of Kew Reservoir storage tanks roof and hatch
- reviewed online monitoring performance before and during the time of detection and previous sample results
- reviewed the sensitivity of the test and sampling, in relation to environmental conditions at the sample site.

Outcomes from the investigation found:

- The water supply system was operating normally before, during and after the sample was collected with all treatment barriers operating effectively.
- There was sufficient chlorine to deactivate *E. coli* within the system. All samples and resamples from the impacted customer sample tap and surrounding areas did not detect *E. coli*.
- The sample had been collected on a day of windy weather that is likely to have affected the collection of the sample. The sample tap location is not appropriate for the environmental conditions that exist in this area.

The investigation concluded that the results of the analysis conducted were not representative of the water in the Richmond sampling locality. The investigation established that the *E. coli* standard criteria (i), (ii), (iii) and (iv) of paragraph 3a(c) Regulation 12 had been met with no evidence, apart from the initial *E. coli* detection, to support that the Richmond water supply has been contaminated. On 12 March 2022, in line with Schedule 2 of the Safe Drinking Water Regulations 2015, it was concluded that the detection of *E. coli* was a 'false positive sample'.

4.1.3 *E. coli* detection in routine sample, Eynesbury (April 2022)

On Tuesday 19 April an *E. coli* detection of 1 orgs/100mL was reported by the external laboratory from a routine sample collected from the Eynesbury sampling locality. Other results taken at the same time include 13 orgs/100mL coliforms, 0.87mg/L free chlorine and 0.70mg/L total chlorine. The *E. coli* result was reported to the Department of Health and a rapid risk assessment, which included resampling by the external laboratory, was completed.

The assessment considered the operational status of the water supply system, the recent water quality results from the surrounding area, and the environmental conditions at the time of sample collection. The resampling results returned no *E. coli* detections and so a detailed investigation was performed over several days. In line with Schedule 2 of Safe Drinking Water Regulations 2015, the following key actions were undertaken to investigate and determine if the result of the analysis was representative of the water in the Eynesbury sampling locality:

- initiated resampling and follow up sample results at the tap and designated sampling points within the Eynesbury network was performed
- reviewed the integrity of assets, including storage tanks roof and hatch of the Greenshill and 35ML Minns Road tanks
- reviewed online monitoring data to demonstrate performance of the asset before and during the detection and previous sample results
- reviewed the sensitivity of the test and sampling, in relation to environmental conditions at the sample site.

Outcomes from the investigation found:

- The water supply system was operating normally before, during and after the sample was collected with all treatment barriers operating effectively.
- There was sufficient chlorine to deactivate *E. coli* within the system. All samples and resamples from the impacted customer sample tap and surrounding areas did not detect *E. coli*.
- The sample had been collected on a day of rainy weather that affected the collection of the sample. The sample tap location is not appropriate for the environmental conditions that exist in this area of sampling due to its proximity to an overhanging tree and loose debris on the ground.

The outcome from the investigation concluded that the results of the analysis conducted were not representative of the water in the Eynesbury sampling locality. The investigation established that the *E. coli* standard criteria (i), (ii), (iii) and (iv) of paragraph 3a(c) Regulation 12 had been met with no evidence, apart from the initial *E. coli* detection, to support that the Eynesbury Water supply has been contaminated. On the 20 April 2022, in line with Schedule 2 of the Safe Drinking Water Regulations 2015, it was concluded that the detection of *E. coli* was a 'false positive sample'.

GWW has continued to work with the laboratory services provider to improve sample collection techniques and access to sample points. In addition, GWW initiated a comprehensive program to review the condition of sample taps to identify priority maintenance and minimise the potential for false positive results at sample taps, in response to these events. GWW continues to review the findings from water quality investigations to improve data analysis, review and reporting opportunities to monitor the safety of the water supply.

4.2 Other drinking water quality events

4.2.1 Coronavirus (COVID-19) pandemic

The COVID-19 pandemic has continued to impact a variety of services and activities throughout Victoria. However, our management and monitoring of drinking water quality have not been affected and continue to be undertaken to our usual high standards. Furthermore, there is no evidence that COVID-19 is transmitted by drinking water.

4.2.2 Rosslynne Reservoir inflows and change of supply, 2021-22

Rosslynne Reservoir has remained offline for drinking water treatment by GWW for most of 2021-22 due to increased rainfall inflow events that changed water quality. Large rainfall events can change the sediment and organics in the reservoir, causing difficulties for the Rosslynne Water Filtration Plant to treat the water to meet the drinking water health and aesthetic standards. The arrangement of the network between Sunbury and the Macedon Ranges allows for connection to the Melbourne Water supply to Gisborne, Riddells Creek, Macedon and Mount Macedon as an alternative source water. The reduced demand during 2021-22 caused by the current La Niña effect ensured all supply demands could be met in the region while operating on the alternative source water.

4.2.3 Merrimu Reservoir taste and change of supply, September 2021

During September, the Merrimu Reservoir level increased significantly due to rainfall events. This caused stratification, where low dissolved oxygen levels at the bottom of the reservoir were likely to release manganese from the sediments. To prevent issues of discoloured water, the selected offtake level from the reservoir was raised higher than the bottom of the reservoir. The level selected encountered a warmer layer of water that was in contact with surface vegetation around the banks of the reservoir. The vegetation caused this layer of water to develop a characteristic taste. In October, field crews during routine maintenance reported that the drinking water had a musty odour, and some customers reported a slight change in taste. Profile sampling was performed in October as part of the investigation to determine the cause of the taste change in the reservoir. The online monitoring reservoir profiler was a vital tool used during this event as health and safety controls due to the pandemic limited in-person testing. To manage the issue, Merrimu Water Filtration Plant supply was blended with Melbourne Water supply to minimise the overall taste changes. At the earliest opportunity, which came in December, the offtake level was changed and selected below the warm water layer but above the low dissolved oxygen level.

4.2.4 Werribee South detection of customer internal cross connection

On 24 January 2022, GWW responded to a customer water quality complaint in K Road, Werribee South. The investigation found an internal cross connection installed beyond the meter at the customer's property. A non-routine sample was collected as part of the investigation and returned an *E. coli* result, which after investigation was found to be non-representative of the water supplied and is discussed above with the s 22 reports. The event highlighted the importance of ensuring all agricultural properties are fitted with high-risk backflow prevention devices to safeguard GWW supply. A community consultation program is being developed to reduce the risk of backflow into the GWW supply from residential agricultural land use in Werribee South.

4.2.5 Lancefield Water Filtration Plant algae and zooplankton bloom, June 2022

The current La Niña cycle encouraged a type of green algae bloom called *Mallomonas* and this resulted in a significant zooplankton bloom in the untreated water of the Lancefield Basin Reservoir. Zooplankton are aquatic microorganisms and are an indication of a healthy environment where there is an abundant algae food source. The zooplankton entered the Lancefield Filtration Plant and caused a foaming effect when mixed with the coagulation process. The foam and zooplankton were able to be removed by the filtration process at the plant. No zooplankton were detected in the treated water and the drinking water produced by Lancefield Treatment Plant was safe to drink and supply to customers.

4.2.6 Blue-green algae

During 2021-22, there were no blue green algae levels that impacted water treatment or notifications to the regulator required that impacted source drinking water quality at Rosslynne Reservoir, Pykes Creek Reservoir, Merrimu Reservoir, local reservoirs or the Melbourne supply from Greenvale Reservoir. The Department of Environment, Land, Water and Planning web portal received several reports of algal blooms, including at the Merrimu, Pykes Creek, Djerriwarrh and Rosslynne reservoirs. While these reservoirs are not used directly for drinking water supply without treatment or for direct recreation, except for Pykes Creek Reservoir, Southern Rural Water was notified for recreation or irrigation purposes. No response was required from GWW. GWW received notification of detections of algae blooms from the independent external laboratory source water biological monitoring program at the reservoirs. The levels were not significant and were able to be removed by the water treatment plants.

4.2.7 Upper Yarra Reservoir high sedimentation event

Following a severe weather event in June 2021, with strong winds and heavy rain in Melbourne's east, increased soil, leaf litter and other plant material washed off the protected catchments into the Upper Yarra Reservoir. This impacted water clarity in the Upper Yarra Reservoir.

To maintain high quality drinking water standards, Melbourne Water took the Upper Yarra Reservoir offline to allow the soil, leaf litter and other plant material to settle out. Melbourne Water worked closely with GWW, South East Water and Yarra Valley Water throughout the event to ensure resilience in the continuity of supply while maintaining the high quality of water supplied.

The Upper Yarra Reservoir water clarity improved over July to October 2021 and was returned to service in October with no impact to the water quality supplied to GWW customers.

5. Drinking water quality monitoring

In 2021-22, a significant part of our water management activities involved monitoring the quality of drinking water to ensure compliance with the Safe Drinking Water Regulations 2015 and the Australian Drinking Water Guidelines.

These guidelines provide a benchmark for a large range of biological, physical and chemical parameters. Monitoring was undertaken under contract by an approved, specialised and quality-certified laboratory. Physical and chemical assessment and monitoring is based on a combination of parameters that indicate physical and aesthetic water characteristics, such as pH, colour and turbidity (water clarity), as well as the chemical quality of the water (levels of chlorine, iron, fluoride, dissolved salts, aluminium, copper and other heavy metals). Contact information for further details of all water quality testing outlined in this report is in section 14 and further water quality monitoring program details are available in sections 6 and 7 and Appendix A.

Non-routine testing is carried out in addition to the routine testing program to investigate water quality trends, water source variation issues or customer complaints or to explore suspected contamination issues. Non-routine testing may be done by external NATA-accredited laboratories or by operational testing, depending on the nature of the issue and the water quality information required. The chemicals used to treat our drinking water are all delivered by approved chemical suppliers. Chemical quality is verified through the quality systems built into the chemical supply contract, which ensure the approved chemicals are used throughout the treatment process according to specifications.

An extensive local source water monitoring program aimed at increasing the understanding of the source water quality in reservoirs, bores and basins managed by GWW was undertaken. The program involves identifying and monitoring hazards, sources and events that could compromise drinking water quality in a catchment, to inform and review the effectiveness of the multiple barrier approach controls in place.

To assess the quality of our water supplies, routine monitoring is undertaken to confirm compliance with the safe drinking water legislation. Water samples are collected in each of our 34 water sampling localities, at the reservoirs, water filtration plants and various points throughout the supply system, including water storage tanks, pump stations and customer taps. Samples are scheduled and collected by an independent NATA-accredited laboratory with results sent directly to GWW data systems for review, investigation, analysis of trends and reporting. If results are outside of defined limits, GWW receives notification in the first instance from the laboratory or by an automatic notification from our data system.

The contracted laboratory is required to immediately notify GWW of any health-related exceedances detected in drinking water samples. The limits are based on the Safe Drinking Water Regulations 2015 and Australian Drinking Water Guidelines 2011.

During 2021-22, changes were made to the routine sampling program frequency for various parameters, including an update to fluoride sampling in accordance with the Code of Practice for fluoridated drinking water supplies. GWW continued to review water quality trends and data from water filtration plant operational and network monitoring systems to monitor trends as needed.

In addition, Melbourne Water monitors the quality of bulk water supplies at points upstream of delivery points to GWW. The results of all these tests are reviewed as part of the Bulk Water Supply Agreement between the two water agencies and provided monthly as part of the Melbourne Water customer report.

6. Drinking water quality compliance

Since 1 July 2004, the management of drinking water in Victoria has been governed by the *Safe Drinking Water Act 2003*. Under this Act, the drinking water must comply with quality standards. The Safe Drinking Water Regulations 2015 specify scheduled water quality standards for several water quality parameters, as listed in table 8.

Table 8: Water quality parameters, standards and frequency of sampling

Water quality parameter	Standard (Safe Drinking Water Regulations 2015)	Relevant sampling frequency for each locality
Escherichia coli (E. coli)	All samples of drinking water collected are found to contain no *E. coli* per 100 millilitres of drinking water, with the exception of any false positive sample	one sample per week
Total Trihalomethanes (Total THMs)	Less than or equal to 0.25 mg/L of drinking water	one sample per month
Turbidity	The 95th percentile of results for samples any 12-month period must be ≤ 5.0 nephelometric turbidity units (NTU)	one sample per week

The tables in sections 6.1 to 6.3 outline the 2021-22 compliance assessment of water quality parameters against the water quality scheduled standards specified in Safe Drinking Water Regulations 2015.

6.1 *E. coli*

Escherichia coli (E. coli) is found in human and animal faeces and is tested as a specific indicator of faecal contamination in the drinking water supply. Detection of *E. coli* can indicate a failure in water treatment, contamination of a water storage facility or possible infiltration of the enclosed system. Treatment through disinfection removes *E. coli*. GWW applies chemical disinfection by chlorination or chloramination in all its supply systems. A level of disinfection residual is maintained within the distribution system to prevent potential regrowth of microorganisms before reaching customer taps.

E. coli performance in our drinking water has consistently complied with Safe Drinking Water Regulations 2015 in all water sampling localities.

Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Altona sampling locality during 2021-22. The total number of samples collected for this locality was inconsistent with our Risk Management Plan sampling program. Further details can be found in section 6.6. All other required elements of our sampling program were carried out as described in the risk management plan and at the frequency of sampling in the standard. Water quality was able to be assessed as compliant with schedule 2 of the Safe Drinking Water Regulations 2015. Further water quality results for all localities are available at Appendix A.

Standard: All samples of drinking water collected are found to contain no *E. coli* per 100 millilitres of drinking water, with the exception of any false positive sample.

Table 9: *E. coli* summary results in drinking water samples tested between 1 July 2021 and 30 June 2022

Water sampling locality	Frequency of sampling	Number of samples	Maximum detected (orgs/100mL)	Average	Number of detections & investigations conducted (s 22**)	Number of samples where standard was not met (s 18***)
Altona	>Weekly	300[a]	0	0	0	0
Bulla	Weekly	52	0	0	0	0
Caroline Springs	>Weekly	341	0	0	0	0
Darley	>Weekly	533	0	0	0	0
Deer Park	>Weekly	242	0	0	0	0
Diggers Rest	>Weekly	104	0	0	0	0
East Keilor	>Weekly	157	0	0	0	0
Eynesbury	>Weekly	165	1*	0	1*	0
Gisborne	>Weekly	370	0	0	0	0
Lancefield	>Weekly	105	0	0	0	0
Lerderderg	>Weekly	221	0	0	0	0
Little River	>Weekly	118	0	0	0	0
Macedon	>Weekly	156	0	0	0	0
Maddingley	>Weekly	208	0	0	0	0
Maribyrnong	>Weekly	367	0	0	0	0
Melton South	>Weekly	218	0	0	0	0
Merrimu	>Weekly	271	0	0	0	0
Moonee Ponds	>Weekly	237	0	0	0	0
Mount Macedon	>Weekly	208	0	0	0	0
Myrniong	>Weekly	245	0	0	0	0
Parkville	>Weekly	405	0	0	0	0
Richmond	>Weekly	113	1*	0	1*	0
Riddells Creek	>Weekly	156	0	0	0	0
Rockbank	>Weekly	208	0	0	0	0
Romsey	>Weekly	318	0	0	0	0
Strathmore	>Weekly	79	0	0	0	0
Sunbury	>Weekly	424	0	0	0	0
Taylors Lakes	>Weekly	249	0	0	0	0
Toolern Vale	>Weekly	104	0	0	0	0
Tullamarine	>Weekly	113	0	0	0	0
Werribee	>Weekly	521	0	0	0	0
Werribee South	>Weekly	98	0[b]*	0	1[b]*	0
Williamstown	>Weekly	169	0	0	0	0
Woodend	>Weekly	231	0	0	0	0

[a] Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Altona locality during 2021-22. Refer to section 6.6 for details.

*these sample results were confirmed as false positive samples. Refer to section 4.1 for details.

[b] This s 22 report was a result of non-routine investigative sample at Werribee South. Please refer to section 4.1.1 for more details.

** as per s 22 of the *Safe Drinking Water Act 2003*.

*** as per s 18 of the *Safe Drinking Water Act 2003*.

6.2 Total trihalomethanes

Trihalomethanes are present in drinking water principally as a by-product of disinfection from chlorination or chloramination, where chlorine reacts with dissolved organic material.

GWW disinfects its drinking water supplies by either chlorination or chloramination. Chlorine-based disinfection by-products measured under the Safe Drinking Water Regulations 2015 include total trihalomethanes. The following section reports the results for the 2021-22 monitoring program.

Standard: Total trihalomethanes less than or equal to 0.25 milligrams per litre of drinking water.

Table 10: Total trihalomethanes summary results in drinking water samples tested between 1 July 2021 and 30 June 2022

Water sampling locality	Frequency of sampling	Number of samples	Drinking water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s 18**)
Altona	>Monthly	13	0.25	0.05	0.04	0
Bulla	>Monthly	16	0.25	0.05	0.04	0
Caroline Springs	>Monthly	14	0.25	0.04	0.03	0
Darley	>Monthly	193	0.25	0.19	0.09	0
Deer Park	>Monthly	13	0.25	0.06	0.04	0
Diggers Rest	>Monthly	16	0.25	0.04	0.02	0
East Keilor	>Monthly	13	0.25	0.04	0.03	0
Eynesbury	>Monthly	29	0.25	0.05	0.04	0
Gisborne	>Monthly	174	0.25	0.12	0.04	0
Lancefield	>Monthly	44	0.25	0.20	0.13	0
Lerderderg	>Monthly	70	0.25	0.21	0.10	0
Little River*	>Monthly	31	0.25	0.07	0.05	0
Macedon	>Monthly	70	0.25	0.09	0.05	0
Maddingley	>Monthly	46	0.25	0.19	0.11	0
Maribyrnong	>Monthly	13	0.25	0.05	0.04	0
Melton South	>Monthly	40	0.25	0.06	0.03	0
Merrimu	>Monthly	65	0.25	0.13	0.06	0
Moonee Ponds	>Monthly	13	0.25	0.06	0.05	0
Mount Macedon	>Monthly	98	0.25	0.09	0.06	0
Myrniong	>Monthly	73	0.25	0.15	0.07	0
Parkville	>Monthly	13	0.25	0.05	0.04	0
Richmond	>Monthly	14	0.25	0.07	0.06	0
Riddells Creek	>Monthly	70	0.25	0.08	0.04	0
Rockbank	>Monthly	40	0.25	0.04	0.02	0
Romsey	>Monthly	53	0.25	0.09	0.02	0
Strathmore	>Monthly	13	0.25	0.10	0.06	0
Sunbury	>Monthly	91	0.25	0.05	0.03	0
Taylors Lakes	>Monthly	27	0.25	0.08	0.04	0
Toolern Vale	>Monthly	42	0.25	0.12	0.07	0
Tullamarine	>Monthly	14	0.25	0.04	0.03	0
Werribee*	>Monthly	17	0.25	0.07	0.05	0
Werribee South	>Monthly	26	0.25	0.08	0.05	0
Williamstown	>Monthly	13	0.25	0.06	0.04	0
Woodend	>Monthly	70	0.25	0.16	0.06	0

* Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Little River and Werribee localities during 2021-22 for monitoring according to our Risk Management Plan. Refer to section 6.6 for details.

** as per s 18 *Safe Drinking Water Act 2003*.

6.3 Turbidity

Turbidity is the measurement of the light scattering particles of water and is caused by the presence of fine suspended matter in the supply. Based on aesthetic considerations, the turbidity standard is set at five nephelometric turbidity units (NTU), which is the point where water may appear slightly discoloured in a glass. Table 11 reflects the reporting period 1 July 2021 to 30 June 2022 under the Safe Drinking Water Regulations and lists the turbidity results for samples taken at customer taps. It includes the 95th percentile measure for samples taken for turbidity over a 12-month period.

Standard: The 95th percentile of results for samples in any given 12-month period must be less than or equal to 5.0 NTU.

Table 11: Turbidity summary results in drinking water samples tested between 1 July 2021 and 30 June 2022

Water sampling locality	Frequency of sampling	Number of samples*	Maximum turbidity in a sample (NTU)	95th percentile of turbidity results in any 12 months (NTU)	Number of 95th percentile results in any 12 months above standard (s 18**)
Altona	Weekly	52	0.5	0.4	0
Bulla	Weekly	52	1.2	1.1	0
Caroline Springs	>Weekly	74	1.1	1.0	0
Darley	>Weekly	534	1.2	0.9	0
Deer Park	>Weekly	53	0.9	0.7	0
Diggers Rest	>Weekly	104	1.5	1.1	0
East Keilor	Weekly	52	1.0	0.6	0
Eynesbury	>Weekly	164	2.1	1.3	0
Gisborne	>Weekly	360	1.2	1.1	0
Lancefield	>Weekly	106	0.3	0.1	0
Lerderderg	>Weekly	208	1.1	0.9	0
Little River	>Weekly	92	0.8	0.5	0
Macedon	>Weekly	157	3.3	1.1	0
Maddingley	>Weekly	208	2.1	0.8	0
Maribyrnong	Weekly	52	1.2	0.7	0
Melton South	>Weekly	158	1.2	1.1	0
Merrimu	>Weekly	258	1.5	1.0	0
Moonee Ponds	>Weekly	55	1.1	0.9	0
Mount Macedon	>Weekly	207	1.5	1.1	0
Myrniong	>Weekly	245	2.9	0.3	0
Parkville	Weekly	52	0.8	0.6	0
Richmond	>Weekly	60*	8.9	1.2	0
Riddells Creek	>Weekly	156	1.3	1.1	0
Rockbank	>Weekly	208	2.0	1.2	0
Romsey	>Weekly	359	0.2	0.1	0
Strathmore	Weekly	52	1.1	0.9	0
Sunbury	>Weekly	365	1.4	1.1	0
Taylors Lakes	>Weekly	72	2.0	1.3	0
Toolern Vale	>Weekly	104	1.2	0.9	0
Tullamarine	>Weekly	75	1.2	1.0	0
Werribee	>Weekly	82	0.8	0.6	0
Werribee South	>Weekly	69	0.7	0.6	0
Williamstown	Weekly	52	0.5	0.4	0
Woodend	>Weekly	219	1.1	0.5	0

* There was a single sample that exceeded the turbidity limit of 5NTU in Richmond. This was related to the state of the sample tap located in an infrequently used private connection which has since been decommissioned. The 95th percentile of results for samples in the 12-month period continued to be less than or equal to 5NTU.

