

Drinking water quality report 2022–23

Acknowledgement of Country

The Greater Western Water region covers Bunurong, Wurundjeri/Woiwurrung, Wadawurrung, Djaara 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 connected¹.

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 https://aiatsis.gov.au/explore/welcome-country

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Message from the Managing Director

On behalf of Greater Western Water (GWW), I am pleased to present our Drinking water quality report 2022-23.



Maree Lang Managing Director

In 2022-23, GWW continued to deliver on our core purpose to provide 'trusted water services for our communities and future generations'.

We have worked to consolidate and strengthen our water quality monitoring program to ensure we can identify and resolve potential water quality issues and continue to make improvements to benefit customers, community and Country.

We carried out approximately 85,000 independent chemical and microbial tests this year, which confirmed that the quality of our drinking water supply continued to meet the standards set out in Victoria's *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015.

In addition to monitoring the quality of water supplied, we rely on feedback from our customers to help identify local issues. This feedback is recorded as water quality related customer complaints. During 2022-23 we received 260 complaints per 100,000 customers, a slight increase on the previous year. Most complaints related to discoloured water, which occurs because of resuspension of natural sediment in our pipe network and variable colour from the bulk Melbourne Water supply but does not impact on the safety of the water. Our 2022-23 customer satisfaction survey indicated a water quality satisfaction level of 89 per cent for both our residential and non-residential customers. This is a minor drop compared to last year's results of 93 per cent and 91 per cent respectively. We use the feedback provided by this survey to inform our improvement initiatives.

We reported four water quality events under s 22 of the *Safe Drinking Water Act 2003* to the Department of Health. Two related to false positive tests and one to unauthorised access to a water tank. All three were found to have no impact on drinking water supply and no risk to customers. The fourth related to a backflow event with suspected chemical contamination due to third party construction activities, impacting supply for 38 customers. GWW took Immediate action by issuing a do not drink advisory and isolated the affected water main to protect customers while we took corrective action prior to verifying the quality and safety of the drinking water.

During 2022-23, we reviewed and updated our sampling program to ensure coverage and compliance across the entire GWW service area. We addressed a partial non-compliance with the Safe Drinking Water Regulations 2015, which related to missed sampling. Our sampling program is now on track and collecting samples as described in our risk management plan.

We commissioned an independent audit of our risk management plan, in response to a Department of Health request. This was the first audit of GWW's risk management plan and the auditor noted our efforts since integration of City West Water and Western Water and the substantial evidence of continual improvement. However, of the 25 areas audited, four minor non-compliances were identified, resulting in an overall finding that GWW had not met our obligations under the *Safe Drinking Water Act 2003*. Since the audit, we have taken action to address the non-compliances, with three already resolved and the remaining one to be completed this year.

We continued to identify opportunities to improve our management systems and practices. A strategic benchmarking review has prompted action including auditing our water management programs and improving our drinking water quality knowledge base through best practice learning for our people.

Development of our 2024 price submission also provided an opportunity to hear what our customers value. They have told us that delivering the same quality and reliability of water supply across our region is important.

This report details the delivery of a comprehensive monitoring program to ensure the quality of drinking water and describes our approach to meeting the needs and expectations of a diverse and fast growing region. We remain focused on ensuring we have safe and secure water supplies that meet customer needs and are resilient to changing populations and climate.

Mp

Maree Lang Managing Director

1. About Greater Western Water

1.1 Overview

Greater Western Water (GWW) provides services to a population in excess of 1.4 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	2022-23
Connected water customers (total)	615,619
Residential	568,267
Non-residential	47,352
Water consumption ML (total)	128,115
Residential	77,160
Non-residential	38,010
Water losses (ML)	12,945
Total water supplied/delivered (ML)	130,346
Water filtration plants (number)	7
New drinking water mains (km)	143
Drinking water mains – total (km)	7708
Drinking water network storage tanks (number)	40
Drinking water network pump stations (number)	47
Secondary chlorinators (number)	23
Carbon dioxide dosing units (number)	1
Water sampling localities (number)	34

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 of 'trusted water services for our communities and generations' 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 provision 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 linkages to the Australian Drinking Water Guidelines 2011 (ADWG) where applicable. We closely follow the risk management principles outlined in the Act and Regulations. 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 customer charter. 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. This policy is available on the GWW website.

With this publicly available 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 provided to customers upon request. This report is provided to the Secretary of the Department of Health in compliance with s 26 of the *Safe Drinking Water Act 2003*.

Where required, data trends and comparison to previous years' 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 and sampling localities

2.1 System features

Our water quality is monitored at 34 water sampling localities, published by the Department of Health in the *Victoria 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. 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 localities and results from our monitoring program.

GWW's drinking water supply network includes seven local water filtration plants, 40 water storage tanks, typically constructed of concrete or metal and fully enclosed, 47 drinking water pump stations, 23 disinfection plants to provide secondary chlorination and one chemical correction unit to adjust pH. GWW regularly undertakes asset condition inspections at these sites to ensure continued water safety and security.

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 three locally operated water filtration plants (WFPs). GWW also manages a number of smaller reservoirs, bores and basins that are treated at the remaining four 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, including the bulk treated supply from Melbourne Water; bulk untreated Southern Rural Water supply to Rosslynne, Merrimu and Myrniong; and local GWW systems at Sunbury, Melton, Romsey, Lancefield and Woodend.

Our service area



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: 2022–23 summary of GWW supply systems, source water and treatment plants

Supply system	Source water	Catchment/storage	Treatment plant
Melbourne system			
Melbourne system			
(consisting of bulk treated			
water supplies from			
Melbourne Water systems			
Greenvale, Silvan (including			
Desalinated Water) and			
Winneke)			
Greenvale	Iranster from Silvan Reser	voir (after treated at Silvan)	Greenvale St Albans
	or from Winneke water tre	atment plant. See Silvan	Greenvale Sydenham
	and winneke water supply	systems	Cilvara Olizada
Silvan	Inomson catchment,		Silvan-Olinda Silvan Prastan
	Opper farra catchment		Silvan Wayarlay
	Troated water from		Wonthaggi Decalination
	Desalination plant via		Plant via Cardinia and
	Cardinia		Silvan (including transfer
			from treatment plant Silvan
			to Greenvale Reservoir)
Winneke	Transfer from Maroondah	Sugarloaf Reservoir	Winneke Water Treatment
	Reservoir, Yarra River		Plant
Local supply systems			
Rosslynne system	Rosslynne Reservoir	Upper Maribyrnong	Rosslynne WFP
(includes Sunbury	(Southern Rural Water -	catchment, Jacksons	
system)	SRW)	Creek catchment	
Merrimu system	Merrimu Reservoir	Lerderderg River,	Merrimu WFP
(incudes Melton		Goodman Creek,	
system)		Pyrites Creek catchment	
	Djerriwarrh Reservoir	Djerriwarrh Catchment	
Lancefield system	Garden Hut Reservoir	Deep Creek Catchment	Lancefield WFP
	Kerrie Reservoir	Upper Bolinda Creek	
	Monument Creek Weir	Monument Creek	
		catchment	
	Bore No. 3	Local Aquifer	
	Romsey Bore		
Woodend system	Campaspe Reservoir	Campaspe River	Marriages WFP
		Catchment	
	Graham Brock Reservoir	Falls/Smokers Creek	Reservoir C WFP
		and Graham Brock	
		Reservoir and Reservoir C	
		catchments	

Supply system	Source water	Catchment/storage	Treatment plant
Myrniong system	Pykes Creek Reservoir	Werribee River and	Myrniong WFP
	(SRW)	Pykes Creek catchment	
Romsey system	Kerrie Reservoir	Upper Bolinda Creek	Romsey WFP
	Romsey Bore	Local Aquifer	
	<u> </u>		

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 (filled by transfer of water from Silvan or Winneke system) (near Somerton).

The relative proportion of water supplied from the three storages can vary, depending on factors such as local water demands, 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 2022-23, 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 (WTP).

During 2022-23, GWW bulk supply from Melbourne Water reservoirs was 57% Sugarloaf, 15% Silvan and 28% Greenvale. Table 3 shows the percentage of drinking water supplied by Melbourne Water's three main reservoirs to GWW and GWW's local reservoir supply. Refer to Appendix B or previous annual reports for historical information.

Table 3: Melbourne reservoirs and GWW local supplies %

2022-23
15%
57%
28%
1.3%
10%
8%
)))

1. 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 protected 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 WTP.

2.3.2 Wonthaggi desalinated water supply

Between 1 July 2022 and 30 June 2023, there was no transfer of water from the Victorian Desalination Plant or from Melbourne Water's Cardinia Reservoir into the Silvan Reservoir that reached GWW water supply.

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 7,708 kilometres of water mains, 47 pumping stations, 40 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, to 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 outlined in tables 2, 4 and 7.

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

Table 4: 2022-23 GWW water sampling localities supply system

Water	Population	
sampling	supplied	Supply
locality	(2021 census)	system
Altona	143,150	Melbourne system
Bulla	590	Melbourne system
		Rosslynne system
Caroline Springs	106,810	Melbourne system
Darley	5,420	Melbourne system
		Merrimu system
Deer Park	84,790	Melbourne system
Diggers Rest	5,630	Melbourne system
		Rosslynne system
East Keilor	42,650	Melbourne system
Eynesbury	2,830	Melbourne system
		Merrimu system
Gisborne	12,730	Melbourne system
		Rosslynne system
Lancefield	2,270	Lancefield system
		Melbourne system
		Rosslynne system
Lerderderg	8,500	Melbourne system
		Merrimu system
Little River	640	Melbourne system

Water	Population	
sampling	supplied	Supply
locality	(2021 census)	system
Macedon	2,440	Woodend system
		(Marriages)
		Woodend system
		(Reservoir C)
		Melbourne system
		Rosslynne system
Maddingley	8,890	Melbourne system
		Merrimu system
Maribyrnong	123,360	Melbourne system
Melton South	56,790	Melbourne system
		Merrimu system
Merrimu	18,420	Melbourne system
		Merrimu system
Moonee Ponds	74,720	Melbourne system
Mount Macedon	710	Melbourne system
		Rosslynne system
Myrniong	290	Myrniong system
		Melbourne system
		(when carting)
		Merrimu system
		(when carting)
Parkville	169,190	Melbourne system
Richmond	25,330	Melbourne system
Riddells Creek	4,420	Melbourne system
		Rosslynne system
Rockbank	16,300	Melbourne system
		Merrimu system
Romsey	5,560	Romsey system
		Melbourne system
		Rosslynne system
Strathmore	8,270	Melbourne system
Sunbury	38,930	Melbourne system
		Rosslynne system
Taylors Lakes	72,670	Melbourne system
Toolern Vale	450	Melbourne system
		Merrimu system
Tullamarine	11,680	Melbourne system
Werribee	158,690	Melbourne system
Werribee South	2,300	Melbourne system
Williamstown	47,530	Melbourne system
Woodend	6,190	Melbourne system
		Rosslynne system

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 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, 82% 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 WFP, which is supplied from Rosslynne Reservoir. In 2022-23, the plant did not run at full capacity; it produced 167 ML of drinking water blended with Melbourne water supply. This was due to significant inflow events throughout 2022 that caused high manganese levels that the plant was not capable of treating. Across the year, 5.93 GL of Melbourne water was supplied through the Sunbury transfer system.

2.5.2 Merrimu system

Bacchus Marsh, Merrimu and Toolern Vale receive treated water from the Merrimu WFP, which is supplied from Merrimu Reservoir. During 2022-23, 1.86 GL was supplied from the Merrimu Reservoir. In September, October, November and part of December 2022, Bacchus Marsh was supplied from Melbourne Water through the Melton system as the Merrimu WFP was offline to allow for high priority maintenance. This totalled 526 ML.

2.5.3 Woodend

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

During 2022-23, Woodend was supplied with 260 ML from Campaspe Reservoir and 350 ML from the Graham Brock Reservoir, which received 248 ML from the Macedon bulk entitlement. Woodend can also receive a potable supply from the Rosslynne system during times of low local storages, water quality events or critical maintenance works. During the year, 81.9 ML was supplied from the Rosslynne system.

2.5.4 Romsey

Romsey receives treated water from the Romsey WFP, which is supplied with water from Kerrie Reservoir. Supplementary water can be sourced from Wright Reservoir in Riddells Creek. In the past year, Romsey WFP received 443 ML from Kerrie Reservoir. Extra inflows were sent to Romsey from the Riddells Creek and Maribyrnong bulk entitlements and bore water (approximately 49.2 ML) was used to supplement surface water storages for Romsey.

2.5.5 Lancefield

The Lancefield WFP can receive and treat surface water, bore water or a mixture of both. In 2022-23, 200 ML of water was produced from Lancefield WFP, where approximately 12.8 ML 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 WFP. A total of 38 ML 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 largely 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 extensive source water monitoring program aimed at increasing the understanding of the source water quality in GWWmanaged reservoirs, bores and basins. The program involves monitoring and identifying hazards, sources and events that could compromise drinking water guality in a catchment to consumer, multiple barrier approach. In 2022-23, a comprehensive source water monitoring program was undertaken through an independent National Authority of Testing Association (NATA) accredited laboratory. Appendix A provides an overview of the parameters tested, frequency of testing at each sampling location for pesticides, chemicals (organics and in-organics), metals, physical and radiological 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 2022-23. 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 (BGA) monitoring was conducted by GWW and data was shared with water storage manager Southern Rural Water. Regular BGA results in 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 more details on the drinking 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 the 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 2023. 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 riskbased 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 restricting 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 WTP.

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.