** as per s 18 *Safe Drinking Water Act 2003*.

6.4 Other water quality standards (algal toxin, pathogen, chemical or substance that may pose a risk to human health)

In addition to the water quality parameters designated as standards by the Safe Drinking Water Regulations 2015, we also monitored a range of other chemical parameters that provide further information on the overall quality of our drinking water supply. Among such other parameters that were monitored in 2021-22, those for which there is a health-related Australian Drinking Water Guidelines 2011 value are considered as 'other drinking water quality standards' under regulation 12(b) of the Safe Drinking Water Regulations 2015. These parameters are listed in table 14. Furthermore, data on aesthetic and other parameters that provide an additional comprehensive characterisation of the water, as well as assisting the needs of customers are in section 7.3, Appendix A.

Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Altona, Werribee and Little River localities during 2021-22. The total number of aesthetic samples across a range of parameters collected for these localities was inconsistent with our risk management plan. Further details can be found in section 6.6. All other required elements of our sampling program were carried out as described in the plan and at the frequency of sampling in the Standard.

Any monitoring for organic chemicals (including pesticides) and radioactive substances is undertaken at locations as part of the bulk water supply and local supply sources managed by GWW. Melbourne Water, as our major bulk water supplier, tests for these substances with respect to its major storage reservoirs such as Silvan and Sugarloaf, where the potential for contamination is greater. Results of this monitoring are provided to GWW by the external laboratory. No significant detections (with respect to Australian Drinking Water Guidelines 2011) in the bulk water supply were reported during 2021-22.

6.5 Fluoride

Both the *Health (Fluoridation) Act 1973* and the Department of Health require that the optimal range of fluoride in drinking water supplied by GWW must be between 0.8mg/L and 1.0mg/L, and a minimum of 0.6mg/L. Fluoride levels in any individual sample from drinking water supplied must also not exceed 1.5mg/L, according to the Australian Drinking Water Guidelines. Table 12 reflects the reporting period 1 July 2021 to 30 June 2022 under the Safe Drinking Water Regulations 2015.

Fluoride is added to the drinking water to improve dental health. In supplies where fluoride is not added, naturally occurring sources, such as soils and rock, may impart fluoride to the water. For further information on water fluoridation, please visit the Victorian Department of Health website.

Table 12: Fluoride summary results in drinking water samples tested between 1 July 2021 and 30 June 2022

Water sampling locality	Frequency of sampling*	Number of samples	Drinking water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s 18)
Altona	>Fortnightly	26	1.5	0.93	0.84	0
Bulla	Monthly	12	1.5	0.85	0.77	0
Caroline Springs	>Fortnightly	28	1.5	0.93	0.79	0
Darley	Monthly	38	1.5	0.85	0.74	0
Deer Park	>Fortnightly	27	1.5	0.99	0.84	0
Diggers Rest	Monthly	24	1.5	0.83	0.77	0
East Keilor	>Fortnightly	27	1.5	0.95	0.84	0
Eynesbury	Monthly	25	1.5	0.83	0.76	0
Gisborne	Monthly	64	1.5	0.85	0.76	0
Lancefield	Monthly	13	1.5	0.11	0.09	0
Lerderderg	Monthly	24	1.5	0.95	0.75	0
Little River	>Fortnightly	44	1.5	1.0	0.84	0
Macedon	Monthly	12	1.5	0.81	0.77	0
Maddingley	Monthly	35	1.5	0.88	0.76	0
Maribyrnong	>Fortnightly	26	1.5	0.94	0.83	0
Melton South	Monthly	12	1.5	0.82	0.77	0
Merrimu	Monthly	126	1.5	0.86	0.73	0
Moonee Ponds	>Fortnightly	27	1.5	0.92	0.80	0
Mount Macedon	Monthly	12	1.5	0.8	0.76	0
Myrniong	Monthly	35	1.5	0.46	0.08	0
Parkville	>Fortnightly	27	1.5	0.97	0.86	0
Richmond	>Fortnightly	28	1.5	0.85	0.76	0
Riddells Creek	Monthly	12	1.5	0.84	0.77	0
Rockbank	Monthly	24	1.5	0.82	0.77	0
Romsey	Monthly	37	1.5	0.13	0.09	0
Strathmore	>Fortnightly	26	1.5	0.95	0.80	0
Sunbury	Monthly	36	1.5	0.82	0.77	0
Taylors Lakes	>Fortnightly	40	1.5	0.84	0.77	0
Toolern Vale	Monthly	12	1.5	0.82	0.73	0
Tullamarine	>Fortnightly	28	1.5	0.96	0.77	0
Werribee	>Fortnightly	32	1.5	0.95	0.84	0
Werribee South	>Fortnightly	42	1.5	0.92	0.83	0
Williamstown	>Fortnightly	26	1.5	0.94	0.85	0
Woodend	Monthly	25	1.5	0.81	0.11	0

* Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Little River and Werribee localities during 2021-22 for monitoring according to our risk management plan. Refer to section 6.6 for details.

6.6 Drinking water quality compliance

For 2021-22, GWW fully complied with the requirements of the *Safe Drinking Water Act 2003* and achieved partial compliance of the Safe Drinking Water Regulations 2015. While the minimum monitoring requirements for health-based water quality tests were met, as set out in Schedule 2 of the Safe Drinking Water Regulations 2015, a small number of tests were missed in comparison to the GWW risk management plan. This will be considered a non-compliance against reg 13(1).

GWW engaged an independent expert and they have confirmed that the remaining test results can be considered as a representative sample of the long-term historic performance to heath-based guideline values and that GWW customers have not been exposed to additional risk.

The non-compliance resulted from 479 water quality tests being missed out of a total 71,000 tests being taken and analysed as part of the 2021-22 sampling program. For the Altona locality, a total of 180 microbial suite parameters were missed, including 36 *E. coli* tests. The remaining parameters in the microbial suite included free chlorine, total chlorine, total coliforms and total plate count. All other requirements of the sampling program were carried out as described in the risk management plan sampling plan and at the frequency of sampling in the standard. A total of 1,821 samples were tested in the Altona locality for the 2021-22 reporting year.

As a result, several initial improvement opportunities have been identified for action:

- Engage an external provider to undertake a review of all sampling program processes and documentation with a focus on the chain of custody for data management.
- Bring forward the integration of the two sampling programs as identified in the Drinking Water Risk Management Plan Integration Roadmap.
- Improve the frequency and efficacy of internal verification processes and validation of sampling program outcomes.
- Improve notification processes with the external laboratory services provider to meet the requirements of the sampling program.
- Include a flagged item to validate sampling program changes at the next external risk management audit.

7. Analysis of results and trends

This section examines:

- trends over time (three years) of water quality parameters tested that are designated as standards in the Safe Drinking Water Regulations 2015 (section 7.1)
- trends over time (five years) and between localities, of parameters listed in Appendix A tables that are drinking water quality standards under regulation 12 or Australian Drinking Water Guidelines 2011 health-related or aesthetic guideline values (section 7.2).

Data analysed in this section is based on drinking water samples obtained from reticulation system sampling sites.

7.1 Historical compliance of standard parameters

Trends for the previous two financial years and the current reporting period (and extent of compliance) of water quality parameters that are scheduled standards in the Safe Drinking Water Regulations 2015 are summarised in table 13. The trend shows consistent 100% compliance with the standards.

Table 13: Schedule 2 compliance trends over time of the standard parameters from our water sampling localities

		Localities compliant (customer sample taps) (% of customers supplied with compliant water)		
Parameter	**Safe Drinking Water Regulations 2015**	**2021-22**	**2020-21***	**2019-20***
E. coli	All samples of drinking water collected are found to contain no *E. coli* per 100 millilitres of drinking water, with the exception of any false positive sample	34/34 (100%)	15/15 (100%) 19/19 (100%)	15/15 (100%) 19/19 (100%)
Total Trihalomethanes	≤0.25 mg/L	34/34 (100%)	15/15 (100%) 19/19 (100%)	15/15 (100%) 19/19 (100%)
Turbidity	95th percentile ≤5 NTU	34/34 (100%)	15/15 (100%) 19/19 (100%)	15/15 (100%) 19/19 (100%)

*information presented based on previous City West Water 15 sampling localities and previous Western Water 19 sampling localities. Refer to the previous annual drinking water quality reports, available from the GWW website for details.

Details of our monitoring data for individual localities, together with monitoring frequencies, Safe Drinking Water Regulations 2015 and Australian Drinking Water Guidelines 2011 for both health-related and aesthetic water quality data, are in Appendix A tables. Contact information for obtaining further details of all water quality testing outlined in this report is in section 14.

7.2 Parameter trends over time and between localities

Analysis of parameter trends over five years and between localities is used to better understand and highlight water quality issues that may occur throughout our service area. This section of the report looks at such trends over the past five years in terms of the key parameters listed in Appendix A tables.

Table 14 shows parameters that have changed over the five-year period. Notable trends of other parameters that have been monitored during 2021-22 are discussed in section 7.3. Results for all reported parameters are provided at Appendix A.

Table 14: Data trend comparison over five years, by parameter and by sampling locality

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Altona											
21-22	0.31	0.04	0.4	<2	NA	0.001	0.02	0.004	<0.001	0.8	20
20-21	0.26	0.04	0.5	2	NA	0.002	0.03	0.011	<0.001	0.8	22
19-20	0.24	0.05	0.3	3	NA	0.001	0.03	0.003	<0.001	0.8	25
18-19	0.33	0.05	0.8	3	NA	0.002	0.03	0.006	<0.001	0.8	19
17-18	0.27	0.05	0.4	2	NA	0.001	0.02	0.004	<0.001	0.7	20
Bulla											
21-22	0.57	0.04	1.1	NA	2	0.002	0.08	0.012	<0.001	0.8	14
20-21	0.38	0.04	0.8	NA	3	0.002	0.08	0.001	<0.001	0.8	19
19-20	0.75	0.03	0.7	NA	3	0.002	0.08	0.001	<0.001	0.7	17
18-19	0.73	0.03	1.2	NA	4	0.005	0.07	0.003	<0.001	0.8	17
17-18	0.67	0.04	1.1	NA	3	0.003	0.06	0.003	<0.001	0.8	18
Caroline Springs											
21-22	0.42	0.03	1.0	3	NA	0.002	0.06	0.003	<0.001	0.8	16
20-21	0.36	0.03	0.7	3	NA	0.002	0.05	0.005	<0.001	0.8	15
19-20	0.34	0.03	1.0	4	NA	0.003	0.05	<0.001	<0.001	0.8	29
18-19	0.34	0.03	1.0	5	NA	0.005	0.06	0.011	<0.001	0.8	15
17-18	0.30	0.04	0.9	4	NA	0.003	0.04	0.010	<0.001	0.8	19

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Darley											
21-22	1.02	0.09	0.9	NA	2	0.002	0.04	0.004	<0.001	0.7	70
20-21	0.96	0.12	0.2	NA	2	0.001	0.02	0.006	<0.001	0.8	110
19-20	1.03	0.12	0.1	NA	2	0.001	0.01	0.006	<0.001	0.8	83
18-19	0.67	0.13	0.4	NA	2	0.001	0.02	0.003	<0.001	0.7	90
17-18	0.64	0.15	0.2	NA	2	0.002	0.02	0.003	<0.001	0.8	78
Deer Park											
21-22	0.48	0.04	0.7	<2	NA	0.001	0.02	0.010	<0.001	0.8	18
20-21	0.44	0.03	0.5	2	NA	<0.001	0.02	0.005	<0.001	0.8	20
19-20	0.38	0.04	0.4	2	NA	<0.001	0.02	<0.001	<0.001	0.8	26
18-19	0.36	0.04	0.8	4	NA	0.003	0.04	0.001	<0.001	0.8	17
17-18	0.36	0.04	0.8	2	NA	0.001	0.02	0.007	<0.001	0.7	25
Diggers Rest											
21-22	0.59	0.02	1.1	NA	2	0.002	0.07	0.020	<0.001	0.8	12
20-21	0.46	0.03	1.2	NA	3	0.002	0.07	0.004	<0.001	0.8	16
19-20	0.53	0.03	0.7	NA	3	0.003	0.08	0.003	<0.001	0.7	15
18-19	0.45	0.03	1.1	NA	4	0.006	0.07	0.004	<0.001	0.8	14
17-18	0.42	0.05	0.9	NA	3	0.003	0.06	0.004	<0.001	0.8	15
East Keilor											
21-22	0.53	0.03	0.6	<2	NA	0.001	0.02	0.005	<0.001	0.8	18
20-21	0.46	0.03	0.5	2	NA	<0.001	0.02	0.004	<0.001	0.8	15
19-20	0.43	0.03	0.7	2	NA	0.001	0.01	0.002	<0.001	0.8	27
18-19	0.52	0.03	1.0	4	NA	0.004	0.04	0.001	<0.001	0.8	16
17-18	0.36	0.03	0.5	2	NA	0.001	0.02	0.010	<0.001	0.7	25

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Eynesbury											
21-22	0.95	0.04	1.3	NA	3	0.002	0.10	0.006	<0.001	0.8	13
20-21	0.87	0.04	1.1	NA	3	0.002	0.09	0.004	<0.001	0.7	14
19-20	0.72	0.04	0.8	NA	3	0.004	0.14	0.004	<0.001	0.8	13
18-19	0.53	0.04	1.1	NA	3	0.008	0.12	0.007	<0.001	0.8	15
17-18	0.64	0.05	0.9	NA	3	0.004	0.10	0.006	<0.001	0.8	14
Gisborne											
21-22	0.98	0.04	1.1	NA	2	0.004	0.07	0.002	<0.001	0.8	29
20-21	1.04	0.05	0.9	NA	2	0.003	0.04	0.002	<0.001	0.8	63
19-20	1.24	0.04	0.6	NA	3	0.004	0.05	0.002	<0.001	0.8	54
18-19	0.91	0.07	1.1	NA	3	0.006	0.04	0.002	0.001	0.8	58
17-18	0.98	0.08	0.6	NA	2	0.006	0.02	0.005	0.001	0.8	97
Lancefield											
21-22	1.19	0.13	0.1	NA	2	0.001	0.01	0.003	<0.001	0.1	49
20-21	1.10	0.15	0.1	NA	3	0.001	0.01	0.003	<0.001	0.1	71
19-20	1.10	0.09	0.1	NA	2	0.001	0.01	0.004	<0.001	0.1	59
18-19	1.04	0.10	0.1	NA	2	0.005	0.02	0.009	<0.001	0.1	72
17-18	0.97	0.11	0.1	NA	2	0.001	0.01	0.004	<0.001	0.1	62
Lerderderg											
21-22	1.13	0.10	0.9	NA	2	0.002	0.04	0.005	<0.001	0.8	65
20-21	1.00	0.12	0.3	NA	2	0.001	0.01	0.005	<0.001	0.8	107
19-20	0.87	0.12	0.1	NA	2	0.001	0.01	0.007	<0.001	0.7	80
18-19	0.60	0.12	0.3	NA	2	0.001	0.02	0.003	<0.001	0.7	83
17-18	0.37	0.13	0.1	NA	2	0.002	0.01	0.003	<0.001	0.8	77

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Little River											
21-22	0.49	0.05	0.5	<2	NA	0.002	0.04	0.019	<0.001	0.8	28
20-21	0.37	0.05	0.4	2	NA	0.001	0.03	0.024	<0.001	0.8	63
19-20	0.37	0.05	0.4	2	NA	0.001	0.03	0.033	<0.001	0.8	27
18-19	0.29	0.05	0.8	4	NA	0.004	0.05	0.021	<0.001	0.8	27
17-18	0.34	0.06	0.6	2	NA	0.002	0.03	<0.001	<0.001	0.7	28
Macedon											
21-22	1.02	0.05	1.1	NA	2	0.002	0.09	0.002	<0.001	0.8	17
20-21	0.87	0.07	0.8	NA	2	0.002	0.06	0.002	<0.001	0.8	86
19-20	0.98	0.07	0.6	NA	3	0.003	0.07	0.006	<0.001	0.8	40
18-19	0.88	0.10	1.1	NA	3	0.004	0.06	0.005	<0.001	0.8	30
17-18	0.89	0.11	0.5	NA	2	0.004	0.04	0.005	<0.001	0.8	112
Maddingley											
21-22	1.16	0.11	0.8	NA	2	0.002	0,04	0.012	<0.001	0.8	64
20-21	1.04	0.14	0.3	NA	2	0.001	0.02	0.011	<0.001	0.8	108
19-20	0.75	0.12	0.1	NA	2	0.001	0.01	0.010	<0.001	0.7	81
18-19	0.70	0.13	0.4	NA	2	0.001	0.02	0.004	0.001	0.7	81
17-18	0.75	0.14	0.2	NA	2	0.002	0.01	0.007	<0.001	0.8	80
Maribyrnong											
21-22	0.38	0.04	0.7	2	NA	0.002	0.03	0.022	<0.001	0.8	19
20-21	0.31	0.04	0.6	4	NA	0.002	0.04	0.018	<0.001	0.8	18
19-20	0.33	0.04	0.5	3	NA	0.002	0.03	0.004	<0.001	0.8	23
18-19	0.37	0.05	0.9	4	NA	0.003	0.04	0.009	<0.001	0.8	16
17-18	0.31	0.05	0.5	3	NA	0.002	0.03	0.008	<0.001	0.7	24

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Melton South											
21-22	0.96	0.03	1.1	NA	2	0.002	0.07	0.004	0.001	0.8	14
20-21	0.65	0.03	0.7	NA	3	0.002	0.06	0.002	<0.001	0.7	16
19-20	0.65	0.03	0.7	NA	3	0.002	0.07	0.004	<0.001	0.7	12
18-19	0.54	0.03	1.0	NA	4	0.007	0.07	0.004	<0.001	0.8	12
17-18	0.46	0.04	0.8	NA	3	0.003	0.05	0.006	<0.001	0.8	20
Merrimu											
21-22	1.04	0.06	1.0	NA	2	0.003	0.04	0.003	<0.001	0.7	55
20-21	0.82	0.06	0.6	NA	2	0.002	0.03	0.002	<0.001	0.7	71
19-20	0.82	0.08	0.2	NA	3	0.001	0.02	0.005	<0.001	0.8	87
18-19	0.67	0.08	0.8	NA	3	0.001	0.01	0.002	<0.001	0.7	72
17-18	0.65	0.08	0.7	NA	2	0.002	0.02	0.004	<0.001	0.8	28
Moonee Ponds											
21-22	0.34	0.05	0.9	4	3	0.003	0.05	0.007	<0.001	0.8	17
20-21	0.25	0.05	0.8	6	NA	0.004	0.07	0.012	<0.001	0.8	19
19-20	0.30	0.04	0.6	4	NA	0.003	0.05	0.010	<0.001	0.8	18
18-19	0.36	0.05	0.9	5	NA	0.006	0.05	0.009	<0.001	0.8	16
17-18	0.22	0.05	0.6	4	NA	0.003	0.04	0.016	<0.001	0.8	17
Mount Macedon											
21-22	1.00	0.06	1.1	NA	2	0.003	0.09	0.014	<0.001	0.8	17
20-21	0.89	0.09	0.8	NA	2	0.003	0.07	0.002	<0.001	0.8	86
19-20	0.91	0.08	0.6	NA	3	0.005	0.08	0.002	<0.001	0.8	41
18-19	0.82	0.12	1.1	NA	3	0.004	0.07	0.002	<0.001	0.8	30
17-18	0.85	0.13	0.6	NA	2	0.004	0.03	0.004	<0.001	0.9	110

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Myrniong											
21-22	0.86	0.07	0.3	NA	2	0.001	0.03	0.011	<0.001	0.1	112
20-21	1.03	0.08	0.3	NA	2	0.001	0.03	0.018	<0.001	0.1	123
19-20	0.72	0.07	0.1	NA	3	0.002	0.02	0.023	<0.001	0.1	115
18-19	0.63	0.08	0.3	NA	2	0.004	0.03	0.020	0.001	0.1	124
17-18	0.70	0.07	0.3	NA	2	0.006	0.02	0.028	0.001	0.1	110
Parkville											
21-22	0.47	0.04	0.6	<2	NA	0.003	0.02	0.015	<0.001	0.9	19
20-21	0.38	0.04	0.6	4	NA	0.002	0.04	0.004	<0.001	0.8	22
19-20	0.34	0.04	0.4	3	NA	0.002	0.02	0.013	<0.001	0.8	21
18-19	0.43	0.05	1.1	4	NA	0.005	0.04	0.017	<0.001	0.8	19
17-18	0.35	0.04	0.7	3	NA	0.002	0.03	0.005	<0.001	0.7	24
Richmond											
21-22	0.50	0.06	1.2	6	NA	0.005	0.10	0.009	<0.001	0.8	17
20-21	0.40	0.07	1.0	7	NA	0.006	0.09	0.009	<0.001	0.8	13
19-20	0.42	0.06	0.9	6	NA	0.005	0.07	0.009	<0.001	0.7	16
18-19	0.38	0.07	1.1	6	NA	0.005	0.08	0.009	<0.001	0.7	14
17-18	0.31	0.09	0.9	7	NA	0.005	0.08	0.006	<0.001	0.8	16
Riddells Creek											
21-22	0.93	0.04	1.1	NA	2	0.003	0.08	0.003	<0.001	0.8	14
20-21	0.97	0.07	1.0	NA	2	0.002	0.07	0.001	<0.001	0.8	57
19-20	0.94	0.06	0.6	NA	3	0.003	0.08	0.001	<0.001	0.8	37
18-19	0.92	0.09	1.2	NA	3	0.003	0.06	0.002	<0.001	0.8	38
17-18	0.90	0.12	0.9	NA	2	0.004	0.04	0.006	<0.001	0.8	107

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Rockbank											
21-22	1.08	0.02	1.2	NA	2	0.002	0.07	0.008	<0.001	0.8	13
20-21	1.00	0.02	0.9	NA	3	0.002	0.07	0.003	<0.001	0.7	15
19-20	0.99	0.02	0.8	NA	3	0.002	0.08	0.002	<0.001	0.7	11
18-19	0.92	0.03	1.4	NA	4	0.005	0.07	0.003	<0.001	0.8	13
17-18	0.82	0.03	1.2	NA	3	0.003	0.05	0.002	<0.001	0.8	15
Romsey											
21-22	0.85	0.02	0.1	NA	4	0.002	0.01	0.004	<0.001	0.1	42
20-21	0.84	0.02	0.1	NA	4	0.005	0.01	0.005	<0.001	0.2	54
19-20	0.76	0.02	0.1	NA	3	0.006	0.01	0.008	<0.001	0.2	61
18-19	0.71	0.02	0.1	NA	3	0.005	0.01	0.008	<0.001	0.2	69
17-18	0.66	0.02	0.1	NA	3	0.007	0.01	0.020	0.001	0.2	67
Strathmore											
21-22	0.23	0.06	0.9	4	NA	0.004	0.06	0.02	<0.001	0.8	19
20-21	0.15	0.06	0.8	7	NA	0.005	0.07	0.005	<0.001	0.8	16
19-20	0.18	0.05	0.8	4	NA	0.003	0.05	0.008	<0.001	0.8	17
18-19	0.18	0.06	1.0	6	NA	0.004	0.06	0.008	<0.001	0.8	15
17-18	0.16	0.06	0.8	5	NA	0.003	0.05	0.012	<0.001	0.8	16
Sunbury											
21-22	0.91	0.03	1.1	NA	2	0.002	0.07	0.002	<0.001	0.8	14
20-21	0.84	0.04	1.3	NA	3	0.002	0.07	0.002	<0.001	0.7	19
19-20	0.86	0.03	0.7	NA	3	0.002	0.08	0.003	<0.001	0.7	14
18-19	0.80	0.04	1.2	NA	4	0.005	0.07	0.005	<0.001	0.8	15
17-18	0.79	0.06	0.9	NA	3	0.003	0.05	0.004	<0.001	0.8	16

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Taylors Lakes											
21-22	0.69	0.04	1.3	5	NA	0.008	0.11	0.005	<0.001	0.8	15
20-21	0.53	0.03	0.9	5	NA	0.004	0.08	0.006	<0.001	0.8	16
19-20	0.50	0.02	1.2	5	NA	0.005	0.08	0.002	<0.001	0.8	16
18-19	0.48	0.03	1.3	6	NA	0.010	0.09	0.003	<0.001	0.8	15
17-18	0.47	0.04	1.1	5	NA	0.005	0.07	0.003	<0.001	0.8	17
Toolern Vale											
21-22	0.70	0.07	0.9	NA	2	0.002	0.03	0.005	<0.001	0.7	66
20-21	0.79	0.10	0.2	NA	2	0.001	0.01	0.003	<0.001	0.8	112
19-20	0.95	0.10	0.1	NA	2	0.001	0.01	0.005	<0.001	0.7	88
18-19	0.70	0.10	0.3	NA	3	0.001	0.02	0.016	0.001	0.7	75
17-18	0.46	0.11	0.1	NA	2	0.001	0.01	0.010	<0.001	0.8	80
Tullamarine											
21-22	0.57	0.03	1.0	2	NA	0.002	0.05	0.004	<0.001	0.8	16
20-21	0.52	0.03	.7	3	NA	0.002	0.04	0.004	<0.001	0.8	18
19-20	0.51	0.03	1.1	4	NA	0.003	0.06	0.007	<0.001	0.8	26
18-19	0.62	0.03	1.1	5	NA	0.005	0.06	0.003	<0.001	0.8	17
17-18	0.38	0.04	0.8	3	NA	0.002	0.03	0.007	<0.001	0.7	26
Werribee											
21-22	0.48	0.05	0.6	<2	<2	0.003	0.03	0.001	<0.001	0.8	22
20-21	0.42	0.05	0.3	2	NA	0.001	0.02	0.009	<0.001	0.8	24
19-20	0.41	0.05	0.5	2	NA	0.002	0.02	0.001	<0.001	0.8	21
18-19	0.41	0.05	0.8	4	NA	0.004	0.04	0.009	<0.001	0.8	15
17-18	0.40	0.06	0.5	3	NA	0.002	0.02	0.003	<0.001	0.7	26

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	Iron (mg/L) average	Copper (mg/L) average	Lead (mg/L) average	Fluoride (mg/L) average	Hardness (mg/L) average
Health guidelines value	5	0.25	NA	NA	NA	0.5	NA	2	0.01	1.5	NA
Aesthetic guideline value	0.6	NA	5	NA	15 HU	0.1	0.3	1	NA	NA	200
Locality											
Werribee South											
21-22	0.53	0.05	0.6	<2	<2	0.001	0.02	0.002	<0.001	0.8	22
20-21	0.43	0.04	0.4	2	NA	0.002	0.04	0.011	<0.001	0.8	19
19-20	0.46	0.03	0.5	4	NA	0.002	0.08	0.001	<0.001	0.8	22
18-19	0.45	0.03	0.9	4	NA	0.003	0.08	0.001	<0.001	0.8	16
17-18	0.42	0.03	0.7	4	NA	0.002	0.07	0.002	<0.001	0.8	21
Williamstown											
21-22	0.35	0.04	0.4	<2	NA	0.002	0.03	0.004	<0.001	0.9	19
20-21	0.29	0.04	0.5	3	NA	0.002	0.03	0.005	<0.001	0.8	19
19-20	0.31	0.04	0.3	3	NA	0.002	0.02	0.007	<0.001	0.8	23
18-19	0.41	0.05	0.6	3	NA	0.002	0.02	0.007	<0.001	0.8	15
17-18	0.31	0.04	0.4	2	NA	0.001	0.02	0.005	<0.001	0.7	26
Woodend											
21-22	1.08	0.06	0.5	NA	2	0.001	0.01	0.003	<0.001	0.1	16
20-21	0.94	0.06	0.1	NA	2	0.002	0.01	0.002	<0.001	0.1	30
19-20	0.87	0.05	0.1	NA	2	0.003	0.02	0.002	0.001	0.2	29
18-19	0.89	0.05	0.3	NA	2	0.006	0.01	0.003	<0.001	0.2	33
17-18	0.84	0.06	0.2	NA	2	0.005	0.01	0.003	<0.001	0.2	34

NA Not applicable, parameter not part of the sampling program for this locality

7.3 Parameter trends during 2021-22

GWW monitors parameters in the drinking water supply that may affect appearance or taste and odour, as well as those that may interact with pipes and fittings within the distribution system and within hot water services. These results are measured in accordance with the aesthetic measures in the Australian Drinking Water Guidelines or other cited guidelines. Compliance calculations hereafter are based on mean results for samples taken throughout the year, as outlined in Australian Drinking Water Guidelines or other cited guidelines.

7.3.1 Aluminium

Aluminium levels in the water supply are low and within the Australian Drinking Water Guidelines value of 0.2mg/L. Some variations at these levels are related to natural differences in the catchments through the natural leaching of soils rather than from artificial treatment dosing. For example, aluminium is used in water treatment at the Winneke Water Treatment Plant and at the local water filtration plants yet the water sampling localities more likely to receive water from these sources do not exhibit markedly higher aluminium levels, as compared with other localities.

Acid-soluble aluminium concentrations in excess of 0.2mg/L, caused by post-flocculation, may lead to aesthetic problems such as 'milky coloured' water in the distribution system.

There was one maximum result reported in Appendix A that exceeded the Australian Drinking Water Guideline total value. Mount Macedon exceeded the limit of 0.2mg/L total aluminium on one sample due to low demand and elevated pH in the network when the sample was collected. No additional flushing was performed due to a source water issue and concern that flushing would not be a suitable response. The issue was monitored for the following week and the subsequent aluminium results were reported below the limit.

7.3.2 Chlorine, total

All of our drinking water supply is disinfected with chlorine. A chlorine residual after disinfection is measured to monitor the levels present that mitigate recontamination of the drinking water supply in the network. The secondary chlorinators maintain a chlorine residual throughout much of the network acting as an additional barrier of protection from microbial risk. Seasonal variation in source water quality, along with demand in the network, can cause the chlorine residual to fluctuate. The average levels amongst individual localities can be markedly different; this is largely due to relative proximity to chlorine dosing points. Year-to-year variations within water sampling localities reflect changes to chlorine dosing rates and bulk water sources. The more active form, free chlorine, is present in all water sampling localities, with levels well within the maximum Australian Drinking Water Guidelines 2011 health guideline of 5mg/L.

There were no maximum results reported in Appendix A that exceeded the Australian Drinking Water Guideline values.

7.3.3 Monochloramine

Sampling for monochloramine was conducted in all localities receiving water supply disinfected by chloramination – Romsey is the only locality chloraminated by GWW. Compliance as measured against the health-related guideline value set out in Australian Drinking Water Guidelines for monochloramine in drinking water should not exceed 3mg/L.

7.3.4 Colour, apparent

Apparent colour is colour that is observed in a sample and can be a mixture of water colour and debris in the sample. Compliance is measured against a benchmark guideline of 25 Pt/Co units. Generally higher colour levels in the Richmond locality are associated with the supply source from Silvan Reservoir. Average colour levels are generally consistent within individual sampling localities.

There was a single sample that exceeded the limit of 25Pt/Co in Richmond. This related to the status of sample tap located in an infrequently used private connection, which has since been decommissioned.

7.3.5 Colour, true

True colour is the colour of the water when a sample has been filtered and debris has been removed. Compliance as measured against the aesthetic guideline value set out in Australian Drinking Water Guidelines for drinking water and should not exceed 15 Pt/Co.

There were no maximum results reported in Appendix A that exceeded the Australian Drinking Water Guideline values.

7.3.6 Copper

Copper is commonly used in pipe material. Water monitoring ensures if there are changes to the network this can be traced and the affected pipe can be addressed.

Compliance as measured against the guideline values set out in Australian Drinking Water Guidelines for copper in drinking water should not exceed 2mg/L

based on health considerations, and 1mg/L based on aesthetic considerations.

There were no maximum results reported in Appendix A that exceeded the Australian Drinking Water Guidelines values.

7.3.7 Iron

Overall, slightly higher iron levels in the Taylors Lakes and Richmond water sampling localities are consistent with the source water comprising more of the relatively greater iron-containing water from Greenvale and Silvan reservoirs.

There were single samples that exceeded the limit of 0.3mg/L total iron in Eynesbury, Macedon, Myrniong, Richmond, Sunbury and Taylors Lakes. The Eynesbury exceedance was related to the status of the sample tap, which was inspected and replaced. The Macedon exceedance was due to sediment stirring up in the main and was resolved by flushing of the network. The Myrniong exceedance was due to sampling a low demand area where sediments had accumulated and this area has been included into the planned flushing program. The Richmond exceedance was related to the status of the sample tap located in an infrequently used private connection, which has since been decommissioned. The Sunbury exceedance was due to a rusted sample tap, which was inspected and replaced. The Taylors Lakes exceedance was related to internal corrosion issues in the sample line in Holden High level tank sample point.

7.3.8 Lead

While lead pipe is not common in Australia, there is a need to monitor due to the profound health effects that can occur from even low levels of lead. The catchments used as the source for drinking water are protected from industrial activities and this prevents increases in lead and other heavy metals.

Compliance as measured against the health-related guideline values set out in Australian Drinking Water Guidelines for lead in drinking water should not exceed 0.01mg/L.

There were no maximum results reported in Appendix A that exceeded the Australian Drinking Water Guidelines values.

7.3.9 pH

Localities that reported above the pH 8.5 value included Bulla, Darley, Deer Park, Gisborne, Macedon, Mount Macedon, Myrniong, Riddells Creek, Sunbury, Toolern Vale, Tullamarine and Werribee South.

The elevated pH in Werribee South, Tullamarine, Sunbury, Mount Macedon and Macedon can be attributed to the presence of cement lined mains and concrete storage tanks. Long term review of the supply source will ensure Mt Macedon will receive from Rosslynne Water Filtration Plant where the water quality has a higher mineral content and is more stable for the concrete network assets.

Another cause for elevated pH is some sampled locations experiencing low demand in the network at times. The reduced turnover can cause the water pH to slightly elevate until the flow increases. This is consistent with all drinking water networks and can be improved with network engineering, such as auto-flushers which artificially increase flow in low demand locations. An ongoing program is currently being considered.

8. Drinking water aesthetics

In addition to defining health-related guideline values, aesthetic water quality values are also outlined in the Australian Drinking Water Guidelines 2011. These are associated with customers' acceptability of drinking water in terms of appearance, taste and odour.

8.1 Water quality customer complaints

During 2021-22, GWW received a total of 1,170 complaints related to drinking water quality. A range of actions are undertaken for water quality related complaints including verbal advice, further investigation, on-site inspection and testing, and works to improve water supply. If customers are experiencing water quality concerns, they can contact GWW on 134 499 for advice.

Table 15: Water quality related customer complaints received over the last three years

Type of complaints	Number of complaints					Comparison with previous reporting periods	Comments
	2021-22	2020-21*		2019-20**			
	GWW	CWW	WW	CWW	WW		
Discoloured water	920	882+63 (+air in water)	147	593+60 (+air in water)	106	Overall decreasing trend from previous reporting period.	Main flushing in Taylors Lakes water sampling locality as part of audit improvement opportunity had a 30% reduction in discoloured water complaints Main flushing of water sampling localities with an increasing trend on discoloured water customer complaints will continue through 2022-23.
Taste/odour (Chlorine taste/odour)	187	90 (28)	40	76 (25)	34	Increase of 57 from previous reporting period.	Slight increase throughout the service area in particular Deer Park and Maribyrnong areas.
Other (alleged illness)	63	27 (9)	22 (1)	16 (2)	21 (1)	Increase of 14 other from previous reporting period. Increase of alleged illness by 8 from previous reporting period.	The alleged illness cases were analysed and investigated. None of the complaints took place on the same day and/or suburb.
Total	**1,170**	**1,062**	**209**	**745**	**161**	Decrease of 101 from previous reporting period	
No. of properties	597,551	505,000	80,721	488,000	72,286		
Complaints per 100 properties	0.196	0.21	0.284	0.153	0.217		

* calculated total complaint figure as a comparison to combine previous CWW and WW total complaints for 2021-22 is 1,271

** calculated total complaint figure as a comparison to combine previous CWW and WW total complaints for 2019-20 is 906

8. Drinking water aesthetics

The three localities that had the highest number of discoloured water complaints for the year were Caroline Springs (134), Taylors Lakes (98) and Parkville (74). There was a slight increase in complaints from Melton South 49 (from 47 last year). The localities that experienced the most complaints included Caroline Springs (154), Taylors Lakes (115) and Werribee (98).

Table 16: Water quality related complaints received during 2021-22 by water sampling locality

	Number of complaints				
Water sampling locality	**Discoloured water**	**Taste/odour**	**Air in water**	**Other (alleged illness, blocked filter, blue-green water, staining, cloudy water)**	**Total complaints by locality**
Altona	67	15	2	2	86
Bulla	0	0	0	1	1
Caroline Springs	134	13	6	4	157
Deer Park	53	18	2	6	79
Darley	6	6	1	4	17
Diggers Rest	5	0	4	2	11
East Keilor	25	7	3	2	37
Eynesbury	2	0	0	0	2
Gisborne	3	3	2	1	9
Lancefield	0	2	1	0	3
Lerderderg	2	5	0	1	8
Little River	3	0	0	0	3
Macedon	3	1	0	0	4
Maddingley	2	2	1	1	6
Maribyrnong	60	20	7	3	90
Melton South	49	7	1	3	60
Merrimu	29	9	2	3	43
Mount Macedon	1	1	3	1	6
Myrniong	1	0	0	0	1
Moonee Ponds	37	13	5	6	61
Parkville	74	13	5	2	94
Richmond	23	3	0	0	26
Riddells Creek	3	0	0	1	4
Rockbank	14	8	3	1	26
Romsey	3	2	0	0	5
Strathmore	8	2	1	0	11
Sunbury	26	3	7	3	39
Taylors Lakes	98	7	5	5	115
Toolern Vale	0	0	0	0	0
Tullamarine	13	1	1	2	17
Werribee	68	19	5	6	98
Werribee South	2	1	0	1	4
Williamstown	27	6	10	2	45
Woodend	1	0	1	0	2

8.2 Responses to complaints

Responses to complaints for the following complaint categories include:

Discoloured water

Discoloured water is generally caused by the suspension of accumulated natural sediments in water mains or by trapped air in water (white water). Where discoloured water is brown in appearance, this can be triggered by the opening or closing of valves, use of hydrants by water carters working in housing development areas and reinstatement of mains into service following repairs. Discoloured water can also result from older, rusting internal galvanised iron pipes or aging hot water services; in these instances customers are advised to seek further advice from a plumber. Calls received from customers are assessed by trained staff and, where the discoloured water is deemed to be originating from the water main, targeted mains flushing is generally undertaken.

White water is water with a cloudy appearance that settles within a few minutes and indicates the presence of tiny, harmless air bubbles. White water tends to be associated with maintenance and repair works, when air can enter the water pipes when the supply mains are recharged.

Blue-green water

Blue-green water is water that has a cloudy to blue-green appearance, possibly containing blue-green particles, and having an unpleasant bitter taste. This is caused by accelerated corrosion of customers' internal copper water pipes and appears to be restricted to cold water pipes. Blue-green water must not be consumed (by drinking or in the preparation of food) because it can cause nausea and vomiting. The prolonged consumption of water containing elevated copper levels can have adverse health effects. As blue-green water originates from a property's internal copper pipes, customers can manage the problem by flushing their tap with fresh mains water. This means running their tap until the water becomes clear. A permanent solution to such blue-green water instances would involve the replacement of the property's internal copper pipes. In certain cases, corrosion of copper pipes can lead to perforation and leakage. Neither the cause(s) of, nor solution to this international and Australia-wide copper corrosion phenomenon are well known (apart from replacement of corroding pipes).

Alleged Illness

Complaints of water-related illness are investigated. Customers may be advised to seek medical advice.

Taste or odour

A change in taste or odour of tap water can occur occasionally and is generally apparent as a chlorine-like or earthy, musty taste or odour. Changes in source supply, water demand and flow rates can vary the chlorine levels that are noticeable by customers. Chlorine is used to disinfect our treated water supply to maintain the safety of the water supply. Other tastes and odours can result as water sources change or water flows are slower and during flow reversals in large pipes. In these cases, once the cause is identified a combination of targeted flushing and changes to flow regimes are implemented.

9. Evaluation and audit

Evaluating and auditing water quality management systems ensures the successful management of water quality risks, data and processes. GWW manages risk to water quality by implementing the 12 elements of the Australian Drinking Water Guidelines framework through our risk management plan and maintaining certification to the international standard for food safety, Codex Hazard Analysis and Critical Control Point (HACCP) code of practice. Codex HACCP principles and supporting programs are recognised in the Australian Drinking Water Guidelines and have been adopted by the water industry to manage risks to drinking water.

9.1 Risk management plan audit results

GWW has combined the existing risk management plans from the previous City West Water and Western Water businesses to form our first risk management plan. The plan is a living document and will continue to be revised, reviewed and updated to reflect the water quality management activities implemented to deliver safe drinking water quality to customers, aligned with the 12 elements of the Australian Drinking Water Guidelines. The combined risk management plan fulfils the requirement under the *Safe Drinking Water Act 2003* to have a documented water quality 'risk management plan' that is subject to independent audit in terms of its content and implementation.

The plan will be due for audit in 2023 as part of the anticipated Department of Health audit schedule between 1 January 2023 to 30 April 2023 inclusive. The specified audit period will be from 1 January 2021 to 31 December 2022.

The previous risk management plans in place for City West Water and Western Water were last audited separately in 2020 and both plans were found to be compliant with the obligations imposed by s 7(1) of the *Safe Drinking Water Act 2003*. Appendix C has copies of the audit certificates and statements of compliance from the independent auditors.

The audits determined that:

- the water quality risk management plans complied with the obligations imposed by s 7(1) of the *Safe Drinking Water Act 2003* during the audit period (17 April 2018 to 23 July 2020 City West Water and 31 May 2018 to 31 August 2020 Western Water) and extended by the Department of Health in response to COVID-19 from 31 May 2020 until 28 August 2020.
- the risk management plans met all the specifications in the *Safe Drinking Water Act 2003* and the Safe Drinking Water Regulations 2015 in an effective manner
- the identified water quality control measures and control measure combinations are in place operationally and are adequate to control water safety risks.