Water sampling		Treatment	Added	
locality	Treatment plant	process ²	substances	Comments
Altona Gree	Greenvale	Disinfection	Sodium hypochlorite	No additional fluoridation at Greenvale as it receives fluoridated water from Silvan (refer Section 2.3.1).
Bulla ¹	(transfer from	 Chlorination 		
Caroline Springs	Silvan to Greenvale			
Darley ¹	Reservoir)			
Diggers Rest ¹				
Deer Park				
East Keilor				
Eynesbury ¹				
Gisborne ¹				
Lancefield ¹				
Lerderderg ¹				
Little River				
Macedon ¹				
Maddingley ¹				
Melton South ¹				
Merrimu ¹				
Mount Macedon ¹				
Myrniong ¹				
Riddells Creek ¹				
Rockbank ¹				
Romsey ¹				
Strathmore				
Sunbury1				
Taylors Lakes				
Toolern Vale ¹				
Tullamarine				
Werribee				
Werribee South				
Woodend ¹				
Altona	Silvan	Disinfection	Chlorine gas ³	
Deer Park		 Chlorination 	Lime	
East Keilor		Othor	Fluorosilicic acid	
Little River				
Maribyrnong		• pH correction		
Moonee Ponds		 Fluoridation 		
Parkville				
Richmond				
Werribee				
Werribee South				
Williamstown				

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

Water sampling locality	Treatment plant	Treatment process ²	Added substances	Comments
Altona	Winneke	Clarification	Polymer Alum	
Caroline Springs		Coagulation &	Sodium hypochlorite	
Deer Park	Deer Park	flocculation	Lime	
East Keilor		 Filtration 	Eluorosilicic acid	
Little River		 Sand filtration 		
Maribyrnong		Disinfection		
Moonee Ponds		 Chlorination 		
Parkville		Othor		
Richmond				
Strathmore		• pH correction		
Taylors Lakes		 Fluoridation 		
Tullamarine				
Werribee				
Werribee South				
Altona	Wonthaggi	Clarification	Ferric sulphate/	Between 1. July 2022
Caroline Springs	Desalination Plant via Cardinia and	Coagulation &	Sulphuric acid/ Polydadmac Antiscalant, Sodium hydroxide, Sodium bisulfite, Membrane cleaning chemicals (caustic, detergent, acid)	and 30 June 2023, no desalinated water was
Deer Park		flocculation		
East Keilor	Silvan (including transfer from	Filtration		blended with water supplied to GWW
Little River	tle River treatment aribyrnong plant Silvan to Greenvale Reservoir)	Drum screens		from Melbourne Wate
Maribyrnong		• Dual media		
Moonee Ponds		pressure filters		
Parkville		 Cartridge filters 		
Richmond		Reverse Osmosis		
Strathmore		Remineralisation		
Tullaraarina		Disinfection		
Worriboo		 Chlorination 		
vernbee				
Werribee South		Other	Hydrated lime	
Williamstown		 pH correction 	Carbon dioxide	
		 Fluoridation 	Chlorine gas	
		 Sludge handling 	Lime	
			Fluorosilicic acid	
			Polymer	

1. 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.

Chemicals added by Melbourne Water for treatment, chlorination and fluoridation refer to the Melbourne Water annual drinking water quality report for details
 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 use a dissolved air flotation filtration (DAFF) treatment process, Merrimu WFP uses the traditional sedimentation-filtration process and Romsey WFP 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 \leq 0.3 NTU and true colour of \leq 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 WFPs (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	Non-fluoridated
water supply	water supply
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,	water supply Lancefield ¹ Myrniong ² Romsey ¹ Woodend ¹
Richmond, Riddells Creek, Rockbank, Strathmore, Sunbury, Taylors Lakes, Toolern Vale, Tullamarine, Werribee, Werribee South, Williamstown	

Lancefield, Woodend and Romsey received a small proportion of fluoridated water during 2022-23 when Melbourne supply and Rosslynne Reservoir water was mixed with local water supplies to ensure supply security

^{2.} Myrniong was provided with a short-term supply of fluoridated water during 2022-23 when tankering from Bacchus Marsh was required to maintain supply security during treatment plant maintenance

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 process - local water supplies

Water sampling		Treatment	Added	
locality	Treatment plant	process	substances	Comments
Lancefield	Lancefield WFP	Coagulation pH Correction Filtration	AluminiumDrinking wate supplied from (as required),Polyelectrolyte,local ground local ground 	Drinking water is supplied from Garden
	Rosslynne WFP Greenvale	Dissolved Air Flotation Chlorination Fluoridation by Rosslynne ⁵ Fluoridation by Melbourne Water ^{5,7}		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	Merrimu WFP	Coagulation	Aluminium	Melton and Melton
Maddingley Darley Merrimu Rockbank Toolern Vale Eynesbury	Greenvale WTP	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	Polyelectrolyte, Chlorine gas, Sodium hexafluorosilicate, Sodium hypochlorite Fluorosilicic acid, Sodium hypochlorite	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		Treatment	Added				
locality	Treatment plant	process	substances	Comments			
Myrniong	Myrniong WFP Greenvale WTP Merrimu WFP	Coagulation OxidationPowdered ActivePCoagulation OxidationPowdered ActivePAirPowdered ActiveFloatation FiltrationCarbon (asChlorinationpermanganate,Additional chlorinationPolyelectrolyte,Additional chlorinationSodium carborby secondary('Soda Ash'), Chchlorinators alongreticulation systemas required ^{2.4} SodiumFluoridation byMelbourne Water7or Merrimu WFP 6Poly Aluminium		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 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 2022-23, Rosslynne treated water was supplied to Gisborne, Riddells Creek, Macedon and Mt Macedon. Sunbury, Bulla and Diggers Rest remain on Melbourne water supply			
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				

Water sampling locality	Treatment plant	Treatment process	Added substances	Comments
Woodend	Marriages WFP Res C WFP	Coagulation pH correction Dissolved Air Flotation Filtration	on pHPowdered ActivatedDissolvedCarbon (as requiredon Filtrationat Marriages WFP),on byPolyelectrolyte,on bySodium carbonateon by('Soda Ash'), Sodiumon byFluorosilicic acid	Drinking water is supplied from two ends of the system –
	Rosslynne WFP Greenvale WTP	Air Flotation Filtration Chlorination Fluoridation by Rosslynne Fluoridation by Melbourne Water ⁷		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 WFP 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 2022-23. Online equipment monitors chlorine, fluoride, 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 so that corrective actions can be implemented.

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 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 2022-23, there were no issues from the 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 2022-23. 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 2022-23, refer to the Melbourne Water Annual Drinking Water Quality Report.

There were no treatment application issues at the GWW-operated local treatment plants during 2022-23. 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 <u>Southern Rural Water</u> Annual Report.

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 its sub-committees. This includes events that may have led to known or suspected contamination of the drinking water supply, including those that were reported to the 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*

Four reports were made to the Department of Health under s 22; two were related to the investigation of E. coli results from our water monitoring program in Richmond and Sunbury. After investigation by GWW, and in line with Schedule 2 of Safe Drinking Water Regulations 2015, it was concluded that the detection of E. coli was a 'false positive sample'. Under the Safe Drinking Water Regulations 2015, a false positive result is not considered a non-compliance of the E. coli water quality standards. A false positive sample result is where there is an *E*. coli detection in a routine water quality sample that is considered to be nonrepresentative of the water supplied to customers following an investigation conducted and reported in accordance with the Secretary's guidelines. The last two reports were related to system integrity events in Moonee Ponds and Gisborne localities. In 2022-23 there was one Do Not Use Advisory issued to 38 impacted customers in Moonee Ponds.

The details of the four reports made to the Department of Health are provided here.

4.1.1 Backflow event, Moonee Ponds (August 2022)

On 9 August 2022, GWW notified the Department of Health that there had been a backflow event with suspected chemical contamination in a localised area of pipe supplying Langs Road, in the Moonee Ponds locality. The backflow event affected 38 customers.

The suspected contamination was identified during emergency maintenance works to repair a burst water main where it was suspected that a third party

accessing a hydrant to fill a water tanker caused the backflow issue. At the time of identification, the water main was isolated for emergency repair works and no customers were being supplied with drinking water via the impacted pipeline. In response, a water quality incident was immediately declared, the Department advised and a 'Do Not Use Advisory' notice issued to the 38 impacted customers. Alternative water and/ or accommodation was provided to customers while the advisory notice was in place. Following a detailed investigation by GWW and review of its water quality risk assessment by the Department of Health, GWW implemented identified corrective actions including flushing of the affected network and service lines of affected properties. The quality of the drinking water in the impacted pipeline and surrounds post corrective actions was then verified through sampling and laboratory analysis. This analysis confirmed the water was free from any microbial and chemical contamination and was representative of the water within the Moonee Ponds locality. In consultation with the Department of Health, this advisory notice was lifted two days later on 11 August 2022. A debrief meeting was held with the Department after the incident. GWW continues to work with GWW project managers and contractors to ensure that appropriate controls are in place to manage access to GWW assets in a way that protects water quality.

4.1.2 False positive *E. coli* sample, Richmond (October 2022)

On 20 October 2022, GWW verbally notified the Department of Health that there had been an *E. coli* detection (1 orgs/100mL) in a routine sample from a sample tap in the Richmond locality on 20 October 2022. A public health risk assessment, which included resampling by the external laboratory, was undertaken. The assessment considered the operational status of the water supply system including treatment, recent water quality results from the surrounding area, any works in the surrounding areas, and the environmental conditions at the time of sample collection. The resampling results returned no *E. coli* detections.

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 determine if the result of the analysis was representative of the water in the Richmond sampling locality:

- confirmed the integrity of assets, including upstream water treatment plants and storage tanks
- confirmed that there were no upstream water quality issues
- collected additional sampling and follow-up samples at the sample location and provided confirmation the water being supplied was free from any microbial contamination.

The investigation concluded that the results of the analysis conducted in accordance with regulation 14 were not representative of the water in the Richmond sampling locality. The investigation established that the standard criteria (i), (ii), (iii) and (iv) of Column 3a (c) Regulation 12, had been met with no evidence, apart from the initial *E. coli* detection, to support that the Richmond water supply had been contaminated.

On 23 October 2022, in line with Schedule 2 of Safe Drinking Water Regulations 2015, it was concluded that the detection of *E. coli* was a 'false positive sample'. Under the Safe Drinking Water Regulations 2015, a false positive result is not considered a failure of the water quality standards.

4.1.3 False positive *E. coli* sample, Sunbury (March 2023)

On 29 March 2023, an *E. coli* detection of 1 orgs/100 mL was reported by the external laboratory from a routine sample at the Sunbury sampling locality at the Shepherds Lane Tank. The Department of Health was notified of this result and a public health risk assessment, which included resampling by the external 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 Safe Drinking Water Regulations 2015, the following key actions were undertaken to determine if the result of the analysis was representative of the water in the Shepherds Lane Tank:

- collected additional samples at the impacted sample tap and designated sampling points within the Sunbury locality
- reviewed the integrity of storage tanks roof and hatch
- reviewed all 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 storage tank tap and surrounding areas did not detect *E. coli*
- the sample had been collected on a day of rain and windy weather that is likely to have affected the collection of the sample. The sample tap location was not appropriate for the environmental conditions that exist in this area.

The investigation concluded that the results of the analysis conducted in accordance with regulation 14 were not representative of the water in the Sunbury sampling locality. The investigation established that the standard criteria (i), (ii), (iii) and (iv) of Column 3a (c) regulation 12, had been met with no evidence, apart from the initial *E. coli* detection, to support that the Sunbury water supply has been contaminated. On 29 March 2023, in line with Schedule 2 of Safe Drinking Water Regulations 2015, it was concluded that the detection of *E. coli* was a 'false positive sample'.

GWW 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.

4.1.4 Unauthorised access, Gisborne (December 2022)

On Wednesday 7 December 2022, the Magnet Hill Tank in the Gisborne sampling locality was found to have been accessed without authorisation and a small cap on the tank roof had been removed. The cap was replaced and the security fence was repaired on the same day of notification.

The Department of Health was notified of this event and a public health risk assessment, which included sampling 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 the event. The sampling results returned no detections of microbial or toxin contamination 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 determine if the result of the analysis was representative of the water in the Gisborne sampling locality:

- collected additional samples and follow-up sample results at the tap and designated sampling points within the Gisborne network
- reviewed the integrity of assets, including storage tanks roof, hatch and security fence
- reviewed online monitoring data to demonstrate performance of the asset before and during the detection and previous sample results
- confirmed the operation of secondary treatment facilities.

Outcomes from the investigation found:

- the water supply system was operating normally before, during and after the time in which the unauthorised access occurred with all treatment barriers operating effectively
- there was sufficient chlorine within the system and all samples and resamples from the impacted customer sample tap and surrounding areas did not detect contamination
- assessment of CCTV for the storage tank site will be considered, for long-term security protection.

The outcome from the investigation concluded that the unauthorised access did not impact the drinking water supplied to the Gisborne locality.

4.2 Other drinking water quality events

4.2.1 Coronavirus (COVID-19) pandemic

Our management and monitoring of drinking water quality has not been affected by, and continues to be undertaken to, our usual high standards during the COVID-19 pandemic. Furthermore, there is no evidence that COVID-19 is transmitted by drinking water. The pandemic declaration ended on 12 October 2022.

4.2.2 Rosslynne Reservoir inflows and change of supply, 2022-23

Rosslynne Reservoir has remained offline for drinking water treatment by GWW for most of 2022-23 due to ongoing 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 WFP 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 2022-23 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 inflows, 2022-23

Merrimu Reservoir increased in level during 2022-23 due to increased rainfall inflow events. The inflows impacted the water quality; however, the Merrimu WTP was able to treat the water to meet safe drinking water quality standards. The treatment plant managed the changes in sediment and organics in the reservoir that may affect appearance and taste of the drinking water. The arrangement of the network connects the Merrimu WTP to Toolern Vale, Merrimu, Darley, Lerderderg and Maddingley.

4.2.6 Blue green algae

During 2022-23, 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 Energy, Environment and Climate Action notification email received no reports of algal blooms for 2022-23. Southern Rural Water advised of blooms in the Pykes Creek Reservoir which is open to recreation. During the bloom period, the Myrniong WFP that treats Pykes Creek Reservoir continued to produce safe drinking water for the locality of Myrniong.

4.2.7 Yarra Valley Water Preston water quality event

On 9 December 2022, Yarra Valley Water notified GWW that 13 orgs/100mL of E. coli had been detected from a routine sample taken on 8 December 2022 within their Preston sampling locality. Yarra Valley Water's Preston sampling locality supplies treated drinking water to GWW's Strathmore sampling locality.

In response, both GWW and Yarra Valley Water formed incident management teams. These teams worked together to understand and assess the risks to public health and to coordinate response actions. Further details regarding Yarra Valley Water's response are available in their 2022-23 Water Quality Report.

GWW's response included:

- review of GWW sample results from within the Strathmore sampling locality which were taken 8 December 2022, review of GWW sample results which did not have any E. coli detections
- collection and analysis of additional samples by the external laboratory and GWW field staff. The resampling results returned no E. coli detections and highlighted the residual disinfection barrier to be operating normally
- liaison with Yarra Valley Water and Melbourne Water regarding the integrity of the upstream system and water quality barriers
- completion of a public health risk assessment.

The investigation concluded that the E.coli detection within the Yarra Valley Water system was a 'false positive' and was not representative of the water supplied to the Strathmore sampling locality.

5. Drinking water quality monitoring

In 2022-23, a major review of our drinking water quality monitoring sampling program was completed.

This review was in response to the sampling program non-compliance actions reported in last year's report. The outcomes of the sampling program review have resulted in a consistent and streamlined water quality monitoring program that is based on risk mitigation and applicable to the whole GWW service area. The changes from the review are described at section 6.6.1.