These results confirmed City West Water's and Western Water's commitment to delivering high quality and safe drinking water to customers.

Progress on the delivery of opportunities for improvement identified at the time of audit are highlighted by the respective water business in the sections below.

9.1.1 Former City West Water

The 2020 audit identified two opportunities for improvement as part of the compliance audit outcomes. An outline of these, together with the status of the opportunity for improvement from the 2018 audit, is provided as part of this report.

2020 audit outcomes and actions

As reported in the 2020-21 Drinking Water Quality Report, two opportunities for improvement were noted by the auditor. The status of these actions during 2022 is provided below.

- Suggest monitoring the customer complaints regarding dirty water, develop a plan to minimise dirty water complaints in the future.

  Action update: A plan was developed during 2021. The key actions delivered as part of the plan during 2021-22 included a pilot cleaning program in the Taylors Lakes locality, ongoing analysis of all water quality complaints, and improvements to the water quality complaints handling process. Further improvements will be completed as part the delivery of the plan and our continual improvement process. This opportunity has now been closed out.

- Consider reintroducing the Water Quality Awareness training for staff.

  Action update: In September 2021, 14 GWW staff attended Best Practice Water Quality Management training run through the University of Queensland. Since completion of this training, water quality awareness materials have been updated as part of the GWW integration activities, with ongoing updates to be maintained as part of the delivery of business-as-usual water quality management activities. This opportunity has now been closed out.

Progress on 2018 audit outcomes and actions

As reported in the 2020-21 Drinking Water Quality Report, one opportunity remains in progress. There were six opportunities for improvement identified at the time of the audit; five have since been closed out. The status of the remaining actions to address the open opportunity for improvement in 2022 is provided below.

- C-Tech is managing the chlorine dosing system. C-Tech to graph both pH and free active chlorine residual. Other parameters could also be considered to optimise water chemistry. A yearly chemistry performance review with suggestion for upgrades and key performance indicators.

  Action update: This opportunity has continued to be reviewed as part of the integration roadmap for GWW. A decision was made during June 2022 to bring the maintenance and management of the C-Tech operated chlorine dosing systems to the GWW operations team. This process will include improving the visibility of data from our chlorine dosing systems through our remote monitoring systems and is due for completion by September 2022. In the meantime, data from the contractor and our sampling programs has continued to provide us with sufficient information to manage our risks.

9.1.2 Former Western Water

The 2020 audit identified three opportunities for improvement as part of the compliant audit outcomes. An outline of these, together with the status of the opportunity for improvements from the 2018 audit, is provided as part of this report.

2020 audit outcomes and actions

As reported in the 2020-21 Drinking Water Quality Report, three opportunities for improvement noted by the auditor included were in progress. During 2021-22, one has been completed with two opportunities remaining in progress.

- The field observations on ground showed some fading of dual reticulation parts and loss of the lilac colour. Some tighter specification for dual reticulation parts and fittings might help reduce this risk and is worth considering.

  Action update: GWW continues to be part of ongoing discussions with an industry working group as the observation of fading coloured pipework is a whole of industry issue. Development of a preferred fittings list is ongoing during 2021 and includes recommended parts with low risk of fading. This issue has been flagged in the Recycled Water Health Environment Management Plan and was due to be reviewed with the Environment Protection Authority (EPA) in 2020-21.

- On ground review of critical limits as set by operators was that they were often tighter than necessary. A formal GWW position on setting critical limits as 'speed limits' rather than absolute limits, or some change management process, might assist in preventing a potential non-compliance in future audits.

  Action update: reference to 'speed limits' for operators has been included in the HACCP Scope Catchment to Tap document 29 January 2020. There is a change of management process in place, and all changes are discussed at the monthly HACCP committee meetings. During 2020, the HACCP scope document was updated and published by the HACCP committee and the item is now completed.

- Batch and lot identification of assets is clearly shown on the new parts but is not necessarily captured in the contract inspection and test plans and is not captured in Western Water's GIS system. Western Water is encouraged to consider whether it is worth capturing batch and lot IDs for infrastructure.

Action update: development of the asset master system will include these assets tagging and this commenced in 2019. The pandemic prevented onsite inspections and this project was postponed until safety controls eased. During 2022, the GWW new mains details are incorporated into GIS system and AMIS via the asset management team. The depot teams maintain the records of asset maintenance with future plans to assign the records to the asset in the AMIS program. This action is still in progress.

Progress on 2018 audit outcomes and actions

As reported in 2020-21 Drinking Water Quality Report, three opportunities for improvement were updated, with one being closed out. The status of the remaining open actions during 2022 is provided below.

- For the most important critical limits (such as individual filter effluent turbidities, a point representative of primary chlorination after adequate contact time has been achieved for free chlorine and pH, and a point representative of fluoridation for fluoride), some identification of top priority critical limits would be of value. For those top priority critical limits, some additional effort could be made to better assure total consistency and compliance between all references to those values, including their names and identities, the limiting values, the times to alarm and the corrections taken in the event of exceedance.

  Action update: Programmable logic controller (PLC) upgrades at the plants were required to deliver this action and the schedule of works was staggered to meet operational constraints and COVID-19 challenges. Upgrades were completed in 2022, the final site being Rosslynne Water Filtration Plant. During 2022-23 the final stage of work, the full roll out of HACCP SCADA pages, will be implemented across all sites. Updates to the pages include automated contact time calculations, alarming and notifications for changes to HACCP alarm settings, inclusion of operator set point alarms, alert and critical levels, and ability to trend key parameters.

- There may be locations where Western Water and ALS would see a benefit in labelling or tagging sample points as used for verification sampling to minimise the risk of sample point misunderstandings arising.

  Action update: The locations and design of labelling was developed during 2020-21. However, due to restrictions on travel as a control for the coronavirus pandemic, the labelling was delayed to 2021-22. Temporary labels were created, in the interim, by the operators to prevent confusion for tap location, and internal training by ALS of new samplers was implemented during 2020. The labelling project will be completed by end of 2021-22, with ongoing development of the asset master system to include the taps as documented assets. During 2022 labelling work has continued and has also been met with delays due to pandemic responses and reallocation of resources. The labelling work is part of the drinking water quality improvement plan for the 2022-23 year.

9.2 HACCP audit outcomes

GWW retained certification to Codex HACCP in 2022. During 2021-22, two HACCP certifications were maintained while the process of working toward a single certification continued. The single certification process is likely to be completed by 2024. Copies of the audit certificates are available at Appendix D. No non-conformance or opportunities for improvement were identified.

Retaining and maintaining HACCP certification demonstrates GWW's commitment to apply best practice approaches to identify and manage risk to water quality in areas of water treatment operations and networks that can impact water quality. Maintenance of HACCP certification requires continual vigilance and improvements to our water quality management practices.

The drinking water risk management plan is based on our existing HACCP plans which are audited as part of the GWW internal audit program, as well as annually by an external, independent auditor. The internal and external audits review work processes, including records of staff training, instrument maintenance and calibrations, and procedures and monitoring programs to ensure compliance with the HACCP principles and the Australian Drinking Water Guidelines. Outcomes from the audit programs are reviewed as part of the annual management review by senior managers and reports are provided regularly to the Drinking Water Executive Committee, senior management and the GWW board.

10. Undertakings under s 30 of the *Safe Drinking Water Act 2003*

During 2021-22, GWW did not enter into any undertakings with the Department of Health, pursuant to s 30 of the *Safe Drinking Water Act 2003*.

11. Exemptions from water quality standards under s 20 and conditions imposed under s 21 of the *Safe Drinking Water Act 2003*

During 2021-22, GWW did not have any s 20 exemptions or s 21 exemptions imposed conditions in place.

12. Variation to aesthetic standards under s 19 of the Act under conditions imposed under s 21 of the *Safe Drinking Water Act 2003*

During 2021-22, GWW did not have any s 19 variations.

13. Regulated water

'Regulated water' is water that is the subject of a declaration made by the Minister for Health concerning water that is not intended for drinking but could reasonably be mistaken as drinking water. We do not manage any water supplies that have been declared as regulated water.

13.1 Non-potable supply

GWW had 15 non-potable water by agreement residential customers located across our system. Typically, they are customers who have made special arrangements for connection to GWW's system between the untreated source water and the treatment plant. GWW advises those customers that this (non-potable) water is not suitable for either drinking or food preparation through the individual contracts as well as ongoing notification on all applicable customer bills.

Non-potable water is water that has not been treated to the standards considered acceptable for drinking water under the *Safe Drinking Water Act 2003*. It can include source (untreated) water direct from reservoirs as well as partially treated water. There are no regulated water declarations regarding the non-potable water supply to customers of GWW.

13.2 Water by agreement

In certain cases, we supply water from our water distribution mains to customers with privately-owned offtakes. Such supplies were provided under a private agreement between GWW and the customer. The agreement does not guarantee the pressure or quality of the supply downstream of the offtake point. However, we endeavour to maintain pressure and quality for these customers. GWW has embarked on a program to reduce the number of such private supplies.

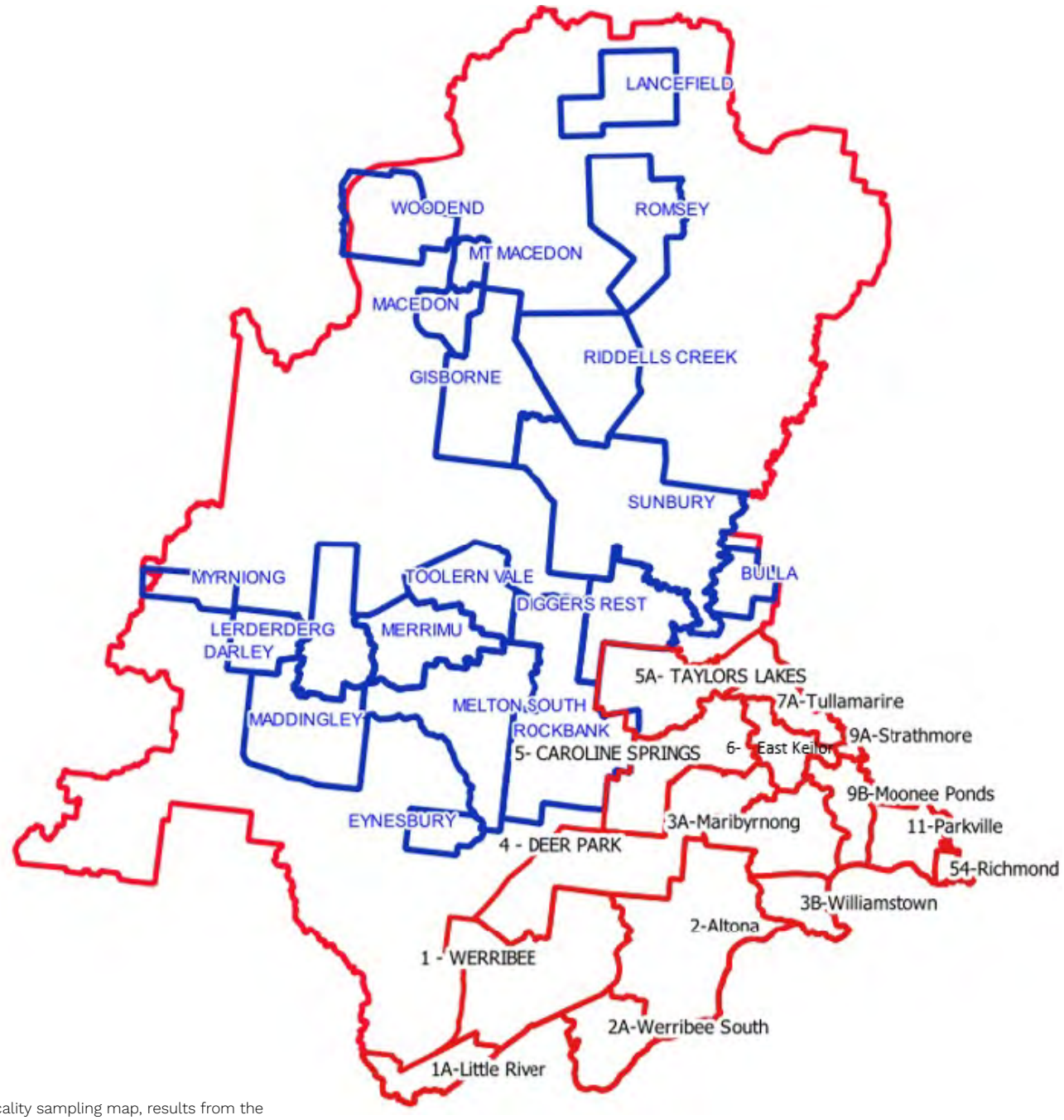
14. Further information

For further information on this report please email: contact@gww.com.au. Previous copies of the annual report are available on the GWW website.

For water quality issues please contact 13 44 99. Written enquiries can be addressed to: Greater Western Water, Locked Bag 350, Sunshine Vic 3020.

This report is available on Greater Western Water's website gww.com.au

Appendix A
Water quality results and performance by locality



Reference locality sampling map, results from the sampling program are presented in the following tables.

Altona

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples*		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	10	10	10	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.02	0.03	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	5.2	5.2	5.2	Annually	1	NA	NA
Chloride	mg/L	250	16	16	16	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.31	0.73	>Weekly	300	300	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.012	0.026	0.037	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100ml	NA	<1	<1	78	>Weekly	300	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	4	Fortnightly	26	26	100%
Copper	mg/L	1	0.004	0.004	0.004	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.004	0.006	0.007	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.011	0.013	0.016	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	60	60	60	Annually	1	1	100%
E. coli	orgs/100ml	Zero(0)	0	0	0	>Weekly	300	300	100%
Electrical Conductivity (25°C)	µS/cm	~900	88	99	110	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.67	0.84	0.93	Fortnightly	26	26	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	20	20	20	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.02	0.05	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.7	1.7	1.7	Annually	1	NA	NA

Altona

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples*		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.001	0.003	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.15	1.15	1.15	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.9	0.9	0.9	Annually	1	NA	NA
pH	units	6.5-8.5	7.1	7.4	7.7	Fortnightly	26	26	100%
Potassium	mg/L	NA	1	1	1	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.5	4.5	4.5	Annually	1	1	100%
Sodium	mg/L	180	8	8	8	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.015	0.015	0.015	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.030	0.045	0.054	>Monthly	13	13	100%
Turbidity	NTU	5	0.1	0.4[1]	0.5	Weekly	52	NA	within standard
Zinc	mg/L	3	0.002	0.002	0.002	Annually	1	1	100%

* Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Altona locality during 2021-22. Refer to section 6.6 for details.

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Bulla

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	14	17	21	Monthly	12	NA	NA
Aluminium	mg/L	0.2	0.03	0.10	0.18	Monthly	12	12	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.02	Monthly	12	12	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	16	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	4	4	100%
Calcium	mg/L	NA	2.2	4.3	8.7	Monthly	12	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.57	1.10	Weekly	52	52	100%
Chloroform	mg/L	NA	0.021	0.029	0.037	Monthly	16	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	65	Weekly	52	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	52	52	100%
Copper	mg/L	1	0.001	0.012	0.033	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.002	Monthly	16	NA	NA
Dichlorobromomethane	mg/L	NA	0.005	0.007	0.009	Monthly	16	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	52	52	100%
Electrical Conductivity (25°C)	µS/cm	~900	70	78	90	Weekly	52	52	100%
Fluoride	mg/L	1.5	0.73	0.77	0.85	Monthly	12	12	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	8	14	23	Monthly	12	12	100%
Iron	mg/L	0.3	0.02	0.08	0.13	Weekly	52	52	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%

Bulla

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Magnesium	mg/L	NA	0.4	0.7	1.1	Monthly	12	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.007	Weekly	52	52	100%
Mercury	mg/L	0.001	<0.0001	0.0001	0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.10	0.12	0.14	Monthly	12	12	100%
pH[4]	Units	6.5-8.5	7.4	7.9	9.3	Weekly	52	47	90.38%
Potassium	mg/L	NA	0.7	0.7	0.7	Annually	1	NA	NA
Sodium	mg/L	180	6.0	6.0	6.0	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.028	0.038	0.048	Monthly	16	16	100%
Turbidity	NTU	5	0.2	1.1[1]	1.2	Weekly	52	NA	within standard
Zinc	mg/L	3	<0.001	0.003	0.009	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tanks and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Caroline Springs

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg $CaCO_3$ / L	NA	15	15	15	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.01	0.02	0.03	>Monthly	14	14	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	14	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.5	4.5	4.5	Annually	1	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.05	0.42	1.10	>weekly	342	342	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.012	0.018	0.021	>Monthly	14	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100ml	NA	<1	<1	30	>Weekly	341	NA	NA
Colour, Apparent	Pt/Co units	25	<2	3	6	Fortnightly	27	27	100%
Copper	mg/L	1	0.003	0.003	0.003	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.003	0.008	>Monthly	14	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.005	0.008	0.016	>Monthly	14	NA	NA
Dissolved Solids, Total	mg/L	600	45	45	45	Annually	1	1	100%
E. coli	orgs/100ml	Zero(0)	0	0	0	>Weekly	341	341	100%
Electrical Conductivity (25°C)	µS/cm	~900	66	79	110	Fortnightly	27	27	100%
Fluoride	mg/L	1.5	0.70	0.79	0.93	Fortnightly	28	28	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	16	16	16	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.06	0.11	Fortnightly	27	27	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.2	1.2	1.2	Annually	1	NA	NA

Caroline Springs

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.002	0.008	Fortnightly	27	27	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	0.44	0.44	0.44	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.8	0.8	0.8	Annually	1	NA	NA
pH	units	6.5-8.5	7.0	7.5	8.3	Fortnightly	47	47	100%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.7	4.7	4.7	Annually	1	1	100%
Sodium	mg/L	180	5.0	5.0	5.0	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.008	0.008	0.008	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.019	0.028	0.044	>Monthly	14	14	100%
Turbidity	NTU	5	<0.1	1.0[1]	1.1	>weekly	74	NA	within standard
Zinc	mg/L	3	<0.001	<0.001	<0.001	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Darley

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	14	28	40	Monthly	40	NA	NA
Aluminium	mg/L	0.2	0.01	0.05	0.19	Monthly	65	65	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	Monthly	65	65	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	0.001	0.002	Monthly	193	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	4	4	100%
Calcium	mg/L	NA	1.3	12.5	22.0	Quarterly	96	NA	NA
Chlorine, Total	mg/L	5	0.09	1.02	2.00	Weekly	533	533	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.017	0.054	0.110	Monthly	193	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	28	Weekly	533	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	533	533	100%
Copper	mg/L	1	0.001	0.004	0.006	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.010	0.022	Monthly	193	NA	NA
Dichloroacetic acid	mg/L	0.1	0.034	0.034	0.034	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.005	0.024	0.057	Monthly	193	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	533	533	100%
Electrical Conductivity (25°C)	µS/cm	~900	70	314	500	Weekly	537	537	100%
Fluoride	mg/L	1.5	0.32	0.74	0.85	Monthly	38	38	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	5	70	130	Monthly	96	96	100%
Iron	mg/L	0.3	<0.01	0.04	0.14	Weekly	105	105	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Magnesium	mg/L	NA	0.5	9.3	17.0	Quarterly	96	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.005	Weekly	105	105	100%

Darley

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.11	0.16	0.23	Monthly	40	40	100%
pH[4]	Units	6.5-8.5	7.1	7.7	8.9	Weekly	534	525	98.31%
Potassium	mg/L	NA	2.7	2.7	2.7	Annually	1	NA	NA
Sodium	mg/L	180	30.0	30.0	30.0	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	55	55	55	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.032	0.032	0.032	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.024	0.088	0.190	Monthly	193	193	100%
Turbidity	NTU	5	<0.1	0.9[1]	1.2	Weekly	534	NA	within standard
Zinc	mg/L	3	<0.001	0.003	0.006	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tanks and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Deer Park

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	10	10	10	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.01	0.02	0.02	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.8	4.8	4.8	Annually	1	NA	NA
Chloride	mg/L	250	17	17	17	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.20	0.48	0.93	>Weekly	243	243	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.010	0.018	0.029	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	120	>Weekly	243	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	4	Fortnightly	27	27	100%
Copper	mg/L	1	0.010	0.010	0.010	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.002	0.006	0.009	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.006	0.012	0.018	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	65	65	65	Annually	1	1	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	242	242	100%
Electrical Conductivity (25°C)	µS/cm	~900	72	99	110	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.60	0.84	0.99	Fortnightly	27	27	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	18	18	18	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.02	0.09	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.6	1.6	1.6	Annually	1	NA	NA

Deer Park

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.001	0.006	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.20	1.20	1.20	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.8	0.8	0.8	Annually	1	NA	NA
pH	units	6.5-8.5	7.0	7.5	8.6	Fortnightly	28	27	96.43%
Potassium	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	3.6	3.6	3.6	Annually	1	1	100%
Sodium	mg/L	180	7.8	7.8	7.8	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.007	0.007	0.007	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.025	0.036	0.056	>Monthly	13	13	100%
Turbidity	NTU	5	<0.1	0.7[1]	0.9	Weekly	53	NA	within standard
Zinc	mg/L	3	0.002	0.002	0.002	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Diggers Rest

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	13	14	15	Monthly	12	NA	NA
Aluminium	mg/L	0.2	0.02	0.10	0.18	Monthly	24	24	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.01	Monthly	24	24	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	16	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	4	4	100%
Calcium	mg/L	NA	1.8	3.3	5.1	Quarterly	12	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.59	1.40	Weekly	104	104	100%
Chloroform	mg/L	NA	0.011	0.018	0.026	Monthly	16	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	26	Weekly	104	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	104	104	100%
Copper	mg/L	1	0.001	0.020	0.064	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.002	Monthly	16	NA	NA
Dichlorobromomethane	mg/L	NA	0.003	0.005	0.007	Monthly	16	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	104	104	100%
Electrical Conductivity (25°C)	µS/cm	~900	68	72	85	Weekly	104	104	100%
Fluoride	mg/L	1.5	0.73	0.77	0.83	Monthly	24	24	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	7	12	18	Monthly	12	12	100%
Iron	mg/L	0.3	0.02	0.07	0.12	Weekly	64	64	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Magnesium	mg/L	NA	0.6	1.0	1.4	Quarterly	12	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.007	Weekly	64	64	100%
Mercury	mg/L	0.001	<0.0001	0.0001	0.0002	Quarterly	4	4	100%

Diggers Rest

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Nitrate (as NO_3)	mg/L	50	0.10	0.12	0.14	Monthly	12	12	100%
pH	Units	6.5-8.5	7.0	7.4	7.9	Weekly	104	104	100%
Potassium	mg/L	NA	0.7	0.7	0.7	Annually	1	NA	NA
Sodium	mg/L	180	6.2	6.2	6.2	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.016	0.024	0.035	Monthly	16	16	100%
Turbidity	NTU	5	0.3	1.1[1]	1.5	Weekly	104	NA	within standard
Zinc	mg/L	3	0.001	0.005	0.010	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

East Keilor

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	9	9	9	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	<0.01	0.02	0.03	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.4	4.4	4.4	Annually	1	NA	NA
Chloride	mg/L	250	17	17	17	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.06	0.53	1.20	>Weekly	158	158	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.008	0.013	0.020	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	4	>Weekly	157	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	4	Fortnightly	26	26	100%
Copper	mg/L	1	0.005	0.005	0.005	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.005	0.008	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.003	0.009	0.015	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	65	65	65	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	157	157	100%
Electrical Conductivity (25°C)	µS/cm	~900	70	97	110	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.39	0.84	0.95	Fortnightly	27	27	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	18	18	18	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.02	0.10	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%

East Keilor

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Magnesium	mg/L	NA	1.7	1.7	1.7	Annually	1	NA	NA
Manganese	mg/L	0.1	<0.001	0.001	0.005	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.24	1.24	1.24	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.9	0.9	0.9	Annually	1	NA	NA
pH	units	6.5-8.5	7.0	7.4	7.7	Fortnightly	26	26	100%
Potassium	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	3.5	3.5	3.5	Annually	1	1	100%
Sodium	mg/L	180	7.8	7.8	7.8	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.015	0.027	0.043	>Monthly	13	13	100%
Turbidity	NTU	5	<0.1	0.6[1]	1.0	Weekly	52	NA	within standard
Zinc	mg/L	3	0.002	0.002	0.002	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Eynesbury

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	12	14	18	Monthly	16	NA	NA
Aluminium	mg/L	0.2	0.02	0.10	0.20	Monthly	29	29	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.01	Monthly	29	29	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	29	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	5	5	100%
Calcium	mg/L	NA	1.7	3.3	4.7	Quarterly	17	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.44	0.95	1.90	Weekly	165	165	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.020	0.028	0.042	Monthly	29	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	5	5	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	130	Weekly	165	NA	NA
Colour, True	PCU	15	<2	3	8	Weekly	116	116	100%
Copper	mg/L	1	<0.001	0.006	0.018	Quarterly	8	8	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.002	Monthly	29	NA	NA
Dichloroacetic acid	mg/L	0.1	0.015	0.015	0.015	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.005	0.006	0.008	Monthly	29	NA	NA
E. coli[4]	orgs/100mL	Zero(0)	0	0	1	Weekly	165	165	100%
Electrical Conductivity (25°C)	µS/cm	~900	71	76	90	Weekly	155	155	100%
Fluoride	mg/L	1.5	0.71	0.76	0.83	Monthly	25	25	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	6	13	17	Monthly	17	17	100%
Iron	mg/L	0.3	0.01	0.10	1.80	Weekly	116	114	98.28%
Lead	mg/L	0.01	<0.001	0.001	0.003	Quarterly	8	8	100%

Eynesbury

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Magnesium	mg/L	NA	0.5	1.1	1.6	Quarterly	17	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.017	Weekly	116	116	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	5	5	100%
Nitrate (as NO_3)	mg/L	50	0.10	0.12	0.14	Monthly	13	13	100%
pH	Units	6.5-8.5	7.1	7.5	7.7	Weekly	164	164	100%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Sodium	mg/L	180	6.4	6.4	6.4	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.017	0.017	0.017	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.026	0.035	0.052	Monthly	29	29	100%
Turbidity	NTU	5	0.3	1.3[1]	2.1	Weekly	164	NA	within standard
Zinc	mg/L	3	0.001	0.004	0.009	Quarterly	8	8	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. *E. coli* detection, for details refer to Sec 4.1.3

NA = Not Applicable

Gisborne

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	12	17	32	Monthly	43	NA	NA
Aluminium	mg/L	0.2	0.02	0.11	0.18	Monthly	35	35	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.09	Monthly	36	36	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	174	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	10	10	100%
Calcium	mg/L	NA	2.0	7.8	41.0	Monthly	43	NA	NA
Chloride	mg/L	250	9	31	79	Quarterly	13	13	100%
Chlorine, Total	mg/L	5	0.16	0.98	2.50	Weekly	370	370	100%
Chloroacetic acid	mg/L	0.15	<0.005	0.005	0.006	Quarterly	23	23	100%
Chloroform	mg/L	NA	0.003	0.034	0.094	Monthly	174	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	27	27	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	91	Weekly	370	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	359	359	100%
Copper	mg/L	1	0.001	0.002	0.005	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.002	0.005	Monthly	174	NA	NA
Dichloroacetic acid	mg/L	0.1	0.007	0.018	0.056	Annually	23	23	100%
Dichlorobromomethane	mg/L	NA	0.001	0.007	0.024	Monthly	174	NA	NA
Dissolved Solids, Total	mg/L	600	42	114	260	Quarterly	12	12	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	370	370	100%
Electrical Conductivity (25°C)	µS/cm	~900	69	108	460	Weekly	360	360	100%
Fluoride	mg/L	1.5	0.32	0.76	0.85	Monthly	64	64	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	7	29	170	Monthly	43	43	100%
Iron	mg/L	0.3	<0.01	0.07	0.12	Weekly	123	123	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	5	5	100%

Gisborne

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Magnesium	mg/L	NA	0.5	2.2	16.0	Monthly	43	NA	NA
Manganese	mg/L	0.1	<0.001	0.004	0.020	Weekly	123	123	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.10	0.13	0.22	Monthly	24	24	100%
pH[4]	Units	6.5-8.5	7.2	7.8	9.2	Weekly	360	323	89.72%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Sodium	mg/L	180	6.5	15.8	25.0	Annually	2	2	100%
Sulfate (as SO_4)	mg/L	250	1	27	52	Annually	2	2	100%
Trichloroacetic acid	mg/L	0.1	0.009	0.025	0.100	Quarterly	23	23	100%
Trihalomethanes, Total	mg/L	0.25	0.003	0.043	0.120	Monthly	174	174	100%
Turbidity	NTU	5	<0.1	1.1[1]	1.2	Weekly	360	NA	within standard
Zinc	mg/L	3	<0.001	0.004	0.011	Quarterly	8	8	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Lancefield

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	26	43	88	Monthly	25	NA	NA
Aluminium	mg/L	0.2	0.01	0.01	0.03	Monthly	17	17	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	<0.01	Monthly	17	17	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	2	2	100%
Bromoform	mg/L	NA	0.002	0.005	0.010	Monthly	44	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	8	8	100%
Calcium	mg/L	NA	3.8	6.9	14.0	Monthly	25	NA	NA
Chloride	mg/L	250	77	86	100	Quarterly	4	4	100%
Chlorine, Total	mg/L	5	0.15	1.19	1.90	Weekly	106	106	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	2	2	100%
Chloroform	mg/L	NA	0.018	0.049	0.079	Monthly	44	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	8	8	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	73	Weekly	104	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	106	106	100%
Copper	mg/L	1	0.002	0.003	0.007	Quarterly	8	8	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.016	0.034	0.053	Monthly	44	NA	NA
Dichloroacetic acid	mg/L	0.1	0.006	0.014	0.021	Annually	2	2	100%
Dichlorobromomethane	mg/L	NA	0.025	0.046	0.065	Monthly	44	NA	NA
Dissolved Solids, Total	mg/L	600	160	193	260	Quarterly	4	4	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	105	105	100%
Electrical Conductivity (25°C)	µS/cm	~900	260	347	490	Weekly	106	106	100%
Fluoride	mg/L	1.5	0.07	0.09	0.11	Monthly	13	13	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	28	49	110	Monthly	25	25	100%
Iron	mg/L	0.3	<0.01	0.01	0.02	Weekly	106	106	100%

Lancefield

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	8	8	100%
Magnesium	mg/L	NA	4.5	7.7	18.0	Monthly	25	NA	NA
Manganese	mg/L	0.1	<0.001	0.001	0.005	Weekly	106	106	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	8	8	100%
Nitrate (as NO_3)	mg/L	50	0.02	0.06	0.17	Weekly	57	57	100%
pH	Units	6.5-8.5	7.4	7.7	8.0	Weekly	108	108	100%
Potassium	mg/L	NA	3.1	3.3	3.5	Annually	2	NA	NA
Sodium	mg/L	180	48.0	51.0	54.0	Annually	2	2	100%
Sulfate (as SO_4)	mg/L	250	2	3	3	Annually	2	2	100%
Trichloroacetic acid	mg/L	0.1	0.017	0.021	0.025	Annually	2	2	100%
Trihalomethanes, Total	mg/L	0.25	0.077	0.134	0.200	Monthly	44	44	100%
Turbidity	NTU	5	<0.1	0.1[1]	0.3	Weekly	106	NA	within standard
Zinc	mg/L	3	0.003	0.004	0.006	Quarterly	8	8	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Lerderderg

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	14	31	86	Monthly	20	NA	NA
Aluminium	mg/L	0.2	0.01	0.06	0.20	Monthly	32	32	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	Monthly	32	32	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	0.001	0.002	Monthly	70	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	4	4	100%
Calcium	mg/L	NA	1.4	11.4	21.0	Monthly	36	NA	NA
Chlorine, Total	mg/L	5	0.20	1.13	1.80	Weekly	224	224	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.022	0.064	0.150	Monthly	70	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	27	Weekly	221	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	209	209	100%
Copper	mg/L	1	0.002	0.005	0.010	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.011	0.021	Monthly	70	NA	NA
Dichloroacetic acid	mg/L	0.1	0.022	0.022	0.022	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.005	0.027	0.047	Monthly	70	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	221	221	100%
Electrical Conductivity (25°C)	µS/cm	~900	71	303	480	Weekly	208	208	100%
Fluoride	mg/L	1.5	0.53	0.75	0.95	Monthly	24	24	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	6	65	130	Monthly	36	36	100%
Iron	mg/L	0.3	<0.01	0.04	0.11	Weekly	73	73	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Magnesium	mg/L	NA	0.5	8.9	18.0	Monthly	36	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.008	Weekly	73	73	100%

Lerderderg

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.11	0.17	0.23	Monthly	20	20	100%
pH	Units	6.5-8.5	7.1	7.5	7.8	Weekly	211	211	100%
Potassium	mg/L	NA	2.5	2.5	2.5	Annually	1	NA	NA
Sodium	mg/L	180	28.0	28.0	28.0	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	52	52	52	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.020	0.020	0.020	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.033	0.103	0.210	Monthly	70	70	100%
Turbidity	NTU	5	<0.1	0.9[1]	1.1	Weekly	208	NA	within standard
Zinc	mg/L	3	0.003	0.006	0.011	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Little River

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples*		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	22	22	22	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.01	0.02	0.04	>Fortnightly	31	31	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Fortnightly	31	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	9.3	9.3	9.3	Annually	1	NA	NA
Chloride	mg/L	250	17	17	17	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.13	0.49	0.97	>weekly	118	118	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.015	0.032	0.048	>Fortnightly	31	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	<1	>Weekly	118	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	2	>Fortnightly	44	44	100%
Copper	mg/L	1	0.019	0.019	0.019	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.003	0.006	0.008	>Fortnightly	31	NA	NA
Dichloroacetic acid	mg/L	0.1	0.006	0.006	0.006	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.010	0.015	0.019	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	70	70	70	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	118	118	100%
Electrical Conductivity (25°C)	µS/cm	~900	87	111	130	>Fortnightly	44	44	100%
Fluoride	mg/L	1.5	0.67	0.84	1.00	>Fortnightly	44	44	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	28	28	28	Annually	1	1	100%
Iron	mg/L	0.3	0.02	0.04	0.09	>Fortnightly	44	44	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.2	1.2	1.2	Annually	1	NA	NA

Little River

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples*		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.002	0.006	>Fortnightly	44	44	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.15	1.15	1.15	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.2	1.2	1.2	Annually	1	NA	NA
pH	units	6.5-8.5	6.7	7.4	8.3	>Fortnightly	44	44	100%
Potassium	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.5	4.5	4.5	Annually	1	1	100%
Sodium	mg/L	180	8.9	8.9	8.9	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.020	0.020	0.020	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.034	0.052	0.071	>Fortnightly	31	31	100%
Turbidity	NTU	5	<0.1	0.5[1]	0.8	>Weekly	92	NA	within standard
Zinc	mg/L	3	0.005	0.005	0.005	Annually	1	1	100%

* Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Little River locality during 2021-22. Refer to section 6.6 for details.

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps and tanks for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Maribyrnong

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	11	11	11	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.02	0.04	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	5.1	5.1	5.1	Annually	1	NA	NA
Chloride	mg/L	250	15	15	15	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.38	0.72	>Weekly	367	367	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.009	0.029	0.044	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	6	>Weekly	367	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	6	Fortnightly	26	26	100%
Copper	mg/L	1	0.022	0.022	0.022	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.004	0.006	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.008	0.011	0.014	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	60	60	60	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	367	367	100%
Electrical Conductivity (25°C)	µS/cm	~900	65	92	110	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.66	0.83	0.94	Fortnightly	26	26	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	19	19	19	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.03	0.09	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.6	1.6	1.6	Annually	1	NA	NA

Maribyrnong

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.002	0.009	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.06	1.06	1.06	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
pH	units	6.5-8.5	7.1	7.3	7.5	Fortnightly	26	26	100%
Potassium	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.6	4.6	4.6	Annually	1	1	100%
Sodium	mg/L	180	7.7	7.7	7.7	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	6	6	6	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.017	0.017	0.017	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.023	0.044	0.053	>Monthly	13	13	100%
Turbidity	NTU	5	<0.1	0.7[1]	1.2	Weekly	52	NA	within standard
Zinc	mg/L	3	0.003	0.003	0.003	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Macedon

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	13	19	22	Monthly	20	NA	NA
Aluminium	mg/L	0.2	0.03	0.12	0.19	Monthly	21	21	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.03	Monthly	21	21	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	70	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	6	6	100%
Calcium	mg/L	NA	2.6	5.0	8.8	Monthly	20	NA	NA
Chloride	mg/L	250	11	11	11		1	1	100%
Chlorine, Total	mg/L	5	0.13	1.02	1.60	Weekly	156	156	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	8	8	100%
Chloroform	mg/L	NA	0.022	0.044	0.079	Monthly	70	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	12	12	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	83	Weekly	156	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	156	156	100%
Copper	mg/L	1	<0.001	0.002	0.003	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.002	Monthly	70	NA	NA
Dichloroacetic acid	mg/L	0.1	0.010	0.017	0.026	Annually	8	8	100%
Dichlorobromomethane	mg/L	NA	0.005	0.007	0.010	Monthly	70	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	156	156	100%
Electrical Conductivity (25°C)	µS/cm	~900	72	86	130	Weekly	156	156	100%
Fluoride	mg/L	1.5	0.71	0.77	0.81	Monthly	12	12	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	9	17	29	Monthly	20	20	100%
Iron	mg/L	0.3	0.02	0.09	0.32	Weekly	61	60	98.36%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%

Macedon

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Magnesium	mg/L	NA	0.5	1.0	1.8	Monthly	20	NA	NA
Manganese	mg/L	0.1	0.001	0.003	0.018	Weekly	61	61	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	011	0.13	0.15	Monthly	12	12	100%
pH[4]	Units	6.5-8.5	7.3	8.3	9.4	Weekly	156	88	56.41%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Sodium	mg/L	180	5.6	5.6	5.6	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	2	2	2	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.013	0.018	0.023	Annually	8	8	100%
Trihalomethanes, Total	mg/L	0.25	0.028	0.053	0.090	Monthly	70	70	100%
Turbidity	NTU	5	0.3	1.1[1]	3.3	Weekly	157	NA	within standard
Zinc	mg/L	3	<0.001	0.004	0.007	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for detail

NA = Not Applicable

Maddingley

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	15	28	40	Monthly	16	NA	NA
Aluminium	mg/L	0.2	0.01	0.06	0.20	Monthly	39	39	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	Monthly	39	39	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	0.001	0.003	Monthly	46	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	4	4	100%
Calcium	mg/L	NA	2.0	11.7	21.0	Monthly	24	NA	NA
Chlorine, Total	mg/L	5	0.22	1.16	2.10	Weekly	208	208	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.032	0.071	0.130	Monthly	46	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	170	Weekly	208	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	208	208	100%
Copper	mg/L	1	0.003	0.012	0.030	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.002	0.012	0.025	Monthly	46	NA	NA
Dichloroacetic acid	mg/L	0.1	0.042	0.042	0.042	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.006	0.030	0.050	Monthly	46	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	208	208	100%
Electrical Conductivity (25°C)	µS/cm	~900	75	304	460	Weekly	208	208	100%
Fluoride	mg/L	1.5	0.62	0.76	0.88	Monthly	35	35	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	8	64	120	Monthly	24	24	100%
Iron	mg/L	0.3	<0.01	0.04	0.11	Weekly	79	79	100%
Lead	mg/L	0.01	<0.001	<0.001	0.001	Quarterly	4	4	100%
Magnesium	mg/L	NA	0.7	8.7	17.0	Monthly	24	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.006	Weekly	79	79	100%

Maddingley

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.11	0.16	0.23	Monthly	16	16	100%
pH	Units	6.5-8.5	7.2	7.5	7.8	Weekly	208	208	100%
Potassium	mg/L	NA	2.4	2.4	2.4	Annually	1	NA	NA
Sodium	mg/L	180	32.0	32.0	32.0	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	55	55	55	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.039	0.039	0.039	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.040	0.113	0.190	Monthly	46	46	100%
Turbidity	NTU	5	<0.1	0.8[1]	2.1	Weekly	208	NA	within standard
Zinc	mg/L	3	0.003	0.008	0.019	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Melton South

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	12	14	21	Monthly	20	NA	NA
Aluminium	mg/L	0.2	0.02	0.09	0.17	Monthly	20	20	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.01	Monthly	20	20	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	40	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	6	6	100%
Calcium	mg/L	NA	1.6	3.7	6.0	Monthly	20	NA	NA
Chloride	mg/L	250	10	10	10	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.21	0.96	1.60	Weekly	219	219	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	2	2	100%
Chloroform	mg/L	NA	0.009	0.020	0.050	Monthly	40	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	6	6	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	2,400	Weekly	218	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	76	76	100%
Copper	mg/L	1	<0.001	0.004	0.016	Quarterly	12	12	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.002	Monthly	40	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	0.005	0.005	Annually	2	2	100%
Dichlorobromomethane	mg/L	NA	0.003	0.005	0.009	Monthly	40	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	218	218	100%
Electrical Conductivity (25°C)	µS/cm	~900	66	72	250	Weekly	156	156	100%
Fluoride	mg/L	1.5	0.74	0.77	0.82	Monthly	12	12	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	6	14	20	Monthly	20	20	100%
Iron	mg/L	0.3	0.02	0.07	0.11	Weekly	156	156	100%
Lead	mg/L	0.01	<0.001	0.001	0.008	Quarterly	12	12	100%

Melton South

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Magnesium	mg/L	NA	0.5	1.1	1.5	Monthly	20	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.008	Weekly	156	156	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	6	6	100%
Nitrate (as NO_3)	mg/L	50	0.10	0.12	0.15	Monthly	12	12	100%
pH	Units	6.5-8.5	6.9	7.5	8.4	Weekly	158	158	100%
Potassium	mg/L	NA	0.7	0.7	0.7	Annually	1	NA	NA
Sodium	mg/L	180	6.1	6.1	6.1	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.007	0.011	0.014	Annually	2	2	100%
Trihalomethanes, Total	mg/L	0.25	0.013	0.026	0.061	Monthly	40	40	100%
Turbidity	NTU	5	0.2	1.1[1]	1.2	Weekly	158	NA	within standard
Zinc	mg/L	3	<0.001	0.006	0.047	Quarterly	12	12	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Merrimu