The drinking water quality sampling program core driver is 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, radiological, physical and chemical parameters. 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 and other heavy metals). Water quality monitoring was undertaken under contract by an approved, specialised and quality-certified, NATA accredited laboratory. Contact information for obtaining further details of all water quality testing outlined in this report is in section 14 and further monitoring program details are available in sections 6 and 7 and Appendix A.

To assess the quality of our water supplies, a daily routine monitoring program 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 to meet the GWW monitoring program 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 parameter exceedances detected in drinking water samples. The drinking water parameter limits are based on the Safe Drinking Water Regulations 2015 and Australian Drinking Water Guidelines 2011.

Non-routine water quality testing is carried out in addition to the routine testing program to investigate water quality trends, water source variation issues, 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.

A local source water monitoring program to monitor the water quality in reservoirs, bores and basins managed by GWW was undertaken. The program involves monitoring and identifying hazards that could compromise drinking water quality in a catchment, to inform and review the performance and effectiveness of the multiple barrier approach controls in place.

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.

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 ensures the approved chemicals supplied and used in treatment process meet the required specifications.

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.

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 <i>E. coli</i> 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 \leq 5.0 nephelometric turbidity units (NTU)	one sample per week

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

The tables in sections 6.1 to 6.3 outline the 2022-23 compliance assessment of water quality parameters against the water quality scheduled standards specified in the Safe Drinking Water Regulations 2015.

6.1 E. coli

Escherichia coli (E. coli) is abundant 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 or chemical disinfection systems, 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.

Further details can be found in section 6.6. All other required elements of our sample program were carried out as described in the plan and at the frequency of sampling in the standard. Further water quality results for all localities are available in 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.

Water sampling locality	Frequency of sampling	Number of Samples	Maximum detected (orgs/100mL)	Average	Number of detections & investigations conducted (s.22 ²)	Number of samples where standard was not met (s.18 ³)
Altona	Weekly	394	0	0	0	0
Bulla	Weekly	52	0	0	0	0
Caroline Springs	Weekly	348	0	0	0	0
Darley	Weekly	514	0	0	0	0
Deer Park	Weekly	260	0	0	0	0
Diggers Rest	Weekly	104	0	0	0	0
East Keilor	Weekly	156	0	0	0	0
Eynesbury	Weekly	156	0	0	0	0
Gisborne	Weekly	376	0	0	0	0
Lancefield	Weekly	113	0	0	0	0
Lerderderg	Weekly	272	0	0	0	0
Little River	Weekly	185	0	0	0	0
Macedon	Weekly	156	0	0	0	0
Maddingley	Weekly	208	0	0	0	0
Maribyrnong	Weekly	359	0	0	0	0
Melton South	Weekly	276	0	0	0	0
Merrimu	Weekly	209	0	0	0	0
Moonee Ponds	Weekly	249	0	0	0	0
Mount Macedon	Weekly	208	0	0	0	0
Myrniong	Weekly	256	0	0	0	0
Parkville	Weekly	406	0	0	0	0
Richmond	Weekly	143	1 ¹	0	1 ¹	0
Riddells Creek	Weekly	155	0	0	0	0
Rockbank	Weekly	211	0	0	0	0
Romsey	Weekly	333	0	0	0	0
Strathmore	Weekly	96	0	0	0	0
Sunbury	Weekly	404	1 ¹	0	1 ¹	0
Taylors Lakes	Weekly	289	0	0	0	0
Toolern Vale	Weekly	106	0	0	0	0
Tullamarine	Weekly	103	0	0	0	0
Werribee	Weekly	490	0	0	0	0
Werribee South	Weekly	144	0	0	0	0
Williamstown	Weekly	193	0	0	0	0
Woodend	Weekly	220	0	0	0	0

Table 9: E. coli summary results in drinking water samples tested between 1 July 2022 and 30 June 2023

1. These sample results were confirmed as false positive samples. Refer to Section 4.1 of this report for details.

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

3. s 18 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 2022-23 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 2022 and 30 June 2023

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. 22¹)
Altona	Monthly	12	0.25	0.05	0.04	0
Bulla	>Monthly	14	0.25	0.04	0.03	0
Caroline Springs	Monthly	12	0.25	0.04	0.03	0
Darley	>Monthly	100	0.25	0.18	0.10	0
Deer Park	Monthly	12	0.25	0.04	0.03	0
Diggers Rest	>Monthly	19	0.25	0.05	0.03	0
East Keilor	Monthly	12	0.25	0.03	0.03	0
Eynesbury	>Monthly	31	0.25	0.05	0.04	0
Gisborne	>Monthly	86	0.25	0.15	0.04	0
Lancefield	>Monthly	28	0.25	0.18	0.11	0
Lerderderg	>Monthly	55	0.25	0.18	0.10	0
Little River	>Monthly	49	0.25	0.07	0.05	0
Macedon	>Monthly	38	0.25	0.15	0.06	0
Maddingley	>Monthly	36	0.25	0.21	0.12	0
Maribyrnong	Monthly	12	0.25	0.05	0.04	0
Melton South	>Monthly	55	0.25	0.06	0.03	0
Merrimu	>Monthly	40	0.25	0.15	0.07	0
Moonee Ponds	Monthly	12	0.25	0.06	0.04	0
Mount Macedon	>Monthly	50	0.25	0.15	0.07	0
Myrniong	>Monthly	48	0.25	0.19	0.10	0
Parkville	Monthly	12	0.25	0.05	0.04	0
Richmond	Monthly	12	0.25	0.08	0.06	0
Riddells Creek	>Monthly	38	0.25	0.13	0.05	0
Rockbank	>Monthly	43	0.25	0.03	0.02	0
Romsey	>Monthly	66	0.25	0.13	0.03	0
Strathmore	Monthly	12	0.25	0.06	0.06	0
Sunbury	>Monthly	79	0.25	0.08	0.03	0
Taylors Lakes	>Monthly	24	0.25	0.09	0.04	0
Toolern Vale	>Monthly	26	0.25	0.14	0.08	0
Tullamarine	Monthly	12	0.25	0.04	0.02	0
Werribee	>Monthly	38	0.25	0.07	0.05	0
Werribee South	>Monthly	30	0.25	0.06	0.05	0
Williamstown	Monthly	12	0.25	0.06	0.04	0
Woodend	>Monthly	43	0.25	0.15	0.06	0

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

6.3 Turbidity

Turbidity is the measurement of the light scattering properties 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. The following table reflects the reporting period 1 July 2022 to 30 June 2023, under the Safe Drinking Water Regulations 2015.

A summary of the turbidity results for sampling at customer taps in 2022-23 is listed below. It includes the statistical measure of the 95th percentile for sampling of turbidity over a 12-month period. Requirements of regulation 13(1) of Safe Drinking Water Regulations 2015 were not met for the Strathmore locality during 2022-23. The weekly frequency for the collection for one turbidity sample was not met as described in the GWW risk management plan or Schedule 2 in the standard. Water quality was assessed as not providing a risk to public health based on other water quality data available at the time.

Further details can be found in section 6.6. All other required elements of our sample program were carried out as described in the plan and at the frequency of sampling in the standard. Further water quality results for all localities are available in Appendix A.

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 2022 and 30 June 2023

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 22 ²)
Altona	Weekly	281	4.5	0.5	0
Bulla	Weekly	52	1.2	0.7	0
Caroline Springs	Weekly	248	1.2	0.7	0
Darley	Weekly	523	4.9	0.7	0
Deer Park	Weekly	184	1	0.5	0
Diggers Rest	Weekly	104	1	0.8	0
East Keilor	Weekly	119	1	0.5	0
Eynesbury	Weekly	156	2.3	1.0	0
Gisborne	Weekly	369	3.5	0.7	0
Lancefield	Weekly	113	0.2	0.1	0
Lerderderg	Weekly	266	1.4	0.6	0
Little River	Weekly	172	0.8	0.5	0
Macedon	Weekly	159	0.8	0.7	0
Maddingley	Weekly	208	1.5	0.7	0
Maribyrnong	Weekly	250	1	0.7	0
Melton South	Weekly	240	1.2	0.7	0
Merrimu	Weekly	201	1.6	0.6	0
Moonee Ponds	Weekly	187	1.4	0.9	0
Mount Macedon	Weekly	208	0.8	0.7	0
Myrniong	Weekly	256	12	0.3	0
Parkville	Weekly	282	1.6	0.6	0
Richmond	Weekly	118	2.4	1.1	0
Riddells Creek	Weekly	155	4.4	0.7	0
Rockbank	Weekly	211	2.3	0.7	0
Romsey	Weekly	364	0.3	0.1	0
Strathmore	Weekly ¹	82	1	1	0
Sunbury	Weekly	369	0.9	0.7	0

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 22 ²)
Taylors Lakes	Weekly	215	9.3	1.3	0
Toolern Vale	Weekly	106	1.3	0.80	0
Tullamarine	Weekly	86	2.1	1.0	0
Werribee	Weekly	349	2	0.5	0
Werribee South	Weekly	130	0.8	0.5	0
Williamstown	Weekly	147	0.7	0.5	0
Woodend	Weekly	213	0.6	0.1	0

Requirements of regulation 13(1) Safe Drinking Water Regulations 2015 were not met for the Strathmore locality during 2022-23. Refer to section 6.6 for details.
 s 22 as per s 22 of the 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)

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. The following tables reflect the reporting period 1 July 2022 to 30 June 2023 under the Safe Drinking Water Regulations 2015.

In addition to the water quality parameters designated as standards by Safe Drinking Water Regulations 2015, we 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 2022-23, 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 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 reported in section 7.3 and Appendix A. 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 2022-23. GWW will be sampling for organic chemicals in 2023-24 with results available in next year's report as scheduled in our updated sampling program.

6.5 Fluoride

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.

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 0.8 mg/L and 1.0 mg/L. Fluoride levels in any individual sample from drinking water supplied must also not exceed 1.5 mg/L, according to the Australian Drinking Water Guidelines. The following table reflects the reporting period 1 July 2022 to 30 June 2023 under the Safe Drinking Water Regulations 2015.

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. 22)
Altona	Monthly	18	1.5	0.87	0.82	0
Bulla	Monthly	12	1.5	0.82	0.72	0
Caroline Springs	Monthly	19	1.5	0.93	0.79	0
Darley	Monthly	77	1.5	0.87	0.77	0
Deer Park	Monthly	20	1.5	0.95	0.82	0
Diggers Rest	Monthly	24	1.5	0.85	0.74	0
East Keilor	Monthly	19	1.5	0.88	0.80	0
Eynesbury	Monthly	29	1.5	0.86	0.77	0
Gisborne	Monthly	72	1.5	0.86	0.78	0
Lancefield	Monthly	19	1.5	0.11	0.09	0
Lerderderg	Monthly	39	1.5	0.98	0.76	0
Little River	Monthly	57	1.5	0.93	0.8	0
Macedon	Monthly	22	1.5	0.82	0.78	0
Maddingley	Monthly	41	1.5	0.89	0.77	0
Maribyrnong	Monthly	18	1.5	0.87	0.79	0
Melton South	Monthly	32	1.5	0.84	0.79	0
Merrimu	Monthly	80	1.5	0.98	0.72	0
Moonee Ponds	Monthly	18	1.5	0.88	0.78	0
Mount Macedon	Monthly	27	1.5	0.82	0.78	0
Myrniong	Monthly	46	1.5	<0.05	<0.05	0
Parkville	Monthly	17	1.5	0.88	0.80	0
Richmond	Monthly	19	1.5	0.85	0.75	0
Riddells Creek	Monthly	22	1.5	0.87	0.79	0
Rockbank	Monthly	34	1.5	0.83	0.78	0
Romsey	Monthly	57	1.5	0.2	0.07	0
Strathmore	Monthly	19	1.5	0.9	0.75	0
Sunbury	Monthly	56	1.5	0.86	0.77	0
Taylors Lakes	Monthly	31	1.5	0.84	0.77	0
Toolern Vale	Monthly	17	1.5	0.94	0.75	0
Tullamarine	Monthly	20	1.5	0.87	0.78	0
Werribee	Monthly	43	1.5	0.91	0.81	0
Werribee South	Monthly	36	1.5	0.87	0.81	0
Williamstown	Monthly	18	1.5	0.89	0.81	0
Woodend	Monthly	34	1.5	0.12	0.04	0

Table 12: Fluoride summary results in drinking water samples tested between 1 July 2022 and 30 June 2023

6.6 Drinking water quality compliance

For 2022–23, GWW partially complied with the water quality requirements of the *Safe Drinking Water Act* 2003 and the Safe Drinking Water Regulations 2015. GWW met the requirement under the Act to ensure the water quality supplied complies with the quality standards specified in the regulations.

GWW has not met the minimum monitoring requirements for health-based water quality tests. This requirement was met for 33 of 34 localities, as set out in schedule 2 of the *Safe Drinking Water Regulations 2015*; however, one set of weekly tests for turbidity in the Strathmore locality was missed. This will be considered a non-compliance against regulation 13(1). All other compliance water quality tests were collected for this locality and were within the concentration limits, so a 100% compliance was attributed at Table 13.

The water quality sampling results for Strathmore were reviewed by an independent expert who confirmed that the remaining test results can be considered as a representative sample of the long-term historic performance to health-based guideline values for Strathmore and that GWW customers have not been exposed to additional risk. No further samples have been missed from the sampling program since October 2022.

6.6.1 Update on actions from 2021-22 non-compliance

As reported in last year's annual report, GWW identified a number of missed samples for the Altona, Little River and Werribee localities and committed to improvement opportunities that have been actioned during 2022-23.

- All sampling program processes and documentation with a focus on the chain of custody for data management have been completed and changes included in the update of the sampling program as described in section 5.
- The integration of the two sampling programs as identified in the Drinking Water Risk Management Plan Integration Roadmap has been completed and a consistent approach is visible across the sampling program and applied to the full GWW service area. The results from the updated sampling program are in Appendix A Water quality results and performance by locality.
- Changes have been made to improve the frequency and efficacy of internal verification processes and validation of sampling program outcomes. Regular reports are provided to senior management and laboratory services provider to monitor and report on performance and the progress of improvements.
- Improving notification processes with the external laboratory services provider to meet the requirements of the sampling program has continued and regular communication processes have been implemented.
- During the 2023 external risk management audit the sampling program was audited and the changes to the program validated. Outcomes from the risk management plan audit are detailed in section 9.1.
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 aesthetic guideline value described further in section 7.2. Note this table has been updated to reflect the updates to the frequency of sampling program.

Data analysed in this section are 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. Data trend over three years.