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	12	25	39	Monthly	39	NA	NA
Aluminium	mg/L	0.2	0.02	0.07	0.20	Monthly	35	35	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.05	Monthly	35	35	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	0.002	Monthly	65	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	7	7	100%
Calcium	mg/L	NA	1.7	10.0	20.0	Monthly	39	NA	NA
Chlorine, Total	mg/L	5	0.08	1.04	3.00	Weekly	272	272	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	2	2	100%
Chloroform	mg/L	NA	0.008	0.031	0.064	Monthly	65	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	5	5	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	26	Weekly	270	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	218	218	100%
Copper	mg/L	1	<0.001	0.003	0.006	Quarterly	8	8	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.008	0.020	Monthly	65	NA	NA
Dichloroacetic acid	mg/L	0.1	0.007	0.010	0.013	Annually	2	2	100%
Dichlorobromomethane	mg/L	NA	0.003	0.016	0.043	Monthly	65	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	271	271	100%
Electrical Conductivity (25°C)	µS/cm	~900	68	247	450	Weekly	258	258	100%
Fluoride	mg/L	1.5	0.11	0.73	0.86	Monthly	126	126	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	7	55	97	Monthly	39	39	100%
Iron	mg/L	0.3	<0.01	0.04	0.12	Weekly	218	218	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	8	8	100%
Magnesium	mg/L	NA	0.6	7.3	14.0	Monthly	39	NA	NA

Merrimu

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.003	0.030	Weekly	218	218	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	5	5	100%
Nitrate (as NO_3)	mg/L	50	0.11	0.16	0.32	Monthly	35	35	100%
pH	Units	6.5-8.5	6.6	7.4	8.0	Weekly	259	259	100%
Potassium	mg/L	NA	2.8	2.8	2.8	Annually	1	NA	NA
Sodium	mg/L	180	6.9	27.8	34.0	Annually	5	5	100%
Sulfate (as SO_4)	mg/L	250	1	35	52	Annually	3	3	100%
Trichloroacetic acid	mg/L	0.1	0.018	0.021	0.024	Annually	2	2	100%
Trihalomethanes, Total	mg/L	0.25	0.015	0.055	0.130	Monthly	65	65	100%
Turbidity	NTU	5	<0.1	1.0[1]	1.5	Weekly	258	NA	within standard
Zinc	mg/L	3	0.001	0.003	0.007	Quarterly	8	8	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Moonee Ponds

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	11	12	12	Annually	10	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.05	0.1	>Monthly	22	22	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.4	4.8	5.4	Annually	10	NA	NA
Chloride	mg/L	250	12	12	12	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.07	0.34	0.94	>Weekly	237	237	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.010	0.035	0.048	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	24	>Weekly	237	NA	NA
Colour, Apparent	Pt/Co units	25	<2	4	8	Fortnightly	35	35	100%
Colour, True	Pt/Co units	15	2	3	4	NA	9	9	100%
Copper	mg/L	1	0.007	0.007	0.007	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.003	0.005	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.006	0.009	0.011	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	38	47	62	Annually	10	10	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	237	237	100%
Electrical Conductivity (25°C)	µS/cm	~900	59	79	110	Fortnightly	35	35	100%
Fluoride	mg/L	1.5	0.60	0.80	0.92	Fortnightly	27	27	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	16	17	20	Annually	10	10	100%
Iron	mg/L	0.3	<0.01	0.05	0.08	Fortnightly	35	35	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%

Moonee Ponds

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Magnesium	mg/L	NA	1.1	1.3	1.8	Annually	10	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.009	Fortnightly	35	35	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.02	1.02	1.02	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.4	1.4	1.4	Annually	1	NA	NA
pH	units	6.5-8.5	7.1	7.3	7.5	Fortnightly	35	35	100%
Potassium	mg/L	NA	0.9	0.9	0.9	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	6.0	6.0	6.0	Annually	1	1	100%
Sodium	mg/L	180	6.4	6.4	6.4	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	4	4	4	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.024	0.024	0.024	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.024	0.047	0.059	>Monthly	13	13	100%
Turbidity	NTU	5[1]	<0.1	0.9	1.1	Weekly	55	NA	within standard
Zinc	mg/L	3	0.001	0.004	0.018	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Mount Macedon

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	17	21	23	Monthly	24	NA	NA
Aluminium	mg/L	0.2	0.03	0.13	0.21	Monthly	24	23	95.83%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	Monthly	24	24	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	98	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	7	7	100%
Calcium	mg/L	NA	2.7	5.4	9.0	Monthly	24	NA	NA
Chloride	mg/L	250	13	13	13	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.46	1.00	1.60	Weekly	208	208	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Monthly	12	12	100%
Chloroform	mg/L	NA	0.026	0.053	0.083	Monthly	98	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	16	16	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	440	Weekly	208	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	207	207	100%
Copper	mg/L	1	<0.001	0.014	0.051	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.002	Monthly	98	NA	NA
Dichloroacetic acid	mg/L	0.1	0.013	0.020	0.028	Monthly	12	12	100%
Dichlorobromomethane	mg/L	NA	0.005	0.008	0.012	Monthly	98	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	208	208	100%
Electrical Conductivity (25°C)	µS/cm	~900	77	92	110	Weekly	207	207	100%
Fluoride	mg/L	1.5	0.73	0.76	0.80	Monthly	12	12	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	9	17	27	Monthly	24	24	100%
Iron	mg/L	0.3	0.03	0.09	0.15	Weekly	64	64	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%

Mount Macedon

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Magnesium	mg/L	NA	0.4	0.9	1.4	Monthly	24	NA	NA
Manganese	mg/L	0.1	0.001	0.003	0.006	Weekly	64	64	100%
Mercury	mg/L	0.001	<0.0001	0.0002	0.0005	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.11	0.12	0.15	Monthly	12	12	100%
pH[4]	Units	6.5-8.5	7.7	8.6	9.3	Weekly	207	68	32.85%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Sodium	mg/L	180	6.3	6.3	6.3	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	2	2	2	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.013	0.019	0.022	Monthly	12	12	100%
Trihalomethanes, Total	mg/L	0.25	0.033	0.063	0.094	Monthly	98	98	100%
Turbidity	NTU	5	0.3	1.1[1]	1.5	Weekly	207	NA	within standard
Zinc	mg/L	3	<0.001	0.004	0.013	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Myrniong

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	14	51	67	Monthly	29	NA	NA
Aluminium	mg/L	0.2	0.01	0.01	0.05	Monthly	31	31	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.04	Monthly	31	31	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	0.005	0.010	Monthly	73	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	5	5	100%
Calcium	mg/L	NA	11.0	14.8	21.0	Monthly	25	NA	NA
Chloride	mg/L	250	110	118	120	Quarterly	4	4	100%
Chlorine, Total	mg/L	5	<0.05	0.86	2.80	Weekly	245	245	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.002	0.023	0.052	Monthly	73	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	16	Weekly	245	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	193	193	100%
Copper	mg/L	1	<0.001	0.011	0.029	Quarterly	8	8	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.021	0.047	Monthly	73	NA	NA
Dichloroacetic acid	mg/L	0.1	0.005	0.005	0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.004	0.023	0.053	Monthly	73	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	245	245	100%
Electrical Conductivity (25°C)	µS/cm	~900	430	566	640	Weekly	245	245	100%
Fluoride	mg/L	1.5	0.05	0.09	0.46	Monthly	35	35	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	88	112	150	Monthly	25	25	100%
Iron	mg/L	0.3	<0.01	0.03	0.36	Weekly	123	122	99.19%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	8	8	100%
Magnesium	mg/L	NA	14.0	18.3	25.0	Monthly	25	NA	NA

Myrniong

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.001	0.009	Weekly	123	123	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.02	0.25	0.35	Monthly	62	62	100%
pH[4]	Units	6.5-8.5	6.9	7.6	8.7	Weekly	245	236	96.33%
Potassium	mg/L	NA	2.4	2.4	2.4	Annually	1	NA	NA
Sodium	mg/L	180	53.0	54.0	55.0	Annually	2	2	100%
Sulfate (as SO_4)	mg/L	250	48	52	60	Annually	5	5	100%
Trichloroacetic acid	mg/L	0.1	0.009	0.009	0.009	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.018	0.072	0.150	Monthly	73	73	100%
Turbidity	NTU	5	<0.1	0.3[1]	2.9	Weekly	245	NA	within standard
Zinc	mg/L	3	<0.001	0.002	0.004	Quarterly	8	8	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Parkville

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	10	10	10	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.03	0.06	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	5.0	5.0	5.0	Annually	1	NA	NA
Chloride	mg/L	250	17	17	17	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.07	0.47	1.00	>Weekly	405	405	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.015	0.024	0.031	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	12	>Weekly	405	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	6	Fortnightly	26	26	100%
Copper	mg/L	1	0.015	0.015	0.015	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.003	0.005	0.007	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.009	0.011	0.015	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	72	72	72	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	405	405	100%
Electrical Conductivity (25°C)	µS/cm	~900	86	99	110	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.67	0.86	0.97	Fortnightly	27	27	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	19	19	19	Annually	1	1	100%
Iron	mg/L	0.3	0.01	0.02	0.10	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%

Parkville

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Magnesium	mg/L	NA	1.6	1.6	1.6	Annually	1	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.023	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.24	1.24	1.24	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.9	0.9	0.9	Annually	1	NA	NA
pH	units	6.5-8.5	7.2	7.3	7.5	Fortnightly	26	26	100%
Potassium	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.0	4.0	4.0	Annually	1	1	100%
Sodium	mg/L	180	8.4	8.4	8.4	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.008	0.008	0.008	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.029	0.040	0.048	>Monthly	13	13	100%
Turbidity	NTU	5	<0.1	0.6[1]	0.8	Weekly	52	NA	within standard
Zinc	mg/L	3	0.007	0.007	0.007	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Riddells Creek

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	13	17	30	Monthly	19	NA	NA
Aluminium	mg/L	0.2	0.03	0.11	0.18	Monthly	20	20	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.02	Monthly	20	20	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	70	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	6	6	100%
Calcium	mg/L	NA	1.9	4.2	7.5	Monthly	20	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.93	1.60	Weekly	156	156	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	8	8	100%
Chloroform	mg/L	NA	0.013	0.034	0.067	Monthly	70	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	12	12	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	19	Weekly	156	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	156	156	100%
Copper	mg/L	1	<0.001	0.003	0.008	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	0.002	0.002	Monthly	70	NA	NA
Dichloroacetic acid	mg/L	0.1	0.007	0.015	0.024	Annually	8	8	100%
Dichlorobromomethane	mg/L	NA	0.004	0.007	0.011	Monthly	70	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	156	156	100%
Electrical Conductivity (25°C)	µS/cm	~900	68	82	100	Weekly	156	156	100%
Fluoride	mg/L	1.5	0.74	0.77	0.84	Monthly	12	12	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	8	14	25	Monthly	20	20	100%
Iron	mg/L	0.3	0.02	0.08	0.14	Weekly	60	60	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Magnesium	mg/L	NA	0.5	0.9	1.5	Quarterly	20	NA	NA

Riddells Creek

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.003	0.009	Weekly	60	60	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.09	0.12	0.14	Monthly	12	12	100%
pH[4]	Units	6.5-8.5	7.2	8.0	9.0	Weekly	156	131	83.97%
Potassium	mg/L	NA	0.7	0.7	0.7	Annually	1	NA	NA
Sodium	mg/L	180	6.2	6.2	6.2	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.008	0.014	0.023	Annually	8	8	100%
Trihalomethanes, Total	mg/L	0.25	0.018	0.042	0.079	Monthly	70	70	100%
Turbidity	NTU	5	0.3	1.1[1]	1.3	Weekly	156	NA	within standard
Zinc	mg/L	3	<0.001	0.002	0.005	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Richmond

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	13	13	13	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.03	0.04	>Monthly	14	14	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	14	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.4	4.4	4.4	Annually	1	NA	NA
Chloride	mg/L	250	10	10	10	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.50	1.40	>Weekly	114	114	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.045	0.054	0.063	>Monthly	14	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	200	>Weekly	114	NA	NA
Colour, Apparent	Pt/Co units	25	<2	6	40	Fortnightly	28	27	96.43%
Copper	mg/L	1	0.009	0.009	0.009	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	<0.001	<0.001	0.001	>Monthly	14	NA	NA
Dichloroacetic acid	mg/L	0.1	0.007	0.007	0.007	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.007	0.009	0.011	>Monthly	14	NA	NA
Dissolved Solids, Total	mg/L	600	48	48	48	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	1*	>Weekly	113	113	100%
Electrical Conductivity (25°C)	µS/cm	~900	59	66	77	Fortnightly	33	33	100%
Fluoride	mg/L	1.5	0.53	0.76	0.85	Fortnightly	28	28	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	17	17	17	Annually	1	1	100%
Iron	mg/L	0.3	0.05	0.10	0.71	Fortnightly	28	27	96.43%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.4	1.4	1.4	Annually	1	NA	NA

Richmond

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	0.003	0.005	0.016	Fortnightly	27	27	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	0.80	0.80	0.80	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
pH	units	6.5-8.5	7.2	7.3	7.5	Fortnightly	33	33	100%
Potassium	mg/L	NA	0.7	0.7	0.7	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	6.3	6.3	6.3	Annually	1	1	100%
Sodium	mg/L	180	5.2	5.2	5.2	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	2	2	2	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.053	0.053	0.053	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.053	0.064	0.072	>Monthly	14	14	100%
Turbidity	NTU	5	0.4	1.2[1]	8.9	Weekly	60	NA	within standard
Zinc	mg/L	3	0.002	0.002	0.002	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

* Following investigation, it was concluded the positive sample was a 'false positive sample'. Refer to section 4.1.1 for further details.

NA = Not Applicable

Rockbank

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	12	13	17	Monthly	32	NA	NA
Aluminium	mg/L	0.2	0.02	0.10	0.18	Monthly	24	24	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.02	Monthly	24	24	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	2	2	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	41	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	5	5	100%
Calcium	mg/L	NA	1.5	3.3	4.8	Monthly	28	NA	NA
Chloride	mg/L	250	10	10	10	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.11	1.08	1.90	Weekly	208	208	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	2	2	100%
Chloroform	mg/L	NA	0.007	0.016	0.034	Monthly	41	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	6	6	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	80	Weekly	208	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	168	168	100%
Copper	mg/L	1	0.002	0.008	0.018	Quarterly	8	8	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	2	2	100%
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.002	Monthly	41	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	0.005	0.005	Annually	2	2	100%
Dichlorobromomethane	mg/L	NA	0.002	0.004	0.008	Monthly	41	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	208	208	100%
Electrical Conductivity (25°C)	µS/cm	~900	65	70	88	Weekly	208	208	100%
Fluoride	mg/L	1.5	0.72	0.77	0.82	Monthly	24	24	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	6	13	18	Monthly	28	28	100%
Iron	mg/L	0.3	0.02	0.07	0.11	Weekly	169	169	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	12	12	100%
Magnesium	mg/L	NA	0.5	1.1	1.6	Monthly	28	NA	NA

Rockbank

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.002	0.010	Weekly	169	169	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	6	6	100%
Nitrate (as NO_3)	mg/L	50	0.10	0.12	0.15	Monthly	16	16	100%
pH	Units	6.5-8.5	6.9	7.4	8.4	Weekly	208	208	100%
Potassium	mg/L	NA	0.7	0.7	0.7	Annually	1	NA	NA
Sodium	mg/L	180	4.2	5.5	6.2	Annually	13	13	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	5	5	100%
Trichloroacetic acid	mg/L	0.1	0.006	0.007	0.008	Annually	2	2	100%
Trihalomethanes, Total	mg/L	0.25	0.009	0.022	0.044	Monthly	40	40	100%
Turbidity	NTU	5	0.2	1.2[1]	2.0	Weekly	208	NA	within standard
Zinc	mg/L	3	0.001	0.004	0.006	Quarterly	12	12	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Romsey

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	23	35	44	Monthly	49	NA	NA
Aluminium	mg/L	0.2	<0.01	<0.01	<0.01	Monthly	49	49	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	<0.01	Monthly	49	49	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	2	2	100%
Bromoform	mg/L	NA	<0.001	0.001	0.002	Monthly	53	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	16	16	100%
Calcium	mg/L	NA	1.4	7.0	12.0	Monthly	49	NA	NA
Chloride	mg/L	250	44	56	61	Quarterly	4	4	100%
Chlorine, Total	mg/L	5	0.11	0.85	1.90	Weekly	360	360	100%
Chloroacetic acid	mg/L	0.15	<0.005	0.005	0.007	Annually	4	4	100%
Chloroform	mg/L	NA	0.002	0.010	0.041	Monthly	53	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	16	16	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	410	Weekly	312	NA	NA
Colour, True	PCU	15	<2	4	8	Weekly	318	318	100%
Copper	mg/L	1	<0.001	0.004	0.017	Quarterly	16	16	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	2	2	100%
Dibromochloromethane	mg/L	NA	<0.001	0.004	0.022	Monthly	53	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	0.022	0.071	Annually	4	4	100%
Dichlorobromomethane	mg/L	NA	0.001	0.006	0.031	Monthly	53	NA	NA
Dissolved Solids, Total	mg/L	600	78	149	200	Quarterly	12	12	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	318	318	100%
Electrical Conductivity (25°C)	µS/cm	~900	150	248	280	Weekly	318	318	100%
Fluoride	mg/L	1.5	0.07	0.09	0.13	Monthly	37	37	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	9	42	61	Monthly	49	49	100%
Iron	mg/L	0.3	<0.01	0.01	0.05	Weekly	236	236	100%

Romsey

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	16	16	100%
Magnesium	mg/L	NA	1.3	6.0	8.8	Monthly	49	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.012	Weekly	236	236	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	16	16	100%
Monochloramine	mg/L	3	<0.05	0.57	1.10	Weekly	302	302	100%
Nitrate (as NO_3)	mg/L	50	0.05	0.17	0.43	Weekly	82	82	100%
pH	Units	6.5-8.5	7.1	7.5	7.9	Weekly	359	359	100%
Potassium	mg/L	NA	1.9	2.0	2.2	Annually	4	NA	NA
Sodium	mg/L	180	22.0	27.3	30.0	Annually	4	4	100%
Sulfate (as SO_4)	mg/L	250	2	2	3	Annually	4	4	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.019	0.061	Annually	4	4	100%
Trihalomethanes, Total	mg/L	0.25	0.002	0.020	0.090	Monthly	53	53	100%
Turbidity	NTU	5	<0.1	0.1[1]	0.2	Weekly	359	NA	within standard
Zinc	mg/L	3	<0.001	0.004	0.013	Quarterly	16	16	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

Strathmore

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	12	12	12	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.03	0.04	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.8	4.8	4.8	Annually	1	NA	NA
Chloride	mg/L	250	12	12	12	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.06	0.23	0.52	>Weekly	79	79	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.029	0.047	0.078	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	25	>Weekly	79	NA	NA
Colour, Apparent	Pt/Co units	25	<2	4	6	Fortnightly	26	26	100%
Copper	mg/L	1	0.020	0.020	0.020	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.003	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.008	0.010	0.017	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	50	50	50	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	79	79	100%
Electrical Conductivity (25°C)	µS/cm	~900	63	75	120	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.58	0.80	0.95	Fortnightly	26	26	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	19	19	19	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.06	0.08	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.7	1.7	1.7	Annually	1	NA	NA

Strathmore

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.004	0.007	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.02	1.02	1.02	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.4	1.4	1.4	Annually	1	NA	NA
pH	units	6.5-8.5	7.2	7.4	7.6	Fortnightly	26	26	100%
Potassium	mg/L	NA	0.9	0.9	0.9	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	6.0	6.0	6.0	Annually	1	1	100%
Sodium	mg/L	180	6.2	6.2	6.2	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	4	4	4	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.022	0.022	0.022	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.042	0.059	0.098	>Monthly	13	13	100%
Turbidity	NTU	5	<0.1	0.9[1]	1.1	Weekly	52	NA	within standard
Zinc	mg/L	3	0.007	0.007	0.007	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Sunbury

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	11	13	16	Monthly	40	NA	NA
Aluminium	mg/L	0.2	0.02	0.10	0.19	Monthly	44	44	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.16	Monthly	47	47	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	2	2	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	92	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	8	8	100%
Calcium	mg/L	NA	1.6	3.7	6.5	Monthly	40	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.91	1.80	Weekly	424	424	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	8	8	100%
Chloroform	mg/L	NA	0.007	0.021	0.043	Monthly	92	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	12	12	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	100	Weekly	424	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	244	424	100%
Copper	mg/L	1	<0.001	0.002	0.008	Quarterly	16	16	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	2	2	100%
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.002	Monthly	92	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	0.010	0.020	Annually	8	8	100%
Dichlorobromomethane	mg/L	NA	0.002	0.005	0.009	Monthly	92	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	424	424	100%
Electrical Conductivity (25°C)	µS/cm	~900	65	76	120	Weekly	356	356	100%
Fluoride	mg/L	1.5	0.72	0.77	0.82	Monthly	36	36	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	7	14	21	Monthly	40	40	100%
Iron	mg/L	0.3	<0.01	0.07	0.34	Weekly	276	275	99.64%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	20	20	100%
Magnesium	mg/L	NA	0.6	1.1	1.6	Monthly	40	NA	NA

Sunbury

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.002	0.016	Weekly	276	276	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	8	8	100%
Nitrate (as NO_3)	mg/L	50	0.09	0.12	0.14	Monthly	16	16	100%
pH[4]	Units	6.5-8.5	6.9	7.8	10.0	Weekly	365	314	86.03%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Sodium	mg/L	180	4.9	5.6	6.4	Annually	13	13	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	5	5	100%
Trichloroacetic acid	mg/L	0.1	0.005	0.013	0.021	Annually	8	8	100%
Trihalomethanes, Total	mg/L	0.25	0.010	0.027	0.053	Monthly	91	91	100%
Turbidity	NTU	5	0.2	1.1[1]	1.4	Weekly	365	NA	within standard
Zinc	mg/L	3	<0.001	0.002	0.006	Quarterly	20	20	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH value exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Taylors Lakes