		Localities compliant (customer sample taps) (% of customers supplied with compliant water)					
Parameter	Safe Drinking Water Regulations (2015)	2022-23	2021-22	2020-21 ¹			
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%)	34/34 (100%)	15/15 (100%) 19/19 (100%)			
Trihalomethanes	≤0.25 mg/L	34/34 (100%)	34/34 (100%)	15/15 (100%) 19/19 (100%)			
Turbidity	95th percentile ≤5 NTU	34/34 (100%)	34/34 (100%)	15/15 (100%) 19/19 (100%)			

1. 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 provided as tables in Appendix A. Contact information for 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 these trends over the past five years with 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 2022-23 are discussed in section 7.3. Results for all reported parameters are provided in 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) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
22/23	0.44	0.04	0.5	2	<2	0.003	0.04	N/A	N/A	0.82	22
21/22	0.31	0.04	0.4	<2	N/A	0.001	0.02	0.004	<0.001	0.8	20
20/21	0.26	0.04	0.5	2	N/A	0.002	0.03	0.011	<0.001	0.8	22
19/20	0.24	0.05	0.3	3	N/A	0.001	0.03	0.003	<0.001	0.8	25
18/19	0.33	0.05	0.8	3	N/A	0.002	0.03	0.006	<0.001	0.8	19
Bulla											
22/23	0.71	0.03	0.7	N/A	<2	0.003	0.07	0.044	<0.001	0.72	19
21/22	0.57	0.04	1.1	N/A	2	0.002	0.08	0.012	<0.001	0.8	14
20/21	0.38	0.04	0.8	N/A	3	0.002	0.08	0.001	<0.001	0.8	19
19/20	0.75	0.03	0.7	N/A	3	0.002	0.08	0.001	<0.001	0.7	17
18/19	0.73	0.03	1.2	N/A	4	0.005	0.07	0.003	<0.001	0.8	17
Caroline Springs											
22/23	0.53	0.03	0.7	2	<2	0.002	0.05	N/A	N/A	0.79	20
21/22	0.42	0.03	1.0	3	N/A	0.002	0.06	0.003	<0.001	0.8	16
20/21	0.36	0.03	0.7	3	N/A	0.002	0.05	0.005	<0.001	0.8	15
19/20	0.34	0.03	1.0	4	N/A	0.003	0.05	< 0.001	< 0.001	0.8	29
18/19	0.34	0.03	1.0	5	N/A	0.005	0.06	0.011	<0.001	0.8	15

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
22/23	1.02	0.10	0.7	N/A	<2	0.002	0.04	0.007	<0.001	0.77	75
21/22	1.02	0.09	0.9	N/A	2	0.002	0.04	0.004	<0.001	0.7	70
20/21	0.96	0.12	0.2	N/A	2	0.001	0.02	0.006	<0.001	0.8	110
19/20	1.03	0.12	0.1	N/A	2	0.001	0.01	0.006	<0.001	0.8	83
18/19	0.67	0.13	0.4	N/A	2	0.001	0.02	0.003	<0.001	0.7	90
Deer Park											
22/23	0.56	0.03	0.5	<2	<2	0.003	0.03	N/A	N/A	0.82	22
21/22	0.48	0.04	0.7	<2	N/A	0.001	0.02	0.010	<0.001	0.8	18
20/21	0.44	0.03	0.5	2	N/A	<0.001	0.02	0.005	<0.001	0.8	20
19/20	0.38	0.04	0.4	2	N/A	<0.001	0.02	<0.001	<0.001	0.8	26
18/19	0.36	0.04	0.8	4	N/A	0.003	0.04	0.001	<0.001	0.8	17
Diggers Rest											
2/23	0.53	0.03	0.8	N/A	<2	0.003	0.06	N/A	N/A	0.74	17
21/22	0.59	0.02	1.1	N/A	2	0.002	0.07	0.020	<0.001	0.8	12
20/21	0.46	0.03	1.2	N/A	3	0.002	0.07	0.004	<0.001	0.8	16
19/20	0.53	0.03	0.7	N/A	3	0.003	0.08	0.003	<0.001	0.7	15
18/19	0.45	0.03	1.1	N/A	4	0.006	0.07	0.004	<0.001	0.8	14
East Keilor											
22/23	0.86	0.03	0.5	<2	<2	0.001	0.03	N/A	N/A	0.8	24
21/22	0.53	0.03	0.6	<2	N/A	0.001	0.02	0.005	<0.001	0.8	18
20/21	0.46	0.03	0.5	2	N/A	<0.001	0.02	0.004	<0.001	0.8	15
19/20	0.43	0.03	0.7	2	N/A	0.001	0.01	0.002	<0.001	0.8	27
18/19	0.52	0.03	1.0	4	N/A	0.004	0.04	0.001	<0.001	0.8	16
Eynesbury											
23/22	0.93	0.04	1.0	N/A	3	0.003	0.07	0.004	<0.001	0.77	17
21/22	0.95	0.04	1.3	N/A	3	0.002	0.10	0.006	<0.001	0.8	13
20/21	0.87	0.04	1.1	N/A	3	0.002	0.09	0.004	<0.001	0.7	14
19/20	0.72	0.04	0.8	N/A	3	0.004	0.14	0.004	<0.001	0.8	13
18/19	0.53	0.04	1.1	N/A	3	0.008	0.12	0.007	<0.001	0.8	15

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	lron (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											
Gisborne											
22/23	1.14	0.04	0.7	N/A	<2	0.004	0.05	0.001	<0.001	0.78	29
21/22	0.98	0.04	1.1	N/A	2	0.004	0.07	0.002	<0.001	0.8	29
20/21	1.04	0.05	0.9	N/A	2	0.003	0.04	0.002	<0.001	0.8	63
19/20	1.24	0.04	0.6	N/A	3	0.004	0.05	0.002	<0.001	0.8	54
18/19	0.91	0.07	1.1	N/A	3	0.006	0.04	0.002	0.001	0.8	58
Lancefield											
22/23	1.29 Table show	wingthetrends in te	stingOesults for major	N/A	<2	0.001	0.01	0.009	<0.001	0.09	78
21/22	1.19 parameter	rs at@act sampling l	ocality.1	N/A	2	0.001	0.01	0.003	<0.001	0.1	49
20/21	1.10	0.15	0.1	N/A	3	0.001	0.01	0.003	<0.001	0.1	71
19/20	1.10	0.09	0.1	N/A	2	0.001	0.01	0.004	<0.001	0.1	59
18/19	1.04	0.10	0.1	N/A	2	0.005	0.02	0.009	<0.001	0.1	72
Lerderderg											
212/23	1.11	0.10	0.6	N/A	<2	0.003	0.04	0.066	<0.001	0.76	73
21/22	1.13	0.10	0.9	N/A	2	0.002	0.04	0.005	<0.001	0.8	65
20/21	1.00	0.12	0.3	N/A	2	0.001	0.01	0.005	<0.001	0.8	107
19/20	0.87	0.12	0.1	N/A	2	0.001	0.01	0.007	<0.001	0.7	80
18/19	0.60	0.12	0.3	N/A	2	0.001	0.02	0.003	<0.001	0.7	83
Little River											
22/23	0.82	0.05	0.05	<2	<2	0.002	0.04	N/A	N/A	0.8	25
21/22	0.49	0.05	0.5	<2	N/A	0.002	0.04	0.019	<0.001	0.8	28
20/21	0.37	0.05	0.4	2	N/A	0.001	0.03	0.024	<0.001	0.8	63
19/20	0.37	0.05	0.4	2	N/A	0.001	0.03	0.033	<0.001	0.8	27
18/19	0.29	0.05	0.8	4	N/A	0.004	0.05	0.021	<0.001	0.8	27
Macedon											
22/23	1.1	0.06	0.7	N/A	<2	0.004	0.06	<0.001	<0.001	0.78	22
21/22	1.02	0.05	1.1	N/A	2	0.002	0.09	0.002	<0.001	0.8	17
20/21	0.87	0.07	0.8	N/A	2	0.002	0.06	0.002	<0.001	0.8	86
19/20	0.98	0.07	0.6	N/A	3	0.003	0.07	0.006	<0.001	0.8	40
18/19	0.88	0.10	1.1	N/A	3	0.004	0.06	0.005	<0.001	0.8	30

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
Maddingley											
22/23	1.16	0.12	0.7	N/A	<2	0.004	0.05	0.007	<0.001	0.77	79
21/22	1.16	0.11	0.8	N/A	2	0.002	0,04	0.012	<0.001	0.8	64
20/21	1.04	0.14	0.3	N/A	2	0.001	0.02	0.011	<0.001	0.8	108
19/20	0.75	0.12	0.1	N/A	2	0.001	0.01	0.010	<0.001	0.7	81
18/19	0.70	0.13	0.4	N/A	2	0.001	0.02	0.004	0.001	0.7	81
Maribyrnong											
22/23	0.53	0.04	0.7	2	<2	0.003	0.04	N/A	N/A	0.79	22
21/22	0.38	0.04	0.7	2	N/A	0.002	0.03	0.022	<0.001	0.8	19
20/21	0.31	0.04	0.6	4	N/A	0.002	0.04	0.018	<0.001	0.8	18
19/20	0.33	0.04	0.5	3	N/A	0.002	0.03	0.004	<0.001	0.8	23
18/19	0.37	0.05	0.9	4	N/A	0.003	0.04	0.009	<0.001	0.8	16
Melton South											
22/23	1.11	0.03	0.7	N/A	<2	0.002	0.06	<0.001	<0.001	0.79	17
21/22	0.96	0.03	1.1	N/A	2	0.002	0.07	0.004	0.001	0.8	14
20/21	0.65	0.03	0.7	N/A	3	0.002	0.06	0.002	<0.001	0.7	16
19/20	0.65	0.03	0.7	N/A	3	0.002	0.07	0.004	<0.001	0.7	12
18/19	0.54	0.03	1.0	N/A	4	0.007	0.07	0.004	<0.001	0.8	12
Merrimu											
22/23	1.04	0.07	0.6	N/A	<2	0.003	0.04	<0.001	<0.001	0.72	76
21/22	1.04	0.06	1.0	N/A	2	0.003	0.04	0.003	<0.001	0.7	55
20/21	0.82	0.06	0.6	N/A	2	0.002	0.03	0.002	<0.001	0.7	71
19/20	0.82	0.08	0.2	N/A	3	0.001	0.02	0.005	<0.001	0.8	87
18/19	0.67	0.08	0.8	N/A	3	0.001	0.01	0.002	<0.001	0.7	72
Moonee Ponds											
22/23	0.53	0.04	0.09	4	<2	0.005	0.06	N/A	N/A	0.78	20
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	N/A	0.004	0.07	0.012	<0.001	0.8	19
19/20	0.30	0.04	0.6	4	N/A	0.003	0.05	0.010	<0.001	0.8	18
18/19	0.36	0.05	0.9	5	N/A	0.006	0.05	0.009	<0.001	0.8	16

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
Mount Macedon											
22/23	1.1	0.07	0.7	N/A	<2	0.004	0.07	<0.001	<0.001	0.78	24
21/22	1.00	0.06	1.1	N/A	2	0.003	0.09	0.014	<0.001	0.8	17
20/21	0.89	0.09	0.8	N/A	2	0.003	0.07	0.002	<0.001	0.8	86
19/20	0.91	0.08	0.6	N/A	3	0.005	0.08	0.002	<0.001	0.8	41
18/19	0.82	0.12	1.1	N/A	3	0.004	0.07	0.002	<0.001	0.8	30
Myrniong											
22/23	0.86	0.10	0.3	N/A	<2	0.002	0.03	0.008	<0.001	<0.05	100
21/22	0.86	0.07	0.3	N/A	2	0.001	0.03	0.011	<0.001	0.1	112
20/21	1.03	0.08	0.3	N/A	2	0.001	0.03	0.018	<0.001	0.1	123
19/20	0.72	0.07	0.1	N/A	3	0.002	0.02	0.023	<0.001	0.1	115
18/19	0.63	0.08	0.3	N/A	2	0.004	0.03	0.020	0.001	0.1	124
Parkville											
22/23	0.58	0.04	0.6	2	<2	0.003	0.04	N/A	N/A	0.80	23
21/22	0.47	0.04	0.6	<2	N/A	0.003	0.02	0.015	<0.001	0.9	19
20/21	0.38	0.04	0.6	4	N/A	0.002	0.04	0.004	<0.001	0.8	22
19/20	0.34	0.04	0.4	3	N/A	0.002	0.02	0.013	<0.001	0.8	21
18/19	0.43	0.05	1.1	4	N/A	0.005	0.04	0.017	<0.001	0.8	19
Richmond											
22/23	0.59	0.06	1.1	4	2	0.004	0.07	N/A	N/A	0.75	17
21/22	0.50	0.06	1.2	6	N/A	0.005	0.10	0.009	<0.001	0.8	17
20/21	0.40	0.07	1.0	7	N/A	0.006	0.09	0.009	<0.001	0.8	13
19/20	0.42	0.06	0.9	6	N/A	0.005	0.07	0.009	<0.001	0.7	16
18/19	0.38	0.07	1.1	6	N/A	0.005	0.08	0.009	<0.001	0.7	14
Riddells Creek											
22/23	1.04	0.05	0.7	N/A	<2	<0	0.06	0.002	<0.001	0.79	22
21/22	0.93	0.04	1.1	N/A	2	0.003	0.08	0.003	<0.001	0.8	14
20/21	0.97	0.07	1.0	N/A	2	0.002	0.07	0.001	<0.001	0.8	57
19/20	0.94	0.06	0.6	N/A	3	0.003	0.08	0.001	<0.001	0.8	37
18/19	0.92	0.09	1.2	N/A	3	0.003	0.06	0.002	<0.001	0.8	38

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
22/23	1.2	0.02	-0.7	N/A	<2	0.002	0.05	0.007	<0.001	0.78	17
21/22	1.08	0.02	1.2	N/A	2	0.002	0.07	0.008	<0.001	0.8	13
20/21	1.00	0.02	0.9	N/A	3	0.002	0.07	0.003	<0.001	0.7	15
19/20	0.99	0.02	0.8	N/A	3	0.002	0.08	0.002	<0.001	0.7	11
18/19	0.92	0.03	1.4	N/A	4	0.005	0.07	0.003	<0.001	0.8	13
Romsey											
22/23	1.01	0.029	0.10	N/A	4	0.003	0.01	<0.001	<0.001	0.07	50
21/22	0.85	0.02	0.1	N/A	4	0.002	0.01	0.004	<0.001	0.1	42
20/21	0.84	0.02	0.1	N/A	4	0.005	0.01	0.005	<0.001	0.2	54
19/20	0.76	0.02	0.1	N/A	3	0.006	0.01	0.008	<0.001	0.2	61
18/19	0.71	0.02	0.1	N/A	3	0.005	0.01	0.008	<0.001	0.2	69
Strathmore											
22/23	0.36	0.06	1.0	4	3	0.004	0.07	N/A	N/A	0.75	17
21/22	0.23	0.06	0.9	4	N/A	0.004	0.06	0.02	<0.001	0.8	19
20/21	0.15	0.06	0.8	7	N/A	0.005	0.07	0.005	<0.001	0.8	16
19/20	0.18	0.05	0.8	4	N/A	0.003	0.05	0.008	<0.001	0.8	17
18/19	0.18	0.06	1.0	6	N/A	0.004	0.06	0.008	<0.001	0.8	15
Sunbury											
22/23	1.04	0.03	0.70	N/A	<2	0.003	0.05	<0.001	<0.002	0.77	18
21/22	0.91	0.03	1.1	N/A	2	0.002	0.07	0.002	<0.001	0.8	14
20/21	0.84	0.04	1.3	N/A	3	0.002	0.07	0.002	<0.001	0.7	19
19/20	0.86	0.03	0.7	N/A	3	0.002	0.08	0.003	<0.001	0.7	14
18/19	0.80	0.04	1.2	N/A	4	0.005	0.07	0.005	<0.001	0.8	15
Taylors Lakes											
22/23	0.77	0.04	1.3	6	3	0.009	0.12	N/A	N/A	0.77	18
21/22	0.69	0.04	1.3	5	N/A	0.008	0.11	0.005	<0.001	0.8	15
20/21	0.53	0.03	0.9	5	N/A	0.004	0.08	0.006	<0.001	0.8	16
19/20	0.50	0.02	1.2	5	N/A	0.005	0.08	0.002	<0.001	0.8	16
18/19	0.48	0.03	1.3	6	N/A	0.010	0.09	0.003	<0.001	0.8	15

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
Toolern Vale											
22/23	0.98	0.08	0.8	N/A	<2	0.002	0.05	0.005	<0.001	0.75	76
21/22	0.70	0.07	0.9	N/A	2	0.002	0.03	0.005	<0.001	0.7	66
20/21	0.79	0.10	0.2	N/A	2	0.001	0.01	0.003	<0.001	0.8	112
19/20	0.95	0.10	0.1	N/A	2	0.001	0.01	0.005	<0.001	0.7	88
18/19	0.70	0.10	0.3	N/A	3	0.001	0.02	0.016	0.001	0.7	75
Tullamarine											
22/23	0.76	0.02	1.0	3	N/A	0.003	0.07	N/A	N/A	0.78	20
21/22	0.57	0.03	1.0	2	N/A	0.002	0.05	0.004	<0.001	0.8	16
20/21	0.52	0.03	0.7	3	N/A	0.002	0.04	0.004	<0.001	0.8	18
19/20	0.51	0.03	1.1	4	N/A	0.003	0.06	0.007	<0.001	0.8	26
18/19	0.62	0.03	1.1	5	N/A	0.005	0.06	0.003	<0.001	0.8	17
Werribee											
22/23	0.64	0.05	0.5	<2	<2	0.003	0.03	N/A	N/A	0.81	22
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	N/A	0.001	0.02	0.009	<0.001	0.8	24
19/20	0.41	0.05	0.5	2	N/A	0.002	0.02	0.001	<0.001	0.8	21
18/19	0.41	0.05	0.8	4	N/A	0.004	0.04	0.009	<0.001	0.8	15
Werribee South											
22/23	0.66	0.05	0.5	<2	<2	0.002	0.03	N/A	N/A	0.81	25
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	N/A	0.002	0.04	0.011	<0.001	0.8	19
19/20	0.46	0.03	0.5	4	N/A	0.002	0.08	0.001	<0.001	0.8	22
18/19	0.45	0.03	0.9	4	N/A	0.003	0.08	0.001	<0.001	0.8	16
Williamstown											
22/23	0.51	0.044	0.5	2	<2	0.002	0.04	N/A	N/A	0.81	21
21/22	0.35	0.04	0.4	<2	N/A	0.002	0.03	0.004	<0.001	0.9	19
20/21	0.29	0.04	0.5	3	N/A	0.002	0.03	0.005	<0.001	0.8	19
19/20	0.31	0.04	0.3	3	N/A	0.002	0.02	0.007	<0.001	0.8	23
18/19	0.41	0.05	0.6	3	N/A	0.002	0.02	0.007	<0.001	0.8	15

Parameter	Total chlorine (mg/L) average	Total THMs (mg/L) average	Turbidity (NTU) 95 th ile	Apparent colour (Pt/Co) average	True colour (Pt/Co) average	Manganese (mg/L) average	lron (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											
Woodend											
22/23	1.09	0.06	0.10	N/A	<2	0.003	0.01	0.004	<0.001	0.04	28
21/22	1.08	0.06	0.5	N/A	2	0.001	0.01	0.003	<0.001	0.1	16
20/21	0.94	0.06	0.1	N/A	2	0.002	0.01	0.002	<0.001	0.1	30
19/20	0.87	0.05	0.1	N/A	2	0.003	0.02	0.002	0.001	0.2	29
18/19	0.89	0.05	0.3	N/A	2	0.006	0.01	0.003	<0.001	0.2	33

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

7.3 Parameter trends during 2022-23

7.3.1 Aluminium

Aluminium levels in the water supply are low and within the Australian Drinking Water Guidelines value of 0.2 mg/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 only used in water treatment at the Winneke WTP, yet the water sampling localities more likely to receive water from this source - Moonee Ponds, Parkville, Altona, Werribee - do not exhibit markedly higher aluminium levels, as compared with other localities.

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

There were three maximum results reported in Appendix A above the Australian Drinking Water Guideline aesthetic value. Darley and Maddingley exceeded the limit of 0.2 mg/L total aluminium on one sample due to low demand and elevated pH in the network when the sample was collected.

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 5 mg/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 only in 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 3 mg/L.

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

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. Average colour levels are generally consistent within individual sampling localities.

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

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 is 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 2 mg/L based on health considerations and 1 mg/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

There were single samples that exceeded the aesthetic guideline value of 0.3 mg/L total iron in Altona, Gisborne, Myrniong, Riddells Creek, Taylors Lakes and Tullamarine localities.

The Altona exceedance was due to the status of the sample tap, which was replaced. The Gisborne exceedance was related to the status of the sample tap, which was inspected and cleaned. The Myrniong exceedance was due to sediment stirring up in the main and was resolved by flushing of the network. The Riddells Creek exceedance was related to sampling a low demand area where sediments had accumulated and included into the planned flushing program. The Taylors Lakes exceedance was due to internal corrosion issues in the sample line at Holden high level tank sample point. The Tullamarine exceedance was related to the status of the sample tap, which was inspected and replaced. Overall, slightly higher iron aesthetic levels were reported in the Taylors Lakes and Melton South water sampling localities. These levels are consistent with the source water comprising more of the relatively greater iron-containing water from Greenvale and Silvan reservoirs.

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 0.01 mg/L.

There was one maximum exceedance in Sunbury from the Riddell Road tank sample tap. Investigation at the time revealed that this result was not due to the water quality but due to the sampling technique and the type of sample tap at the tank. The tap was inspected and flushed, and subsequent samples were compliant for the site. The sample has now been replaced. Previous results for lead sampling for this site were within the Australian Drinking Water Guidelines^{*}. Further reporting was not required of this test result as water quality was within guideline limits.

7.3.9 pH

Localities that reported above the pH 8.5 aesthetic value included Bulla, Darley, East Keilor, Gisborne, Little River, Macedon, Merrimu, Mount Macedon, Myrniong, Riddells Creek, Sunbury and Toolern Vale.

The elevated pH in Sunbury, Riddells Creek, Mount Macedon and Macedon can be attributed to the presence of cement-lined mains and concrete storage tanks.

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.

7.4 Turbidity

There were a few localities that reported a single event above the 5 NTU aesthetic maximum for the 22-23 monitoring period. For both Myrniong and Taylors Lakes, elevated turbidity was due to sediment stirring up in the main and was resolved by flushing of the network.

^{*} The Department of Health advised GWW to submit a retrospective section 18 notification as the lead result from the sample tap was above the ADWG health limit.

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 2022-23, GWW received 1,242 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.

	Number	of complai	nts								
Type of	2022-23	2021-22	202	0-21 ¹	Comparison with previous reporting						
complaints	GWW	GWW	CWW	ww	periods	Comments					
Discoloured water	1,018	920	882+63 (+air in water)	147	Overall increase in trend from previous reporting period.	Responsive water mains flushing of impacted water sampling localities with an increasing trend on discoloured water customer complaints continued throughout the reporting year and will continue in 2023-24					
Taste/odour (Chlorine taste/odour)	185	187	90 (28)	40	Slight decrease from previous reporting period.	Numbers stayed constant as previous reporting period with slight increase in complaints from Werribee					
Other (alleged illness)	39	63	27 (9)	22 (1)	Decrease from previous reporting period.	The alleged illness cases were analysed and investigated. None of the					
					decreased from previous reporting period. Total 11 alleged illness cases were recorded this year.	complaints took place on the same day and/or suburb.					
Total	1,242	1,170	1,062	209	Increase of 72 from						
No. of properties	615,619	597,551	505,000	80,721							
Complaints per 100 properties	0.201	0.196	0.21	0.284							

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

1. The calculated total number of complaints for 2020-21 is 1,271

The three localities that had the highest number of discoloured water complaints for the year were Taylors Lakes (143), Parkville (122) and Werribee (119).

Table 16: Water quality related complaints received during 2022-23 by water sampling locality

	Number of cor	Number of complaints									
				Other (alleged illness, blocked filter, blue-green	Total						
Water sampling	Discoloured	To sta /a dave	A ! !	water, staining,	complaints						
	water	laste/odour	Air in water	cloudy water)							
Altona	95	20	4	5	124						
Bulla	0	0	0	0	0						
Caroline Springs	65	10	(3	85						
Deer Park	34	19	9	1	63						
Darley	4	1	0	1	6						
Diggers Rest	4	2	0	0	6						
East Keilor	28	9	5	1	43						
Eynesbury	0	0	0	1	1						
Gisborne	4	0	0	0	4						
Lancefield	0	0	0	0	0						
Lerderderg	2	0	0	0	2						
Little River	1	0	0	0	1						
Macedon	1	0	0	0	1						
Maddingley	1	0	0	0	1						
Maribyrnong	94	14	10	1	119						
Melton South	21	7	0	1	29						
Merrimu	21	4	0	3	28						
Mount Macedon	3	0	0	1	4						
Myrniong	0	2	0	0	2						
Moonee Ponds	79	7	3	3	92						
Parkville	122	20	5	3	150						
Richmond	20	3	0	0	23						
Riddells Creek	2	1	0	0	3						
Rockbank	19	4	2	0	25						
Romsey	0	1	0	2	3						
Strathmore	14	1	0	0	15						
Sunbury	14	1	0	3	18						
Taylors Lakes	143	16	4	1	164						
Toolern Vale	0	0	0	0	0						
Tullamarine	23	2	3	0	28						
Werribee	119	36	7	6	168						
Werribee South	0	0	0	0	0						
Williamstown	25	2	1	1	29						
Woodend	0	3	0	2	5						

8.2 Responses to complaints

Responses to complaints for the following complaint categories include the following.

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 ageing hot water services; in these instances customers are advised to seek further advice from a plumber. Calls 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 bluegreen 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 chlorinelike 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 and results

The audit of the risk management plan is a requirement of the *Safe Drinking Water Act 2003* (the Act) and Regulations (2015). Under s 11(1) of the Act, the Secretary to the Department of Health issued a written notice in August 2022 which required GWW to have its risk management plan audited by an approved auditor at a time between 1 January 2023 and 30 April 2023. GWW complied with this request as required under s 11(2) of the Act. This regulatory audit was the first audit as GWW.

The scope of the audit was in accordance with the Department of Health's risk management plan regulatory audit guidance information (2017). The auditor was onsite from the 14 – 17 March 2023 to conduct the audit. The audit sample included inspection of the water treatment and supply schemes, interviews with relevant staff and observation of documentation and records, covering the audit period between 1 January 2021 to 31 December 2022.

The auditor was especially pleased to note the following:

- Even though the merger is relatively recent there is an effort to integrate as a single organisation.
- There is also evidence that GWW is using the process to lift up areas where systems are not mature.

- There was pride in the work that staff undertook. This was evident in things such as the in-house design of the network re-chlorination systems.
- There is a real drive for continual improvement, there was evidence of this across the board.

The audit covered 25 elements and found 21 compliant findings and four minor non-compliance findings. Eleven opportunities for improvement were identified, with the majority on audit areas that were compliant.

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

The auditor noted that the non-compliances identified were minor and likely a reflection of the audit period including operation during a pandemic, lockdowns and the commencement of a major merger of two separate organisations. Two of the minor noncompliances were most likely exacerbated by these issues, missing monitoring samples and testing of back flow devices.

As a result of the non-compliances identified, the auditor found that GWW has not complied with the obligations imposed by s 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

There were four minor non-compliances identified as follows:

- Preventive measures in accordance with s 9(1)(b) of the *Safe Drinking Water Act 2003* were not fully implemented. A number of water agency owned testable backflow prevention devices were not tested in the required timeframe.
- The risk management plan was not implemented in its entirety in accordance with s 7(1)(a) of the *Safe Drinking Water Act 2003.* The water quality monitoring program was not fully implemented as a number of samples were missed.
- Competency requirements for personnel contracted by GWW were not specified in accordance with regulation 8(1)(f) of the Safe Drinking Water Regulations 2015.
- Actions implemented at the Romsey WFP to address an identified treatment deficit, were found to be non-compliant with the requirements of regulation 8(1)(g) of the Safe Drinking Water Regulations 2015 f or the management of short-term water quality risk.

9.1.1 Status on the actions to address the audit minor non-compliance findings

The 2023 audit identified four minor non-compliance findings in the following areas of the risk management plan audit

• Backflow prevention - The development and implementation of preventative strategies (including appropriate control and monitoring measures) has been given a minor non-compliance as the backflow prevention devices owned by GWW in the Western Water region were not tested within an adequate timeframe.

Status: Completed. The backflow prevention devices that were overdue at the time of the audit have been tested and this action is complete.

• Risk management plan - The implementation and compliance with the requirements of the risk management plan has been given a minor noncompliance as GWW failed to fully implement the water quality monitoring plan in the audit period.

Status: Completed. The water quality monitoring plan was reviewed, updated and resolved during the audit period. Additional review was performed by an external expert consultant in July 2023 and the changes made to the plan were found to have addressed the original non-compliance. This action is now complete.