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	13	13	13	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	<0.01	0.02	0.04	Fortnightly	27	27	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Fortnightly	27	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	3.7	3.7	3.7	Annually	1	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	<0.05	0.69	1.20	>Weekly	253	253	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.009	0.029	0.064	Fortnightly	27	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	200	>Weekly	252	NA	NA
Colour, Apparent	Pt/Co units	25	<2	5	20	>Fortnightly	42	42	100%
Colour, True	Pt/Co units	15	<2	<2	<2	NA	1	1	100%
Copper	mg/L	1	0.005	0.005	0.005	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.002	Fortnightly	27	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.003	0.006	0.010	Fortnightly	27	NA	NA
Dissolved Solids, Total	mg/L	600	45	45	45	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	249	249	100%
Electrical Conductivity (25°C)	µS/cm	~900	65	74	98	>Fortnightly	41	41	100%
Fluoride	mg/L	1.5	0.72	0.77	0.84	>Fortnightly	40	40	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	15	15	15	Annually	1	1	100%
Iron	mg/L	0.3	0.03	0.11	0.34	>Fortnightly	40	39	97.50%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.3	1.3	1.3	Annually	1	NA	NA

Taylors Lakes

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.008	0.044	>Fortnightly	40	40	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	0.44	0.44	0.44	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
pH	units	6.5-8.5	7.0	7.5	7.9	>Fortnightly	47	47	100%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.7	4.7	4.7	Annually	1	1	100%
Sodium	mg/L	180	4.9	4.9	4.9	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.013	0.036	0.077	>Fortnightly	27	27	100%
Turbidity	NTU	5	0.2	1.3[1]	2.0	>Weekly	72	NA	within standard
Zinc	mg/L	3	0.003	0.003	0.003	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps and tanks for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Toolern Vale

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	14	28	40	Monthly	16	NA	NA
Aluminium	mg/L	0.2	0.03	0.06	0.16	Monthly	16	16	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	Monthly	16	16	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	0.001	0.003	Monthly	42	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	4	4	100%
Calcium	mg/L	NA	3.2	12.4	19.0	Monthly	24	NA	NA
Chlorine, Total	mg/L	5	0.05	0.70	1.90	Weekly	105	105	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.020	0.040	0.064	Monthly	42	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	5	Weekly	104	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	104	104	100%
Copper	mg/L	1	0.001	0.005	0.017	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.011	0.024	Monthly	42	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.006	0.024	0.042	Monthly	42	NA	NA
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	104	104	100%
Electrical Conductivity (25°C)	µS/cm	~900	70	302	440	Weekly	104	104	100%
Fluoride	mg/L	1.5	0.59	0.73	0.82	Monthly	12	12	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	12	66	100	Monthly	24	24	100%
Iron	mg/L	0.3	<0.01	0.03	0.11	Weekly	56	56	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	4	4	100%
Magnesium	mg/L	NA	1.0	8.6	15.0	Monthly	24	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.007	Weekly	56	56	100%

Toolern Vale

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.13	0.16	0.22	Monthly	16	16	100%
pH[4]	Units	6.5-8.5	7.0	7.4	8.8	Weekly	105	104	99.05%
Potassium	mg/L	NA	2.9	2.9	2.9	Annually	1	NA	NA
Sodium	mg/L	180	31.0	31.0	31.0	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	54	54	54	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.021	0.021	0.021	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.034	0.075	0.120	Monthly	42	42	100%
Turbidity	NTU	5	<0.1	0.9[1]	1.2	Weekly	104	NA	within standard
Zinc	mg/L	3	0.003	0.008	0.022	Quarterly	4	4	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality
4. Maximum pH exceeds the guideline targets, refer to Sec 7.3.9 for details

NA = Not Applicable

Tullamarine

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	14	14	14	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	<0.01	0.02	0.02	>Monthly	14	14	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	14	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.3	4.3	4.3	Annually	1	NA	NA
Chloride	mg/L	250	11	11	11	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.08	0.57	1.00	>Weekly	114	114	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.008	0.017	0.027	>Monthly	14	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	200	>Weekly	115	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	4	Fortnightly	27	27	100%
Copper	mg/L	1	0.004	0.004	0.004	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.003	0.007	>Monthly	14	NA	NA
Dichloroacetic acid	mg/L	0.1	0.006	0.006	0.006	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.004	0.007	0.013	>Monthly	14	NA	NA
Dissolved Solids, Total	mg/L	600	45	45	45	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	113	113	100%
Electrical Conductivity (25°C)	µS/cm	~900	68	82	210	Fortnightly	46	46	100%
Fluoride	mg/L	1.5	0.19	0.77	0.96	Fortnightly	28	28	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	16	16	16	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.05	0.11	Fortnightly	27	27	100%

Tullamarine

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.2	1.2	1.2	Annually	1	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.006	Fortnightly	27	27	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	0.44	0.44	0.44	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.9	0.9	0.9	Annually	1	NA	NA
pH	units	6.5-8.5	6.8	7.6	9.0	Fortnightly	49	44	89.80%
Potassium	mg/L	NA	0.6	0.6	0.6	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.8	4.8	4.8	Annually	1	1	100%
Sodium	mg/L	180	5.2	5.2	5.2	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	1	1	1	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.007	0.007	0.007	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.016	0.026	0.039	>Monthly	14	14	100%
Turbidity	NTU	5	<0.1	1.0[1]	1.2	Weekly	75	NA	within standard
Zinc	mg/L	3	0.002	0.002	0.002	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Werribee

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples*		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	11	12	13	Annually	2	NA	NA
Aluminium[4]	mg/L	0.2	0.01	0.02	0.05	>Monthly	17	17	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	17	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	7.1	7.1	7.1	Annually	1	NA	NA
Chloride	mg/L	250	17	17	17	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.10	0.48	1.10	>Weekly	522	522	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.014	0.028	0.041	>Monthly	17	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	200	>Weekly	522	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	6	Fortnightly	31	31	100%
Colour, True	Pt/Co units	15	<2	<2	<2	NA	1	1	100%
Copper	mg/L	1	<0.001	0.001	<0.001	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.003	0.006	0.008	>Monthly	17	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.010	0.014	0.020	>Monthly	17	NA	NA
Dissolved Solids, Total	mg/L	600	70	71	72	Annually	2	2	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	521	521	100%
Electrical Conductivity (25°C)	µS/cm	~900	76	101	110	Fortnightly	34	34	100%
Fluoride	mg/L	1.5	0.71	0.84	0.95	>Fortnightly	32	32	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	22	22	22	Annually	1	1	100%
Iron	mg/L	0.3	0.01	0.03	0.08	>Fortnightly	34	34	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%

Werribee

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples*		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Magnesium	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.042	>Fortnightly	34	34	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.24	1.24	1.24	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	0.8	0.8	0.8	Annually	1	NA	NA
pH	units	6.5-8.5	7.1	7.5	7.8	>Fortnightly	35	35	100%
Potassium	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.1	4.1	4.1	Annually	1	1	100%
Sodium	mg/L	180	8.3	8.3	8.3	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.013	0.013	0.013	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.031	0.048	0.069	>Monthly	17	17	100%
Turbidity	NTU	5	<0.1	0.6[1]	0.8	>Weekly	82	NA	within standard
Zinc	mg/L	3	0.005	0.005	0.005	Annually	1	1	100%

* Requirements of reg 13(1) Safe Drinking Water Regulations 2015 were not met for the Werribee locality during 2021-22. Refer to section 6.6 for details.

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps and tanks for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Werribee South

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	13	13	13	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.01	0.02	0.03	>Monthly	27	27	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	2	2	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Fortnightly	26	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	2	2	100%
Calcium	mg/L	NA	6.8	6.8	6.8	Annually	1	NA	NA
Chloride	mg/L	250	17	17	17	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.24	0.53	1.10	>Weekly	98	98	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.019	0.029	0.051	Fortnightly	26	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	1	>Weekly	98	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	4	>Fortnightly	42	42	100%
Colour, True	Pt/Co units	15	<2	<2	<2	>Fortnightly	3	3	100%
Copper	mg/L	1	0.001	0.002	0.003	Annually	2	2	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.003	0.006	0.008	Fortnightly	26	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.008	0.014	0.021	Fortnightly	26	NA	NA
Dissolved Solids, Total	mg/L	600	68	70	72	Annually	4	4	100%
E. coli	orgs/100mL	Zero(0)	0	0	1*	>Weekly	98	98	100%
Electrical Conductivity (25°C)	µS/cm	~900	76	101	110	>Fortnightly	42	42	100%
Fluoride	mg/L	1.5	0.62	0.83	0.92	>Fortnightly	42	42	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	22	22	22	Annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.02	0.08	>Fortnightly	40	40	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	2	2	100%

Werribee South

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling[3]	Total[2]	Passing	
Magnesium	mg/L	NA	1.3	1.3	1.3	Annually	1	NA	NA
Manganese	mg/L	0.1	<0.001	0.001	0.006	>Fortnightly	40	40	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	2	2	100%
Nitrate (as NO_3)	mg/L	50	1.24	1.44	1.64	Annually	2	2	100%
Organic Carbon, Total	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
pH	units	6.5-8.5	7.0	7.8	8.6	>Fortnightly	47	46	97.87%
Potassium	mg/L	NA	1.1	1.2	1.2	Annually	2	NA	NA
Silica (SiO_2)	mg/L	80	4.2	4.7	5.2	Annually	2	2	100%
Sodium	mg/L	180	8.7	9.4	10.0	Annually	2	2	100%
Sulfate (as SO_4)	mg/L	250	6	6	6	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.015	0.015	0.015	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.031	0.049	0.080	Fortnightly	26	26	100%
Turbidity	NTU	5	<0.1	0.6[1]	0.7	>Weekly	69	NA	within standard
Zinc	mg/L	3	<0.001	0.002	0.003	Annually	2	2	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps and tanks for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

**E. coli* from a non-routine investigative sample which following investigation, it was concluded the positive sample was a 'false positive sample'. Refer to section 4.1.1 for further details.

NA = Not Applicable

Williamstown

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg CaCO3 / L	NA	10	10	10	Annually	1	NA	NA
Aluminium[4]	mg/L	0.2	0.02	0.02	0.03	>Monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	13	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Annually	1	1	100%
Calcium	mg/L	NA	4.9	4.9	4.9	Annually	1	NA	NA
Chloride	mg/L	250	16	16	16	Annually	1	1	100%
Chlorine, Total	mg/L	5	0.08	0.35	0.67	>Weekly	170	170	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.021	0.026	0.041	>Monthly	13	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Annually	1	1	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	100	>Weekly	170	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	2	Fortnightly	27	27	100%
Copper	mg/L	1	0.004	0.004	0.004	Annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.004	0.005	0.006	>Monthly	13	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.010	0.012	0.015	>Monthly	13	NA	NA
Dissolved Solids, Total	mg/L	600	62	62	62	Annually	1	1	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	169	169	100%
Electrical Conductivity (25°C)	µS/cm	~900	85	99	120	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.71	0.85	0.94	Fortnightly	26	26	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	19	19	19	Annually	1	1	100%
Iron	mg/L	0.3	0.01	0.03	0.04	Fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Magnesium	mg/L	NA	1.7	1.7	1.7	Annually	1	NA	NA

Williamstown

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.002	0.003	Fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Annually	1	1	100%
Nitrate (as NO_3)	mg/L	50	1.15	1.15	1.15	Annually	1	1	100%
Organic Carbon, Total	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
pH	units	6.5-8.5	7.2	7.4	7.7	Fortnightly	26	26	100%
Potassium	mg/L	NA	1.0	1.0	1.0	Annually	1	NA	NA
Silica (SiO_2)	mg/L	80	4.5	4.5	4.5	Annually	1	1	100%
Sodium	mg/L	180	8.1	8.1	8.1	Annually	1	1	100%
Sulfate (as SO_4)	mg/L	250	7	7	7	Annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.015	0.015	0.015	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.037	0.044	0.061	>Monthly	13	13	100%
Turbidity	NTU	5	<0.1	0.4[1]	0.5	Weekly	52	NA	within standard
Zinc	mg/L	3	0.002	0.002	0.002	Annually	1	1	100%

1. Based on 95th percentile result
2. No of samples includes routine, investigative and resample program at network taps for the specific water sampling locality
3. No of samples collected is more than the frequency due to investigative and resample programs included in the table
4. Aluminium as acid-soluble aluminium

NA = Not Applicable

Woodend

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	16	28	50	Monthly	36	NA	NA
Aluminium	mg/L	0.2	<0.01	0.02	0.06	Monthly	33	33	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	Monthly	33	33	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	Annually	1	1	100%
Bromoform	mg/L	NA	<0.001	0.001	0.001	Monthly	72	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	Quarterly	6	6	100%
Calcium	mg/L	NA	1.0	2.8	6.2	Monthly	36	NA	NA
Chloride	mg/L	250	15	28	38	Monthly	24	24	100%
Chlorine, Total	mg/L	5	0.13	1.08	1.90	Weekly	229	229	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	1	1	100%
Chloroform	mg/L	NA	0.009	0.035	0.110	Monthly	72	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	6	6	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	110	Weekly	231	NA	NA
Colour, True	PCU	15	<2	2	4	Weekly	219	219	100%
Copper	mg/L	1	0.001	0.003	0.004	Quarterly	4	4	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	Annually	1	1	100%
Dibromochloromethane	mg/L	NA	0.001	0.007	0.018	Monthly	72	NA	NA
Dichloroacetic acid	mg/L	0.1	0.012	0.012	0.012	Annually	1	1	100%
Dichlorobromomethane	mg/L	NA	0.003	0.016	0.042	Monthly	72	NA	NA
Dissolved Solids, Total	mg/L	600	78	127	180	Quarterly	8	8	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	231	231	100%
Electrical Conductivity (25°C)	µS/cm	~900	81	225	360	Weekly	219	219	100%
Fluoride	mg/L	1.5	0.03	0.11	0.81	Monthly	25	25	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	6	16	32	Monthly	36	36	100%
Iron	mg/L	0.3	<0.01	0.01	0.17	Weekly	169	169	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	Quarterly	6	6	100%
Magnesium	mg/L	NA	0.8	2.3	5.5	Monthly	36	NA	NA

Woodend

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling[3]	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total[2]	Passing	
Manganese	mg/L	0.1	<0.001	0.001	0.007	Weekly	169	169	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	Quarterly	4	4	100%
Nitrate (as NO_3)	mg/L	50	0.01	0.10	0.19	Monthly	36	36	100%
pH	Units	6.5-8.5	7.2	7.6	7.9	Weekly	219	219	100%
Potassium	mg/L	NA	1.1	1.1	1.1	Annually	1	NA	NA
Sodium	mg/L	180	17.0	32.1	47.0	Annually	9	9	100%
Sulfate (as SO_4)	mg/L	250	10	21	34	Annually	3	3	100%
Trichloroacetic acid	mg/L	0.1	0.009	0.009	0.009	Annually	1	1	100%
Trihalomethanes, Total	mg/L	0.25	0.016	0.058	0.160	Monthly	70	70	100%
Turbidity	NTU	5	<0.1	0.5[1]	1.1	Weekly	219	NA	within standard
Zinc	mg/L	3	0.002	0.003	0.003	Quarterly	6	6	100%

1. Based on 95th percentile result
2. No of samples includes routine program at network taps, tank and pump stations for the specific water sampling locality
3. No of samples collected is more than the frequency due to multiple sites sampled in the locality

NA = Not Applicable

All water sampling localities

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			No of samples			Performance against standard/ guideline
			Min	Average	Max	Frequency of sampling	Total	Passing	
Alkalinity, Total (as $CaCO_3$)	mg/L	NA	9	24	88	>monthly	532	NA	NA
Aluminium	mg/L	0.2	0.01	0.07	0.21	>weekly	570	569	99.82%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.10	>weekly	587	587	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	>monthly	39	39	100%
Bromoform	mg/L	NA	<0.001	<0.001	0.010	>weekly	1,551	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	0.0002	>monthly	135	135	100%
Calcium	mg/L	NA	1.0	7.8	41.0	>monthly	614	NA	NA
Chloride	mg/L	250	9	33	120	>monthly	73	73	100%
Chlorine, Free	mg/L	5	0.03	0.55	2.50	>weekly	7,864	7,864	100%
Chlorine, Total	mg/L	5	<0.05	0.74	3.00	>weekly	7,864	7,864	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	0.007	>monthly	93	93	100%
Chloroform	mg/L	NA	0.002	0.037	0.150	>weekly	1,551	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>monthly	175	175	100%
Coliforms, Total	orgs/100ml	NA	<1	<1	2,400	>weekly	7,807	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	40	>weekly	460	459	99.78%
Colour, True	Pt/Co units	15	<2	<2	8	>weekly	3,761	3,761	100%
Copper	mg/L	1	<0.001	0.006	0.064	>monthly	144	144	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	>monthly	38	38	100%
Dibromochloromethane	mg/L	NA	<0.001	0.007	0.053	>weekly	1,551	NA	NA
Dichloroacetic acid	mg/L	0.1	<0.005	0.014	0.071	>monthly	93	93	100%
Dichlorobromomethane	mg/L	NA	0.001	0.014	0.065	>weekly	1,551	NA	NA
Dissolved Oxygen	mg/L	NA	0.7	9.48	11.9	>monthly	1,042	NA	NA
Dissolved Solids, Total	mg/L	600	38	102	260	>monthly	64	64	100%
E. coli	orgs/100ml	Zero(0)	0	0	1	>weekly	7,806	7,806	100%
Electrical Conductivity (25°C)	µS/cm	~900	59	195	640	>monthly	4,606	4,606	100%
Fluoride	mg/L	1.5	0.03	0.71	1.00	>weekly	1,032	1,032	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	5	41	170	>monthly	614	614	100%

All water sampling localities

Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Frequency of sampling	No of samples		Performance against standard/ guideline
			Min	Average	Max		Total	Passing	
Iron	mg/L	0.3	<0.01	0.05	1.80	>weekly	2,763	2,756	99.75%
Lead	mg/L	0.01	<0.001	<0.001	0.008	>monthly	155	155	100%
Magnesium	mg/L	NA	0.4	5.3	25.0	>monthly	614	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.044	>weekly	2,762	2,762	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	0.0005	>monthly	118	118	100%
Monochloramine	mg/L	3	0.03	0.57	1.10	>weekly	304	304	100%
Nitrate (as NO_3)	mg/L	50	0.02	0.67	1.90	>weekly	521	521	100%
Organic Carbon, Total	mg/L	NA	0.8	1.0	1.4	>monthly	15	NA	NA
pH	units	6.5-8.5	6.6	7.7	10.0	>weekly	4,699	4,348	92.53%
Potassium	mg/L	NA	0.6	1.4	3.5	>monthly	39	NA	NA
Silica (SiO_2)	mg/L	80	3.5	4.7	6.3	>monthly	16	16	100%
Sodium	mg/L	180	4.2	15.6	55.0	>monthly	77	77	100%
Sulfate (as SO_4)	mg/L	250	1	14	60	>monthly	55	55	100%
Temperature	°C	NA	9.2	15.51	23.2	>monthly	109	NA	NA
Trichloroacetic acid	mg/L	0.1	<0.005	0.019	0.100	>monthly	93	93	100%
Trihalomethanes, Total	mg/L	0.25	0.002	0.058	0.210	>weekly	1,547	1,547	100%
Turbidity	NTU	5	<0.1	1.1[1]	8.9	>weekly	5,116	NA	within standard
Zinc	mg/L	3	<0.001	0.004	0.047	>monthly	167	167	100%

1. Based on 95th percentile result

NA = Not Applicable

Appendix B
List of parameters

The limits for parameters tested by GWW at various locations and as identified in the risk management plan – as specified by various guides such as the Australian Drinking Water Guidelines – are outlined below. In some cases, a parameter does not have a limit specified but has been identified through risk assessments as a parameter of interest in case a limit is determined in the future.