 Training - The requirement for competency and training of personnel who are employed or engaged by the water agency, in relation to the monitoring and management of hazards and risks, has been given a minor non-compliance as a gap was identified in the competency and training processes for contract staff undertaking field services. This was considered to be minor as there are some informal structures in place and contract oversight through audits by GWW.

Status: In progress. Since the audit, the external contractor has improved the accessibility to procedures for crews working on site. GWW will continue to work with the contractor to develop and update water quality training processes to improve awareness and assess competency. Activities to deliver this action are still in progress.

 Infrastructure in place to manage risk - The interpretation of the treatment gap identified at the Romsey WFP at the time of the 2020 risk assessment was considered low risk as a new treatment plant identified to close that gap was due for delivery in 2022. The audit considered it was appropriate to undertake further shortterm actions to mitigate the risk. As there was no evidence of virus and the gap marginal with low risk of community impact, the finding was considered a minor non-compliance.

Status: Partially complete. Additional monitoring has been implemented and interim, short-term additional disinfection processes are being implemented and are due for completion in October 2023.

9.1.2 Status on the actions to address the audit Opportunities for Improvement findings

Eleven opportunities for improvement were identified from the audit. To date, two of the 11 actions have been completed. The following outlines the opportunities and their status.

• Remove the reference to plant bypass in the Merrimu risk assessment. This has been disconnected and would require a separate risk assessment process to reinstate.

Status: The documentation is scheduled to be updated in line with the internal risk management review process during 2023-24. This action is in progress.

• Consider adding an explicit hazardous event in the City West Water risk assessment for recycled water cross-connects. The current event that covers this risk is generic.

Status: Review of the recycled water interaction with drinking water is scheduled as part of the internal risk management review process during 2023-24.

This action is in progress.

• Include a revision history in the risk assessment spreadsheets. This should include the date of a review and the changes made.

Status: Action is complete with recent risk assessment reviews of source water to customer taps.

• Consider aligning the process and structure of water quality risk assessments between City West Water and Western Water. This will improve their usability and integration of the risk management plans.

Status: Both plans have been reviewed by an external consultant and the process to combine and update the assessment process will be delivered as part of the drinking water improvement roadmap actions, with completion expected during 2023-24. This action is in progress.

 Include a requirement to undertake a review of the drinking water supply system as part of the risk assessment methodology. This should include descriptive statistics and trending of water quality, a review of complaints, the performance of critical control points (CCPs) and details of recent incidents.

Status: This action will be delivered as part of the drinking water improvement roadmap actions and consolidation of risk management approaches and alignment. This action is in progress.

- Repair the damaged fence around Kerrie Reservoir. **Status:** Completed. The fence repairs have been completed. This action is complete.
- It would be beneficial to use operator checklists at water filtration plants for daily, weekly and monthly routine tasks. This will aid operators and provide auditable evidence. A hardcopy or electronic copy could be used.

Status: This action is in progress with a core checklist template being tested and rolled out across the water treatment plants.

• It is recommended that incident and emergency details are only in the City West Water risk management plan, as they should be consistent across all sites. A thorough review of incident and emergency documentation use in relation to water quality is required to ensure currency.

Status: This action is being progressed as part of the next version of the consolidated risk management plan and alignment with the updated GWW

emergency management work currently underway.

• The risk management plan must include the details for competency and training of employees and those engaged by GWW, including under service contracts. Training and competency requirements for contractors must be reviewed, documented and appropriate measures put in place to ensure competency.

Status: This action is being progressed as part of the next version of the consolidated risk management plan.

• A short-term risk management strategy must be put in place for the Romsey WFP. It currently has an estimated four log treatment shortfall for virus and although there is a process in place to upgrade the plant there must be action taken to verify the risk and short-term action before the new plant is built.

Status: This is a multi-step action. The first part included setting up an interim sampling program to monitor the performance of the plant in the removal of viruses if they were detected in the source water. The program began in May 2023 and will be reviewed when the chlorine contact pipework has been installed. Implementation and performance of the Romsey WFP HACCP barriers is also a core item on our HACCP meetings until the interim chlorine dosing and contact pipe work is installed and the ultraviolet (UV) unit installation is completed. This work has been completed with additional short-term monitoring program in place for source water being treated at the Romsey WFP. Increased oversight of the performance of the HACCP preventative measure barriers by the plant operators also forms part of the short-term measure as well as the implementation of chlorine disinfection until the UV treatment unit is installed. This action is in progress.

• As part of the integration of the HACCP plans, ensure that CCPs are assessed consistently across City West Water and Western Water service areas. Currently tanks have been assessed differently between the two areas.

Status: This will be delivered as part of the drinking water improvement roadmap actions and the consolidation of risk management approaches in 2023-24. This action is in progress.

9.1.3 Status of previous audit actions

During the 2023 audit, the auditor noted the close out of the previously open actions from the 2020 and 2018 audits completed as City West Water and Western Water.

As reported in the 2022 Drinking water quality report, City West Water had one action in progress from the 2018 audit. This has now been closed out.

Progress on 2018 audit outcomes and actions City West Water

As reported in the 2022 Drinking water quality report, one opportunity for improvement remains in progress. There were six opportunities for improvement identified at the time of the audit; five have since been closed out. The final opportunity for improvement was closed out in 2023 with details 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: The handover of the operation and maintenance of GWW's chlorine doing systems has been completed. These units are now operated and maintained by GWW. This process included implementation of new telemetry and will enable improved visibility and monitoring of secondary disinfection performance, including in relation to water chemistry. This item is now closed and action complete.

Progress on 2020 audit outcomes and actions Western Water

As reported in the 2022 Drinking water quality report, three opportunities for improvement noted by the auditor were in progress. During 2022-23, the remaining two opportunities were closed out.

• 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: This is a long-term issue to be managed at an industry level. GWW completed the actions and through the integration have access to the Melbourne Water Retail Water Agencies product specifications for recycled water schemes. This action is now complete. • 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: The HACCP scope document was updated and published by the HACCP committee and the item is completed.

Progress on 2018 audit outcomes and actions

As reported in the 2022 Drinking water quality report, the status of the remaining two open actions during 2023 is provided below. One action has been closed out and the final action is planned for completion by June 2024.

- For the most important critical limits (such as individual filter effluent turbidities, a point representative of primary chlorination after adequate CT 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: A significant program of work to upgrade programmable logic controller (PLC) at all plants was required to deliver this action. The schedule of works was staggered to meet operational and delivery constraints and was impacted by COVID-19 restrictions. The final upgrades were completed in 2022. During 2022-23, the final stage of work was scoped, which is the full rollout of HACCP SCADA pages and 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. This action is in progress.
- There may be locations where Western Water and the laboratory service provider 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 labelling work was completed in 2023.

9.2 HACCP audit outcomes

GWW retained certification to Codex HACCP in 2022. During 2022-23, two HACCP certifications were maintained while the process of working toward a single certification continued. The singe certification process is likely to be completed by end of 2024. Copies of the audit certificates are available upon request. 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 and 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 2022-23, 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 2022-23, 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 2022-23, 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 nonpotable 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 annual reports 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

All water sampling localities

Concentration or value										
				(all sample	es)		No of Sa	mples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Alkalinity, Total (as CaCO ₃)	mg/L	NA	11	24	230	>Monthly	278	NA	NA	
Aluminium	mg/L	0.2	0.01	0.06	0.35	>Monthly	323	320	99.07%	
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.08	>Monthly	463	463	100%	
Bromoform	mg/L	NA	<0.001	<0.001	0.011	>Monthly	1168	NA	NA	
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	< 0.0002	Quarterly	46	46	100%	
Calcium	mg/L	NA	2.6	8.5	34	Monthly	292	NA	NA	
Chloride	mg/L	250	19	47	110	Quarterly	27	27	100%	
Chlorine, Free	mg/L	5	<0.05	0.64	3.8	Weekly	8174	8174	100%	
Chlorine, Total	mg/L	5	<0.05	0.84	4.8	Weekly	8175	8175	100%	
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	0.006	Quarterly	28	28	100%	
Chloroform	mg/L	NA	0.001	0.035	0.12	>Monthly	1168	А	NA	
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	Quarterly	74	74	100%	
Coliforms, Total	orgs/100mL	NA	<1	<1	100	Weekly	8146	NA	NA	
Colour, Apparent	Pt/Co units	25	<2	3	18	Fortnightly	237	237	100%	
Colour, True	Pt/Co units	15	<2	<2	12	>Fortnightly	3425	3425	100%	
Copper	mg/L	1	<0.001	0.007	0.13	Quarterly	64	64	100%	
Dibromochloromethane	mg/L	NA	<0.001	0.007	0.05	>Monthly	1168	NA	NA	
Dichloroacetic acid	mg/L	0.1	0.009	0.019	0.074	Quarterly	28	28	100%	
Dichlorobromomethane	mg/L	NA	0.001	0.015	0.066	>Monthly	1168	NA	NA	
Dissolved Oxygen	mg/L	NA	7.1	9.8	11.6	Monthly	607	NA	NA	
Dissolved Solids, Total	mg/L	600	42	138	330	Fortnightly	1255	1255	100%	
E. coli	orgs/100mL	Zero(0)	0	0	14	Weekly	8144	8,144	100%	
Electrical Conductivity (25°C)	µS/cm	~900	65	203	620	Fortnightly	3976	3976	100%	
Fluoride	mg/L	1.5	0.03	0.67	0.98	Monthly	1112	1,112	100%	
Hardness, Total (as CaCO ₃)	mg/L	200	9	42	140	Monthly	1590	1,590	100%	
Iron	mg/L	0.3	<0.01	0.04	0.41	>Weekly	2141	2,135	99.72%	
Lead	mg/L	0.01	<0.001	<0.001	0.017	Quarterly	68	67	98.53%	
Magnesium	mg/L	NA	0.4	5	21	Monthly	292	NA	NA	
Manganese	mg/L	0.1	<0.001	0.003	0.049	>Weekly	2142	2,142	100%	
Mercury	mg/L	0.001	<0.0001	<0.0001	0.0002	Quarterly	46	46	100%	

All water sampling localities Table detailing parameters sampled, values of samples, frequency and performance against

Table detailing parameters sampled, values of

standards for all water sampling localities combifed on contration or value												
		······································		(all sample	es)		No of Samples					
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline			
Monochloramine	mg/L	3	<0.05	0.54	1.4	Weekly	308	308	100%			
Nitrate (as NO ₃)	mg/L	50	0.007	0.141	0.370	Monthly	416	416	100%			
рН	units	6.5-8.5	6.8	7.6	9.6	Weekly	7000	6,702	95.74%			
Sodium	mg/L	180	5.3	14	46	Monthly	18	18	100%			
Sulfate (as SO ₄)	mg/L	250	2	20	64	Quarterly	6	6	100%			
Temperature	°C	NA	5.6	17.4	26.1	Weekly	4450	NA	NA			
Total Plate Count (37°C)	cfu/mL	NA	<1	2	2000	Weekly	8006	NA	NA			
Trichloroacetic acid	mg/L	0.1	0.01	0.021	0.076	Quarterly	28	28	100%			
Trihalomethanes, Total	mg/L	0.25	0.001	0.058	0.21	>Monthly	1168	1,168	100%			
Turbidity	NTU	5	<0.1	0.71	12	Weekly	7120	NA	within standard			
Zinc	mg/L	3	< 0.001	0.004	0.016	Quarterly	70	70	100%			

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps, tanks, pump stations for the specific water sampling localities

3 No. of samples collected is more than the frequency due to multiple sites sampled in the localities

4 These sample results were confirmed as false positive samples. Refer to Section 4.1 of this report for details.

Altona

			Concent						
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.02	0.03	0.03	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.32	1	>Weekly	394	394	100%
Chlorine, Total	mg/L	5	0.06	0.44	1.2	>Weekly	394	394	100%
Chloroform	mg/L	NA	0.019	0.027	0.041	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	16	>Weekly	394	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	4	>Monthly	11	11	100%
Colour, True	Pt/Co units	15	<2	<2	2	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.003	0.004	0.006	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.009	0.011	0.013	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	10	10	10	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	62	68	72	Monthly	12	12	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	394	394	100%
Electrical Conductivity (25°C)	µS/cm	~900	82	98	110	Fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.71	0.82	0.87	>Monthly	18	18	100%
Hardness, Total (as CaCO ₃)	mg/L	200	19	22	26	>Monthly	14	14	100%
Iron	mg/L	0.3	0.02	0.04	0.06	>Monthly	19	19	100%
Manganese	mg/L	0.1	<0.001	0.003	0.008	>Monthly	19	19	100%
рН	units	6.5-8.5	7.1	7.3	7.8	>Weekly	273	273	100%
Temperature	°C	NA	11.8	18.4	25.4	>Weekly	270	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	1	260	>Weekly	391	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.035	0.043	0.054	Monthly	12	12	100%
Turbidity	NTU	5 ¹	<0.1	0.5 ¹	4.5	>Weekly	281	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Bulla

			Concentr (all samp	ation or valı les)	No of Samples				
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	13	16	21	>Quarterly	7	NA	NA
Aluminium	mg/L	0.2	<0.01	0.06	0.08	>Quarterly	7	7	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	0.02	>Quarterly	7	7	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	2	2	100%
Calcium	mg/L	NA	4.8	6.1	8.9	>Quarterly	7	А	NA
Chlorine, Free	mg/L	5	<0.05	0.57	0.95	Weekly	52	52	100%
Chlorine, Total	mg/L	5	0.09	0.71	1.1	Weekly	52	52	100%
Chloroform	mg/L	NA	0.019	0.027	0.035	>Monthly	14	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	5	Weekly	52	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	42	42	100%
Copper	mg/L	1	0.003	0.044	0.085	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.002	>Monthly	14	NA	NA
Dichlorobromomethane	mg/L	NA	0.005	0.007	0.009	>Monthly	14	NA	NA
Dissolved Oxygen	mg/L	NA	7.3	9.7	11	>Fortnightly	30	А	NA
Dissolved Solids, Total	mg/L	600	50	53	60	Monthly	12	12	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	52	52	100%
Electrical Conductivity (25°C)	µS/cm	~900	71	78	89	>Fortnightly	42	42	100%
Fluoride	mg/L	1.5	0.09	0.72	0.82	Monthly	12	12	100%
Hardness, Total (as CaCO ₃)	mg/L	200	17	19	24	>Monthly	19	19	100%
Iron	mg/L	0.3	<0.01	0.07	0.16	>Fortnightly	35	35	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	0.4	1	1.5	>Quarterly	7	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.02	>Fortnightly	35	35	100%
Mercury	mg/L	0.001	<0.0001	0.0001	0.0002	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.15	0.18	>Quarterly	7	7	100%
рН	units	6.5-8.5	7.5	7.9	9.4	Weekly	52	50	96.15%
Temperature	°C	NA	11.9	17	20.7	>Monthly	22	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	10	420	Weekly	52	NA	NA

Bulla

			Concent	tration or valu					
			(all sam	ples)			No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Trihalomethanes, Total	mg/L	0.25	0.026	0.035	0.044	>Monthly	14	14	100%
Turbidity	NTU	5	0.3	0.71	1.2	Weekly	52	NA	within standard
Zinc	mg/L	3	0.003	0.01	0.016	>Annually	2	2	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Caroline Springs

			Concent	ration or valu	Ie				
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.02	Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.4	0.94	>Weekly	348	348	100%
Chlorine, Total	mg/L	5	0.06	0.53	1	>Weekly	348	348	100%
Chloroform	mg/L	NA	0.013	0.016	0.02	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	100	>Weekly	348	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	6	>Monthly	13	13	100%
Colour, True	Pt/Co units	15	<2	<2	2	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.001	0.004	0.009	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.008	0.013	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	11.2	11.2	11.2	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	48	59	78	Monthly	12	12	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	348	348	100%
Electrical Conductivity (25°C)	µS/cm	~900	46	79	120	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.71	0.79	0.93	>Monthly	19	19	100%
Hardness, Total (as CaCO ₃)	mg/L	200	14	20	36	>Monthly	14	14	100%
Iron	mg/L	0.3	<0.01	0.05	0.08	>Monthly	20	20	100%
Manganese	mg/L	0.1	< 0.001	0.002	0.004	>Monthly	20	20	100%
рН	units	6.5-8.5	6.9	7.4	8.3	>Weekly	243	243	100%
Temperature	°C	NA	10.1	18.1	23.8	>Weekly	236	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	1	120	>Weekly	350	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.019	0.027	0.037	Monthly	12	12	100%
Turbidity	NTU	5	<0.1	0.71	1.2	>Weekly	248	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Darley

			Concentr	ation or valu	Ie				
			(all samp	les)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	12	35	230	>Monthly	19	NA	NA
Aluminium	mg/L	0.2	0.02	0.08	0.35	>Monthly	39	37	94.87%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	>Monthly	39	39	100%
Bromoform	mg/L	Ν	<0.001	0.001	0.003	>Weekly	100	NA	NA
Cadmium	mg/L	0.002	< 0.0002	<0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	4.2	10.6	18	>Monthly	43	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.79	2	>Weekly	513	513	100%
Chlorine, Total	mg/L	5	0.06	1.02	2.3	>Weekly	514	514	100%
Chloroform	mg/L	Ν	0.024	0.058	0.11	>Weekly	100	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	25	>Weekly	514	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Weekly	414	414	100%
Copper	mg/L	1	0.005	0.007	0.008	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	<0.001	0.015	0.029	>Weekly	100	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.031	0.057	>Weekly	100	NA	NA
Dissolved Oxygen	mg/L	NA	8.2	10	11.4	>Monthly	30	NA	NA
Dissolved Solids, Total	mg/L	600	210	254	270	>Weekly	121	121	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	514	514	100%
Electrical Conductivity (25°C)	µS/cm	~900	72	264	410	>Weekly	414	414	100%
Fluoride	mg/L	1.5	0.56	0.77	0.87	>Weekly	77	77	100%
Hardness, Total (as CaCO ₃)	mg/L	200	16	75	110	>Weekly	159	159	100%
Iron	mg/L	0.3	<0.01	0.04	0.16	>Weekly	112	112	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.4	6.9	14	>Monthly	43	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.005	>Weekly	112	112	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.18	0.22	Quarterly	19	19	100%
рН	units	6.5-8.5	7.2	7.7	9.1	>Weekly	513	509	99.22%
Temperature	°C	NA	10.2	17	23.3	>Weekly	222	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	1	400	>Weekly	513	NA	NA

Darley

		Concentration or value								
			(all sam	ples)			No of Samples			
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Trihalomethanes, Total	mg/L	0.25	0.03	0.10	0.18	>Weekly	100	100	100%	
Turbidity	NTU	5	<0.1	0.71	4.9	>Weekly	523	NA	within standard	
Zinc	mg/L	3	0.004	0.007	0.009	>Annually	2	2	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps, tanks, 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

Deer Park

			Concent	ration or valu					
			(all samp	oles)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.01	0.02	0.03	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	0.09	0.42	1.1	>Weekly	260	260	100%
Chlorine, Total	mg/L	5	0.19	0.56	1.3	>Weekly	260	260	100%
Chloroform	mg/L	NA	0.011	0.015	0.021	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	7	>Weekly	260	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	6	>Monthly	13	13	100%
Colour, True	Pt/Co units	15	<2	<2	<2	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.002	0.005	0.008	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.005	0.009	0.013	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	10.8	10.8	10.8	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	56	70	77	Monthly	12	12	100%
<u>E. coli</u>	orgs/100mL	Zero (0)	0	0	0	>Weekly	260	260	100%
Electrical Conductivity (25°C)	µS/cm	~900	50	99	120	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.71	0.82	0.95	>Monthly	20	20	100%
Hardness, Total (as CaCO ₃)	mg/L	200	18	22	30	>Monthly	14	14	100%
Iron	mg/L	0.3	<0.01	0.03	0.12	>Monthly	20	20	100%
Manganese	mg/L	0.1	< 0.001	0.003	0.026	>Monthly	20	20	100%
рН	units	6.5-8.5	6.8	7.4	8.8	>Weekly	176	174	98.86%
Temperature	°C	NA	12.2	18.6	24.4	>Weekly	169	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	4	>Weekly	263	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.02	0.029	0.037	Monthly	12	12	100%
Turbidity	NTU	5	<0.1	0.5 ¹	1	>Weekly	184	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Diggers Rest

			Concentr (all samp	ation or valu les)	No of Samples				
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity. Total (as CaCO ₂)	mg/L	NA	12	2	13	>Ouarterly	7	NA	NA
Aluminium	mg/L	0.2	0.04	0.06	0.08	>Ouarterly	14	14	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	<0.01	>Quarterly	14	14	100%
Bromoform	mg/L	NA	< 0.001	< 0.001	<0.001	>Monthly	19	NA	NA
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	А	4.1	4.2	4.3	>Quarterly	7	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.41	1.1	Weekly	104	104	100%
Chlorine, Total	mg/L	5	< 0.05	0.53	1.3	Weekly	104	104	100%
Chloroform	mg/L	NA	0.012	0.022	0.035	>Monthly	19	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	2	Weekly	104	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	84	84	100%
Copper	mg/L	1	0.002	0.002	0.002	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	<0.001	0.002	0.002	>Monthly	19	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.006	0.008	>Monthly	19	NA	NA
Dissolved Oxygen	mg/L	NA	7.2	9.7	11	>Fortnightly	30	NA	NA
Dissolved Solids, Total	mg/L	600	48	51	55	Monthly	24	24	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	104	104	100%
Electrical Conductivity (25°C)	μS/cm	~900	70	74	81	>Fortnightly	84	84	100%
Fluoride	mg/L	1.5	<0.05	0.74	0.85	Monthly	24	24	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	15	17	24	>Monthly	31	31	100%
Iron	mg/L	0.3	0.04	0.06	0.1	>Fortnightly	47	47	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.3	1.4	1.6	>Quarterly	7	NA	NA
Manganese	mg/L	0.1	0.001	0.003	0.005	>Fortnightly	47	47	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.15	0.17	>Quarterly	7	7	100%
pH	units	6.5-8.5	7.1	7.5	8	Weekly	104	104	100%
Temperature	°C	Ν	11.6	17.9	23.5	>Monthly	44	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	51	2,000	Weekly	104	NA	NA

Diggers Rest

		Concentration or value							
			(all sam	ples)			No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Trihalomethanes, Total	mg/L	0.25	0.017	0.030	0.045	>Monthly	19	19	100%
Turbidity	NTU	5 ¹	0.3	0.8 ¹	1	Weekly	104	NA	within standard
Zinc	mg/L	3	0.002	0.003	0.003	>Annually	2	2	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps, tanks, 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

East Keilor

			Concent						
			(all sam	oles)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.01	0.02	0.02	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	0.13	0.71	1.5	>Weekly	156	156	100%
Chlorine, Total	mg/L	5	0.31	0.86	1.9	>Weekly	156	156	100%
Chloroform	mg/L	NA	0.009	0.013	0.016	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	100	>Weekly	156	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	6	>Monthly	13	13	100%
Colour, True	Pt/Co units	15	<2	<2	4	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.002	0.005	0.007	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.009	0.011	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	11.4	11.4	11.4	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	56	72	83	Monthly	12	12	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	156	156	100%
Electrical Conductivity (25°C)	µS/cm	~900	73	103	140	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.55	0.8	0.88	>Monthly	19	19	100%
Hardness, Total (as CaCO ₃)	mg/L	200	17	24	37	>Monthly	14	14	100%
Iron	mg/L	0.3	<0.01	0.03	0.06	>Monthly	20	20	100%
Manganese	mg/L	0.1	< 0.001	0.001	0.003	>Monthly	20	20	100%
рН	units	6.5-8.5	7.2	7.5	9.6	>Weekly	111	107	96.40%
Temperature	°C	NA	10.9	18.3	24.4	>Weekly	104	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	10	>Weekly	157	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.016	0.026	0.033	Monthly	12	12	100%
Turbidity	NTU	5 ¹	<0.1	0.51	1	>Weekly	119	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Eynesbury

			Concentr	ation or valu	le				
		Guideline	(all samp	les)			No of Sa	mples	Performance
Parameter	Unit	Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	11	13	14	>Quarterly	9	NA	NA
Aluminium	mg/L	0.2	0.04	0.06	0.08	>Quarterly	16	16	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	0.01	>Quarterly	16	16	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	31	NA	NA
Cadmium	mg/L	0.002	< 0.0002	<0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	3.8	4.2	4.6	>Quarterly	9	NA	NA
Chlorine, Free	mg/L	5	0.24	0.72	1.2	Weekly	156	156	100%
Chlorine, Total	mg/L	5	0.31	0.93	1.4	Weekly	156	156	100%
Chloroform	mg/L	NA	0.014	0.027	0.038	>Monthly	31	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	9	Weekly	156	NA	NA
Colour, True	Pt/Co units	15	<2	3	8	>Fortnightly	103	103	100%
Copper	mg/L	1	<0.001	0.004	0.008	>Annually	4	4	100%
Dibromochloromethane	mg/L	NA	<0.001	0.002	0.003	>Monthly	31	NA	NA
Dichlorobromomethane	mg/L	NA	0.003	0.007	0.009	>Monthly	31	NA	NA
Dissolved Oxygen	mg/L	NA	8	9.9	11	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	52	54	57	Monthly	34	34	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	156	156	100%
Electrical Conductivity (25°C)	µS/cm	~900	72	76	84	>Fortnightly	127	127	100%
Fluoride	mg/L	1.5	0.71	0.77	0.86	Monthly	29	29	100%
Hardness, Total (as CaCO ₃)	mg/L	200	12	17	23	>Monthly	43	43	100%
Iron	mg/L	0.3	0.03	0.07	0.26	>Fortnightly	84	84	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	4	4	100%
Magnesium	mg/L	NA	1.1	1.3	1.4	>Quarterly	9	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.013	>Fortnightly	84	84	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.14	0.16	0.18	>Quarterly	7	7	100%
рН	units	6.5-8.5	7.1	7.5	7.8	Weekly	156	156	100%
Temperature	°C	NA	12.8	17.3	20.9	>Monthly	63	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	22	Weekly	156	NA	NA

Eynesbury

	Unit		Concentration or value						
Parameter			(all samples)				No of Samples		
		Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Trihalomethanes, Total	mg/L	0.25	0.017	0.035	0.048	>Monthly	31	31	100%
Turbidity	NTU	5	0.3	1 ¹	2.3	Weekly	156	NA	within standard
Zinc	mg/L	3	0.002	0.003	0.003	>Annually	4	4	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Gisborne

	Unit		Concentration or value							
		Guideline Value (ADWG 2011)	(all samples)				No of Samples			
Parameter			Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Alkalinity Total (as CaCO ₂)	mg/l	NA	11	21	38	>Ouarterly	24	NA	NA	
Aluminium	mg/L	0.2	0.04	0.07	0.11	>Ouarterly	19	19	100%	
Aluminium. Soluble	mg/L	0.2	< 0.01	0.01	0.03	>Ouarterly	19	19	100%	
Bromoform	mg/L	NA	< 0.001	< 0.001	<0.001	>Monthly	86	NA	NA	
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	<0.0002	>Annually	2	2	100%	
Calcium	mg/L	NA	4.4	13.2	34	>Quarterly	23	NA	NA	
Chloride	mg/L	250	19	55	80	>Quarterly	7	7	100%	
Chlorine, Free	mg/L	5	0.09	0.91	2	>Weekly	376	376	100%	
Chlorine, Total	mg/L	5	0.21	1.14	2.3	>Weekly	376	376	100%	
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	0.006	Monthly	12	12	100%	
Chloroform	mg/L	NA	0.001	0.033	0.11	>Monthly	86	NA	NA	
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Monthly	14	14	100%	
Coliforms, Total	MPN/100mL	NA	<1	<1	17	>Weekly	376	NA	NA	
Colour, True	PCU	15	<2	<2	6	>Weekly	294	294	100%	
Copper	mg/L	1	<0.001	0.001	0.001	>Annually	2	2	100%	
Dibromochloromethane	mg/L	NA	<0.001	0.002	0.01	>Monthly	86	NA	NA	
Dichloroacetic acid	mg/L	0.1	0.009	0.023	0.074	>Monthly	12	12	100%	
Dichlorobromomethane	mg/L	NA	0.001	0.008	0.031	>Monthly	86	NA	NA	
Dissolved Oxygen	mg/L	NA	7.6	9.7	11.1	Fortnightly	30	NA	NA	
Dissolved Solids, Total	mg/L	600	51	75	260	>Monthly	91	91	100%	
E. coli	MPN/100mL	Zero (0)	0	0	0	>Weekly	376	376	100%	
Electrical Conductivity (25°C)	µS/cm	~900	72	158	430	>Weekly	294	294	100%	
Fluoride	mg/L	1.5	0.59	0.78	0.86	>Monthly	72	72	100%	
Hardness, Total (as CaCO ₃)	mg/L	200	15	29	120	>Monthly	108	108	100%	
Iron	mg/L	0.3	0.01	0.05	0.33	Fortnightly	106	105	99.06%	
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%	
Magnesium	mg/L	NA	1	3.7	9.6	>Quarterly	23	NA	NA	
Manganese	mg/L	0.1	0.001	0.004	0.043	Fortnightly	106	106	100%	
Mercury	mg/L	0.001	<0.0001	<0.0001	< 0.0001	>Annually	2	2	100%	
Nitrate (as NO_3)	mg/L	50	0.13	0.16	0.24	>Monthly	14	14	100%	
Gisborne