Parameter	Sampling Frequency	Water Quality Standard
1,1-Dichloroethene	Various	should not exceed 0.03mg/L
1,2-Dichloroethane	Various	should not exceed 0.06mg/L
1.1-Dichloropropylene	Various	currently no recommended health guideline value set
1.1.1.2-Tetrachloroethane	Various	should not exceed 1mg/L
1.1.1-Trichloroethane	Various	currently no recommended health guideline value set
1.1.2.2-Tetrachloroethane	Various	should not exceed 1mg/L
1.1.2-Trichloroethane	Various	currently no recommended health guideline value set
1.1-Dichloropropylene	Various	currently no recommended health guideline value set
1.2.3-Trichlorobenzene	Various	should not exceed 0.005mg/L
1.2.3-Trichloropropane	Various	should not exceed 0.007mg/L
1.2.4-Trichlorobenzene	Various	should not exceed 0.005mg/L
1.2.4-Trimethylbenzene	Various	currently no recommended health guideline value set
1.2-Dibromo-3- chloropropane	Various	currently no recommended health guideline value set
1.2-Dibromoethane (EDB)	Various	should not exceed 40mg/L
1.2-Dichlorobenzene	Various	should not exceed 0.001mg/L
1.2-Dichloropropane	Various	should not exceed 75mg/L
1.3.5-Trimethylbenzene	Various	should not exceed 25mg/L
1.3-Dichlorobenzene	Various	currently no recommended health guideline value set
1.3-Dichloropropane	Various	currently no recommended health guideline value set
1.4-Dichlorobenzene	Various	should not exceed 0.0003mg/L
2,4,6-Trichlorophenol	Various	currently no recommended health guideline value set
2,4-D	Various	should not exceed 0.03mg/L
2.3.4.6-Tetrachlorophenol	Various	currently no recommended health guideline value set
2.4.5-T	Various	should not exceed 0.1mg/L
2.4.5-Trichlorophenol	Various	should not exceed 0.02mg/L
2.4-Dichlorophenol	Various	should not exceed 0.02mg/L
2.6-Dichlorophenol	Various	should not exceed 0.02mg/L
2-Chlorophenol	Various	should not exceed 0.2mg/L

Appendix B – List of parameters

Parameter	Sampling Frequency	Water Quality Standard
2-Chlorotoluene	Various	should not exceed 1mg/L
4,4'-DDT	Various	should not exceed 0.009mg/L
4.4'-DDD	Various	currently no recommended health guideline value set
4.4'-DDE	Various	currently no recommended health guideline value set
4-Chloro-3-Methylphenol	Various	currently no recommended health guideline value set
4-Chlorotoluene	Various	should not exceed 1mg/L
Aldrin	Various	should not exceed 0.003mg/L
Alkalinity, Total as $CaCO_3$	Various	aesthetic limit is 200mg/L
Aluminium, acid soluble	Various	aesthetic limit is 0.2mg/L
Aluminium, filtered	Various	currently no recommended health guideline value set
Aluminium, Total as Al	Various	currently no recommended health guideline value set
Ammonia	Various	aesthetic limit is 0.5mg/L
Antimony	Various	should not exceed 0.003mg/L
Antimony, Filtered	Various	should not exceed 0.003mg/L
Apparent Colour	Various	Benchmark guideline value of 25Pt/Co units
Arsenic	Various	should not exceed 0.01mg/L
Arsenic, Filtered	Various	should not exceed 0.01mg/L
Barium, as Ba	Various	should not exceed 2mg/L
Barium, Filtered	Various	limit based on Barium
Benzo(a)pyrene	Various	should not exceed 0.00001mg/L
Beryllium, Filtered	Various	should not exceed 0.06mg/L
Beryllium, as Be	Various	should not exceed 0.06mg/L
BHC (alpha)	Various	should not exceed 1.2mg/L
BHC (beta)	Various	should not exceed 1.2mg/L
BHC (delta)	Various	should not exceed 1.2mg/L
Bicarbonate Alkalinity as $CaCO_3$	Various	aesthetic limit is 200mg/L
Bromate	Various	should not exceed 0.02mg/L
Bromobenzene	Various	should not exceed 50mg/L
Bromodichlormethane	Various	should not exceed 0.25mg/L
Bromoform	Various	should not exceed 0.25mg/L
Cadmium	Various	should not exceed 0.002mg/L
Cadmium, Filtered	Various	Limit based on Cadmium
Calcium	Various	currently no recommended health guideline value set
Carbon tetrachloride	Various	should not exceed 0.003mg/L
Carbonate Alkalinity as $CaCO_3$	Various	aesthetic limit is 200mg/L
Chlordane, Total	Various	should not exceed 0.002mg/L
Chlorine, Total	Various	should not exceed 5mg/L
Chlorine, Free	Various	Limit based on Chlorine, Total
Chloroacetic acid	Various	should not exceed 0.15mg/L
Chlorobenzene	Various	should not exceed 0.01mg/L
Chloroform	Various	should not exceed 0.25mg/L
Chromium	Various	should not exceed 0.05mg/L
Chromium, Filtered	Various	should not exceed 0.05mg/L
cis-1.2-Dichloroethene	Various	should not exceed 0.06mg/L
cis-1.3-Dichloropropylene	Various	should not exceed 0.03mg/L

Appendix B – List of parameters

Parameter	Sampling Frequency	Water Quality Standard
cis-Chlordane	Various	should not exceed 0.002mg/L
Cobalt, as Co	Various	should not exceed 0.002mg/L
Cobalt, Filtered	Various	Limit based on Cobalt
Coliforms, Total	Various	currently no recommended health guideline value set
Colour, True	Various	should not exceed 15HU
Copper	Various	should not exceed 1mg/L
Copper, Filtered	Various	Limit based on Copper
Cyanide	Various	should not exceed 0.08mg/L
Dibromochloromethane	Various	should not exceed 0.25mg/L
Dibromomethane	Various	should not exceed 0.04mg/L
Dichloroacetic acid	Various	should not exceed 0.1mg/L
Dissolved Organic Carbon	Various	currently no recommended health guideline value set
Dissolved Oxygen (Field)	Various	currently no recommended health guideline value set
Escherichia coli *E. coli*	Weekly	100% of all samples of drinking water collected are found to contain no Escherichia coli per 100 millilitres of drinking water, with the exception of any false positive sample.
Electrical Conductivity @ 25C	Various	aesthetic limit is 940µS/cm
Endosulfan I	Various	should not exceed 0.02mg/L
Endosulfan II	Various	should not exceed 0.02mg/L
Endosulfan sulfate	Various	currently no recommended health guideline value set
Endrin	Various	should not exceed 0.00002mg/L
Endrin aldehyde	Various	should not exceed 0.01mg/L
Endrin ketone	Various	should not exceed 0.005mg/L
Enterococci	Various	should not exceed 0orgs/100mL
Ethylbenzene	Various	should not exceed 0.003mg/L
Faecal Streptococci	Various	should not exceed 0orgs/100mL
Fluoride	Various	should not exceed the limit of 1.5mg/L
Formaldehyde	Various	should not exceed 0.5mg/L
Hardness, as $CaCO_3$	Various	aesthetic limit is 200mg/L
Heptachlor	Various	should not exceed 0.0003mg/L
Heptachlor Epoxide	Various	should not exceed 0.0003mg/L
Heterotrophic Plate Count, 22C	Various	currently no recommended health guideline value set
Heterotrophic Plate Count, 37C	Various	currently no recommended health guideline value set
Hexachlorobenzene	Various	currently no recommended health guideline value set
Hydroxide Alkalinity as $CaCO_3$	Various	aesthetic limit is 200mg/L
Iron, Filtered	Various	Limit based on Iron, Total
Iron, total as Fe	Various	aesthetic limit is 0.3mg/L
Lead	Various	should not exceed 0.01mg/L
Lead, Filtered	Various	Limit based on Lead, Total
Lindane	Various	should not exceed 0.01mg/L
Magnesium, as Mg	Various	currently no recommended health guideline value set
Manganese, Filtered (Soluble)	Various	Limit based on Manganese, Total
Manganese, total as Mn	Various	Aesthetic limit should not exceed 0.1mg/L, should not exceed 0.5mg/L
MCPA	Various	should not exceed 0.04mg/L

Appendix B – List of parameters

Parameter	Sampling Frequency	Water Quality Standard
Mercury, as Hg	Various	should not exceed 0.001mg/L
meta- & para-Xylene	Various	should not exceed 0.02mg/L
Methoxychlor	Various	should not exceed 0.3mg/L
Methylene chloride	Various	should not exceed 0.004mg/L
Molybdenum, as Mo	Various	should not exceed 0.05mg/L
Monochloramine	Various	should not exceed 3mg/L
Nickel	Various	should not exceed 0.02mg/L
Nickel, Filtered	Various	Limit based on Nickel
Nitrate	Various	should not exceed 50mg/L
Nitrite	Various	should not exceed 3mg/L
n-Propylbenzene	Various	currently no recommended health guideline value set
ortho-Xylene	Various	should not exceed 0.02mg/L
Pentachlorophenol	Various	should not exceed 0.01mg/L
pH	Various	aesthetic limits are no less than 6.5 and no greater than 8.5
Phosphorus, Reactive as P	Various	should not exceed 1mg/L
p-Isopropyltoluene	Various	currently no recommended health guideline value set
Potassium, as K	Various	currently no recommended health guideline value set
sec-Butylbenzene	Various	currently no recommended health guideline value set
Selenium	Various	should not exceed 0.01mg/L
Selenium, Filtered	Various	Limit based on Selenium
Silica, Non Reactive	Various	currently no recommended health guideline value set
Silica, Reactive	Various	currently no recommended health guideline value set
Silver, Filtered as Ag	Various	Limit based on Silver
Silver, Total as Ag	Various	should not exceed 0.1mg/L
Simazine	Various	should not exceed 0.02mg/L
Sodium	Various	aesthetic limit should not exceed 180mg/L
Strontium, Filtered	Various	Limit based on Strontium
Strontium, Total	Various	should not exceed 1.5mg/L
Styrene	Various	should not exceed 0.004mg/L
Sulfate	Various	aesthetic limit should not exceed 250mg/L
tert-Butylbenzene	Various	currently no recommended health guideline value set
Tetrachloroethene	Various	should not exceed 0.05mg/L
Thallium, Total	Various	should not exceed 2mg/L
Tin, Filtered	Various	currently no recommended health guideline value set
Tin, Total as Sn	Various	currently no recommended health guideline value set
Titanium, Filtered	Various	currently no recommended health guideline value set
Titanium, Total	Various	currently no recommended health guideline value set
Toluene	Various	should not exceed 0.025mg/L
trans-1.2-Dichloroethene	Various	should not exceed 0.06mg/L
trans-1.3-Dichloropropylene	Various	should not exceed 0.03mg/L
trans-Chlordane	Various	should not exceed 0.002mg/L
Trichloroacetic acid	Various	should not exceed 0.1mg/L
Trichloroethene	Various	currently no recommended health guideline value set
Trihalomethanes	Monthly	must not exceed 0.25mg/L (reference Safe Drinking Water Regulations 2015)

Appendix B – List of parameters

Parameter	Sampling Frequency	Water Quality Standard
Turbidity	Weekly	95th percentile limit of drinking water samples collected in the preceding 12months must be less than or equal to 5NTU (reference Safe Drinking Water Regulations 2015)
UV Transmission as 254nm	Various	currently no recommended health guideline value set
Zinc	Various	should not exceed 3mg/L
Zinc, Filtered	Various	limit based on Zinc

Appendix C
Risk management plan audit certificates

AWQC

Regulation 10

Schedule 1- Risk Management Plan Audit Certificate

Safe Drinking Water Regulations 2015

Certificate Number: 22

Audit Period: 17th April 2018 to 23rd July 2020

To: Ms Maree Lang
Managing Director
City West Water Corporation
Locked Bag 350
Sunshine Vic 3020

Australian Business Number (ABN): 70 066 902 467

I, Sophia Dellis, after conducting a risk management plan audit of the water supplied by City West Water Corporation, am of the opinion that:

City West Water Corporation has complied with obligations imposed by Section 7 (1) of the ***Safe Drinking Water Act 2003*** during the audit period.

Date: 04th August 2020

Signature of Approved Auditor

Sophia Dellis

250 Victoria Square/Tarntanyangga ADELAIDE SA 5000

Mobile: 0472 868 110

Email: sophia.dellis@awqc.com.au

Risk management plan audit certificate

Safe Drinking Water Regulations 2015 - Regulation 10

Certificate Number: 178

Audit period: 31 May 2018 to 28 August 2020

To: Rebecca Chapman, Water Quality Advisor

Western Water, 36 Macedon Road, Sunbury, Vic 3429

Australian Business Number (ABN): 67 433 835 375

I, Dr Daniel Deere, after conducting a risk management plan audit of the water supplied by Western Water am of the opinion that -

Western Water 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: DADeere Date: 28 Aug 2020

Department of Health & Human Services

State Government Victoria

Appendix D
HACCP audit certificates

LRQA

Current issue date: 22 March 2022
Expiry date: 21 March 2025
Certificate number: 10434209

Original approval date: 8 December 2015

Certificate of Approval

This is to certify that:

City West Water Corporation trading as Greater Western Water Corporation

36 Macedon Street Sunbury, Melbourne, 3429, Australia

has been approved by LRQA to the following standards:

HACCP Codex Alimentarius Annex to CAC/RCP 1-1969 (2009)

Approval number(s): HACCP – 0050017

The scope of this approval is applicable to:
Management, storage, treatment and distribution of drinking water into the reticulation systems supplied by the Rosslynne, Lancefield, Romsey, Marriages, Res C, Merrimu and Myrniong water treatment plants, and including the water provided into these systems from Melbourne Water via the Loemans Road and Hillside pump stations.

Luis Cunha

Area Operations Manager - SAMEA

Issued by: LRQA Limited – Australia Branch

Page 1 of 1

CERTIFICATE OF REGISTRATION

This is to certify that:

City West Water Corporation

ABN 70 066 902 467

Trading as
Greater Western Water

36 Macedon Street Sunbury VIC 3429 AUSTRALIA

1 McNab Avenue Footscray VIC 3011 AUSTRALIA

operates a

FOOD SAFETY MANAGEMENT SYSTEM

which complies with the requirements of

CXC CODEX HACCP 2020: Good Hygiene Practices (GHPs) and the Hazard Analysis and Critical Control Point (HACCP)

for the following scope

The supply of drinking water to domestic, commercial and industrial consumers.

Certificate No: HCV21312

Issued: 24 May 2022

Expires: 17 September 2024

Originally Certified: 22 September 2000

Current Certification: 18 May 2022

Calin Moldovean
President, Business Assurance
SAI Global Assurance

Certified System
Food Safety
CODEX
HACCP

Registered by:
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Glossary

Algae	Simple types of plant with no root, stems, or leaves. They occur mostly in freshwater and marine environments.
Algal bloom	A rapid growth of algae in aquatic environments often triggered by an input of high levels of nutrients and an increase in temperature. Blue-green algae (or cyanobacteria) are of most concern.
Alum	An aluminium sulphate-based chemical used as a coagulant in the water treatment process.
Aluminium (Al)	A naturally occurring element in soils which can enter water from catchments.
Ammonia (NH3)	A highly soluble compound resulting from the decomposition of organic matter containing nitrogen. Usually only found in small concentrations in surface waters.
Apparent Colour	Is the measurement of colour without turbidity removal, that is the colour of the whole water sample due to both dissolved and suspended components
Aquifer	A layer or section of earth or rock that contains freshwater (known as groundwater), any water that is stored naturally underground or that flows through rock or soil, supplying springs and wells.
ADWG	National Health and Medical Research Council's Australian Drinking Water Guidelines 2011
Blue-green algae (cyanobacteria)	Single celled, filamentous, or colony-forming organisms which are widely distributed in the freshwater and marine environments. Under favourable conditions of light, temperature and nutrient supply, extensive growth of blue green algae may occur, leading to blooms. These can result in environmental problems and can create challenges for water treatment.
Bulk entitlement or Bulk Water Agreement	An agreement that outlines the conditions for supply of bulk drinking water from reservoirs managed by Southern Rural Water and drinking water supplied by the Melbourne Water Corporation to Greater Western Water.
Calcium (Ca)	A naturally occurring element which can enter water from catchments. It may also be added to water in the treatment process to reduce the acidity levels or increase the capacity of water to buffer pH changes.
Catchment	An area of land surrounding a water storage. The runoff water from rain falling over the catchment drains into the storage and may collect nutrients, minerals and other contaminants including microorganisms from the surface of the land.
Chlorination	The disinfection of water, wastewater, and industrial waste through the application of chlorine (Cl) as part of the water treatment process. Chlorination kills microorganisms and oxidises undesirable compounds.
Chloramination	The application of the chlorine followed by ammonia to create monochloramine (NH2Cl), a stable disinfectant that is added to drinking water to kill bacteria or to oxidise undesirable compounds. Chloramines persist for a longer time than chlorine and as a result are used in longer water distribution systems.
Coliforms	Coliform bacteria are used as one of the indicators of the quality of drinking water and the possible presence of disease-causing microorganisms. These bacteria are killed by chlorine.

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Cryptosporidium	A parasitic protozoan (microorganism) which causes gastroenteritis in humans. These organisms occur in the gut of infected warm-blooded animals and can be introduced into source water through faecal contamination.
The Department	Department of Health
Disinfection	Inactivation (killing) of pathogens or organisms capable of causing infectious disease by chemical or physical processes, including chlorination.
Drinking Water Quality Management System (DWQMS)	GWW's DWQMS is used to ensure our drinking water supplies are managed effectively to provide high quality drinking water and to ensure the protection of public health.
Escherichia coli (*E. coli*)	The most common heat tolerant coliform present in faeces, which is regarded as the most specific indicator of recent faecal contamination. *E. coli* can be killed by standard disinfection practices.
False positive sample *E. coli* result	*E. coli* detection in a routine water quality sample considered non representative of the water supplied to customers, following an investigation conducted in accordance with the guidelines issued by the Department of Health's Secretary. A 'false positive sample' result is considered to have met the *E. coli* drinking water quality standards in Schedule 2 of the Safe Drinking Water Regulations 2015.
Filtration	A process for removing particles from water by passing through a porous barrier, such as a screen, membrane, sand or gravel. Often used in conjunction with a coagulant to settle contaminants.
Flagellates	Any group of protozoans that possess a hairlike structure that is capable of a whip like motion for movement
Fluoride (F)	Fluoride is regarded as a useful constituent of drinking water, particularly for the prevention of tooth decay. Fluoride is added to the water supply at Merrimu Water Filtration Plant, Rosslynne Water Filtration Plant and all water supplied from the Melbourne system.
Groundwater	Water beneath the earth's surface (often between saturated soil and rock) that supplies bores, wells and springs.
HACCP	Hazard Analysis and Critical Control Point. A system that identifies, evaluates and controls hazards that are significant for food safety (Codex 2020).
Incident	Any event or circumstance that causes or is likely to cause: a) threat to community health or safety; or b) creation of the need for urgent action under statute or legislation.
Inflows	Water flowing from the catchment to the reservoirs through streams, rivers and creeks.
Iron (Fe)	An element which when found in water leads to brownish discolouration. Limits on the amount of iron in water are usually due to taste and appearance factors rather than any detrimental health effects.
kL	kilolitres (thousand litres)
Manganese (Mn)	Manganese in a water supply may affect taste, cause staining of clothes, produce deposits in pipes and contribute to turbidity.
mg/L	milligrams per litre
ML	megalitres (million litres)
µg/L	micrograms per litre
NA	Not Applicable
National Association of Testing Authorities (NATA)	NATA is Australia's national laboratory accreditation authority. NATA accreditation recognises and promotes facilities competent in specific types of testing, measurement, inspection and calibration.
National Health and Medical Research Council (NHMRC)	NHMRC is Australia's peak body for supporting health and medical research for developing health advice for the Australian community, health professionals and governments.
Nitrogen (N)	Nitrogen is an essential nutrient for plant growth. It is used in fertilisers and is present in sewage effluent. High levels of nutrients can lead to excessive algal growth.

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Nitrate (N03-)	The most stable form of combined nitrogen in water. Present in surface waters in small amounts, the major sources are from human and animal wastes.
Nephelometric turbidity unit (NTU)	A measure of the turbidity in water.
Nutrients	Compounds required for growth by plants and other organisms. Major nutrients for plant growth are phosphorous and nitrogen.
Pathogens	Disease causing organisms such as bacteria and viruses.
pH	The pH value indicates if a substance is acidic, neutral or alkaline. It is calculated from the number of hydrogen ions present and is measured on a scale of 0 to 14. A pH greater than 7 is alkaline, less than 7 is acidic and 7 is neutral.
Phosphorous (P)	Phosphorous is an essential nutrient for plant growth. High levels of phosphorous can lead to excessive algal growth and can be due to inputs from human activity such as fertiliser run-off and land clearing.
Potable water (drinking water)	Water that is intended for human consumption or for purposes connected with human consumption (e.g., food preparation, making of ice, preservation of unpackaged food).
Reservoir	A natural lake or artificial body of water used as storage for water supply.
Risk assessment	A scientifically based process consisting of the following steps: i) hazard identification; ii) hazard characterisation; iii) exposure assessment; and, iv) risk characterisation.
Risk management	The process of weighing policy alternatives in the light of the results of risk assessment and, if required, selecting and implementing an appropriate control option, including regulatory measures.
Risk management plan	As set out in s 9 of the *Safe Drinking Water Act 2003*.
SCADA	Supervisory Control and Data Acquisition system
Source water	Water that has not been treated in any way.
SRW	Southern Rural Water, bulk water supplier responsible for Merrimu, Rosslynne and Pykes Creek Reservoirs
Total dissolved solids	A measure of organic salts and small amounts of organic matter that are dissolved in water.
Total hardness	Total hardness is the sum of the concentrations of calcium and magnesium ions expressed as calcium carbonate equivalent. Waters with a total hardness in excess of 200mg/L are considered hard.
Treatment (water)	The filtration and disinfection processes employed to produce drinking water.
Trihalomethanes	Compounds that may occur in a chlorinated water supply as a by-product of organic materials present in the water reacting with chlorine.
True colour	True colour refers to the colour of water after particles of organic matter have been removed through filtration and is the measurement of the extent to which light is absorbed by the water. Measured in Hazen Units (HU).
Turbidity	Refers to the presence of suspended solids in water causing a muddy or discoloured appearance. Turbidity is measured in Nephelometric Turbidity Units (NTUs).
Water plant	Drinking water treatment plant
Water quality standard	A quality standard specified for drinking water by regulations made for the purposes of s 17 of the *Safe Drinking Water Act 2003*.
Water supply system	The complete system that provides a water supply to customers. It includes all infrastructure from the water source to the customer including the catchment, water storage, treatment and delivery systems and networks.

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