			Concent	tration or valu	le				
	(a Guideline Value Unit (ADWG 2011) M Units 6.5-8.5 7.		(all sam	ples)			No of Samples		
Parameter		Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
pH Units		7.3	7.8	9.1	>Weekly	369	342	92.68%	
Temperature	°C	NA	8.7	15.9	21.3	>Weekly	159	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	50	>Weekly	370	NA	NA
Trichloroacetic acid	mg/L	0.1	0.01	0.027	0.076	Monthly	12	12	100%
Trihalomethanes, Total	mg/L	0.25	0.001	0.042	0.15	>Monthly	86	86	100%
Turbidity	NTU	5	<0.1	0.71	3.5	>Weekly	369	NA	within standard
Zinc	mg/L	3	0.002	0.005	0.007	>Annually	4	4	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Lancefield

			Concentration or value					No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Alkalinity. Total (as CaCO ₂)	mg/L	NA	26	30	34	>Ouarterly	14	NA	NA	
Aluminium	mg/L	0.2	<0.01	0.03	0.1	>Ouarterly	9	9	100%	
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	<0.01	>Quarterly	9	9	100%	
Bromoform	mg/L	NA	0.002	0.006	0.011	>Monthly	28	NA	NA	
Cadmium	mg/L	0.002	<0.0002	< 0.0002	<0.0002	>Annually	4	4	100%	
Calcium	mg/L	NA	5.9	7.7	10	>Quarterly	12	NA	NA	
Chloride	mg/L	250	83	97	110	>Annually	2	2	100%	
Chlorine, Free	mg/L	5	0.06	0.94	1.5	Weekly	113	113	100%	
Chlorine, Total	mg/L	5	0.23	1.29	2	Weekly	113	113	100%	
Chloroform	mg/L	NA	0.011	0.036	0.083	>Monthly	28	NA	NA	
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	4	4	100%	
Coliforms, Total	orgs/100mL	NA	<1	<1	2	Weekly	115	NA	NA	
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	90	90	100%	
Copper	mg/L	1	0.002	0.009	0.019	>Annually	4	4	100%	
Dibromochloromethane	mg/L	NA	0.018	0.032	0.05	>Monthly	28	NA	NA	
Dichlorobromomethane	mg/L	NA	0.016	0.038	0.061	>Monthly	28	NA	NA	
Dissolved Oxygen	mg/L	NA	7.6	9.5	11.6	>Fortnightly	31	NA	NA	
Dissolved Solids, Total	mg/L	600	170	267	300	Monthly	30	30	100%	
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	113	113	100%	
Electrical Conductivity (25°C)	µS/cm	~900	260	368	450	>Fortnightly	90	90	100%	
Fluoride	mg/L	1.5	0.06	0.09	0.11	Monthly	19	19	100%	
Hardness, Total (as CaCO ₃)	mg/L	200	40	78	130	>Monthly	42	42	100%	
Iron	mg/L	0.3	<0.01	0.01	0.05	>Fortnightly	74	74	100%	
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	4	4	100%	
Magnesium	mg/L	NA	6.1	8.1	11	>Quarterly	12	NA	NA	
Manganese	mg/L	0.1	<0.001	0.001	0.01	>Fortnightly	74	74	100%	
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	4	4	100%	
Nitrate (as NO ₃)	mg/L	50	0.01	0.04	0.1	>Quarterly	38	38	100%	
рН	units	6.5-8.5	7.4	7.7	8.1	Weekly	113	113	100%	
Temperature	°C	NA	10	15.5	21	>Monthly	53	NA	NA	

Lancefield

			Concent	ration or valu	e					
			(all sam	ples)			No of Sa	mples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	18	Weekly	113	NA	NA	
Trihalomethanes, Total	mg/L	0.25	0.055	0.111	0.18	>Monthly	28	28	100%	
Turbidity	NTU	5 ¹	<0.1	0.1 ¹	0.2	Weekly	113	NA	within standard	
Zinc	mg/L	3	<0.001	0.004	0.008	>Annually	4	4	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Lerderderg

			Concentr (all samp	ation or valu les)	No of Samples				
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	12	23	34	>Quarterly	13	NA	NA
Aluminium	mg/L	0.2	0.03	0.06	0.1	>Quarterly	20	20	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.04	>Quarterly	20	20	100%
Bromoform	mg/L	NA	<0.001	0.001	0.002	>Monthly	55	NA	NA
Cadmium	mg/L	0.002	<0.0002	< 0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	4	10.5	16	>Quarterly	23	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.85	1.5	Weekly	272	272	100%
Chlorine, Total	mg/L	5	0.17	1.11	1.8	Weekly	272	272	100%
Chloroform	mg/L	NA	0.019	0.053	0.11	>Monthly	55	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	30	Weekly	272	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	212	212	100%
Copper	mg/L	1	0.001	0.066	0.13	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.014	0.025	>Monthly	55	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.029	0.05	>Monthly	55	NA	NA
Dissolved Oxygen	mg/L	NA	8.4	10.1	11.4	>Fortnightly	32	NA	NA
Dissolved Solids, Total	mg/L	600	230	261	290	Monthly	56	56	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	272	272	100%
Electrical Conductivity (25°C)	µS/cm	~900	72	267	430	>Fortnightly	272	272	100%
Fluoride	mg/L	1.5	0.5	0.76	0.98	Monthly	39	39	100%
Hardness, Total (as CaCO ₃)	mg/L	200	16	73	110	>Monthly	84	84	100%
Iron	mg/L	0.3	<0.01	0.04	0.14	>Fortnightly	70	70	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.4	7.6	13	>Quarterly	23	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.017	>Fortnightly	70	70	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.14	0.18	0.21	>Quarterly	13	13	100%
рН	units	6.5-8.5	7.3	7.6	8.1	Weekly	266	266	100%
Temperature	°C	NA	10	17	25.4	>Monthly	115	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	30	Weekly	266	NA	NA

Lerderderg

			Concent	tration or valu	le					
Parameter			(all sam	ples)		No of Samples				
	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Trihalomethanes, Total	mg/L	0.25	0.024	0.097	0.18	>Monthly	55	55	100%	
Turbidity	NTU	5 ¹	<0.1	0.6 ¹	1.4	Weekly	266	NA	within standard	
Zinc	mg/L	3	0.002	0.007	0.012	>Annually	2	2	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Little River

			Concent	ration or valu	le				
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.01	0.03	0.06	> Quarterly	26	26	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	49	NA	NA
Chlorine, Free	mg/L	5	0.06	0.68	1.6	>Weekly	185	185	100%
Chlorine, Total	mg/L	5	0.14	0.82	1.7	>Weekly	185	185	100%
Chloroform	mg/L	NA	0.023	0.034	0.056	Monthly	49	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	100	>Weekly	185	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	6	>Monthly	35	35	100%
Colour, True	Pt/Co units	15	<2	<2	2	>Monthly	53	53	100%
Dibromochloromethane	mg/L	NA	0.003	0.005	0.007	Monthly	49	NA	NA
Dichlorobromomethane	mg/L	NA	0.009	0.013	0.017	Monthly	49	NA	NA
Dissolved Solids, Total	mg/L	600	64	75	92	Monthly	48	48	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	185	185	100%
Electrical Conductivity (25°C)	µS/cm	~900	84	110	140	Fortnightly	85	85	100%
Fluoride	mg/L	1.5	0.56	0.8	0.93	>Monthly	57	57	100%
Hardness, Total (as CaCO ₃)	mg/L	200	17	25	41	>Monthly	53	53	100%
Iron	mg/L	0.3	0.01	0.04	0.09	>Monthly	56	56	100%
Manganese	mg/L	0.1	<0.001	0.002	0.014	>Monthly	56	56	100%
рН	units	6.5-8.5	6.9	7.4	8.8	>Weekly	164	162	98.78%
Temperature	°C	NA	11.8	17.7	23.5	>Weekly	143	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	41	>Weekly	185	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.041	0.052	0.073	Monthly	49	49	100%
Turbidity	NTU	5	<0.1	0.5 ¹	0.8	>Weekly	172	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Macedon

			Concentr	ation or valu	le				
			(all samp	les)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Δυργοσο	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity Total (as CaCO)			1/	20			11	rassing NA	
Aluminium		0.2	0.04		01	>Quarterly	11	11	10.0%
Aluminium Solublo		0.2	<0.04	0.07	0.02	>Quarterly	11	11	100%
Promoform		0.2 NA	<0.01	<0.02	<0.001	>Quarterty	20		NIA
			<0.001	<0.001	<0.001		<u> </u>	2	10.0%
		0.002 NA	51	<u><0.0002</u>	28				NIA
Chloring Free		5	0.01	0.97	11		156	156	10.0%
Chlorino, Total		5	0.27	11	1.4	Wookly	156	156	100%
Chloropacitic acid		015	<0.005	-0.005	-0.005	Quartorly	100	150	100%
Chloroform	mg/L	0.13 NA	0.003	0.003	0.000	Monthly	38	4 NA	NIA
Chromium	mg/L	0.05	<0.024	<0.047	<0.001		6	6	10.0%
Coliforme Total	orde/100ml	0.03	<0.001	<0.001	84	Mookly	156		NIA
Colour Truo	Digs/100111L	15	<1	<1	6		107	120	10.0%
Coppor	Ft/CO units	1	<0.001	<0.001	<0.001		2	2	100%
Dibromochloromethane	mg/L		0.001	0.003	0.001		28		NIA
		01	0.002	0.003	0.003	Quartarly			10.0%
Dichlorobromomothana	ng/L	0.1	0.013	0.017	0.021		20	4	NIA
			74	0.01	10.029	>Fortpidbtly	21		
Dissolved Oxygen	mg/L	600	54	<u> </u>	71	Monthly	3/	3/	100%
E coli		70r0 (0)	0	00	0	Mookly	156	156	100%
Electrical Conductivity (25°C)		~900	76	107	420		107	107	100%
Electrical conductivity (25 C)	mg/l	15	073	0.78	0.82	Monthly	22	22	100%
Hardness Total (as CaCO)	mg/L	200	1/1	22	110	Monthly	15	15	100%
	mg/L	03	0.02	0.06	01	SEortnightly	50	50	100%
		0.01	<0.02	<0.00	<0.001		20	2	100%
Magnesium	mg/L	0.01	11	2	8.6	>Annually	 11		NIA
Mandanasa		01	0.002	2	0.007	>Quarterly	<u> </u>	50	10.0%
Morouny		0.001		<0.004	<0.001		20	20	100%
Nitrato (ac NO)		50	012	0.0001	017		 7	 	100%
		65.85	75	8.0	0.17	Wookly	156	110	70 510/
μп	units	0.0-0.0	1.D	0.2	I.Z	vveekiy	100	ΠU	10.31%

Macedon

			Concentration or value							
			(all sam	ples)			No of Samples			
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Temperature	°C	NA	9.8	15.7	20	>Monthly	63	NA	NA	
Total Plate Count (37°C)	cfu/mL	NA	<1	1	70	Weekly	156	NA	NA	
Trichloroacetic acid	mg/L	0.1	0.015	0.017	0.02	Quarterly	4	4	100%	
Trihalomethanes, Total	mg/L	0.25	0.032	0.06	0.15	>Monthly	38	38	100%	
Turbidity	NTU	5 ¹	0.1	0.7 ¹	0.8	Weekly	156	NA	within standard	
Zinc	mg/L	3	<0.001	<0.001	<0.001	>Annually	2	2	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Maddingley

			Concentr	ation or valu	le		No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity. Total (as CaCO ₂)	mg/L	NA	13	42	180	>Ouarterly	9	NA	NA
Aluminium	mg/L	0.2	0.03	0.07	0.23	>Ouarterly	23	22	95.65%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.06	>Quarterly	23	23	100%
Bromoform	mg/L	NA	<0.001	0.001	0.002	>Monthly	36	NA	NA
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	< 0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	4.2	10.2	18	>Quarterly	9	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.91	1.5	Weekly	208	208	100%
Chlorine, Total	mg/L	5	0.11	1.16	1.8	Weekly	208	208	100%
Chloroform	mg/L	NA	0.025	0.071	0.12	>Monthly	36	NA	NA
Chromium	mg/L	0.05	<0.001	< 0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	100	Weekly	208	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	166	166	100%
Copper	mg/L	1	0.001	0.007	0.013	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.016	0.027	>Monthly	36	NA	NA
Dichlorobromomethane	mg/L	NA	0.005	0.035	0.06	>Monthly	36	NA	NA
Dissolved Oxygen	mg/L	NA	8.5	10	11.2	>Fortnightly	30	NA	NA
Dissolved Solids, Total	mg/L	600	220	257	270	Monthly	46	46	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	208	208	100%
Electrical Conductivity (25°C)	µS/cm	~900	72	266	400	>Fortnightly	166	166	100%
Fluoride	mg/L	1.5	0.63	0.77	0.89	Monthly	41	41	100%
Hardness, Total (as $CaCO_3$)	mg/L	200	16	79	99	>Monthly	60	60	100%
Iron	mg/L	0.3	0.01	0.05	0.19	>Fortnightly	66	66	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.2	6.7	13	>Quarterly	9	NA	NA
Manganese	mg/L	0.1	<0.001	0.004	0.037	>Fortnightly	66	66	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.17	0.18	>Quarterly	9	9	100%
pH	units	6.5-8.5	7.3	7.6	8	Weekly	208	208	100%
Temperature	°C	NA	11.5	18.4	25.4	>Monthly	89	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	30	Weekly	206	NA	NA

Maddingley

			Concentration or value							
Parameter			(all sam	ples)			No of Samples			
	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Trihalomethanes, Total	mg/L	0.25	0.036	0.124	0.21	>Monthly	36	36	100%	
Turbidity	NTU	5	<0.1	0.71	1.5	Weekly	208	NA	within standard	
Zinc	mg/L	3	0.002	0.009	0.015	>Annually	2	2	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

<u>Maribyrnong</u>

			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.02	0.03	0.03	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.4	0.88	>Weekly	359	359	100%
Chlorine, Total	mg/L	5	0.09	0.53	1	>Weekly	359	359	100%
Chloroform	mg/L	NA	0.016	0.026	0.041	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	90	>Weekly	359	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	6	>Monthly	11	11	100%
Colour, True	Pt/Co units	15	<2	<2	4	>Monthly	14	14	100%
Dibromochloromethane	mg/L	А	0.002	0.004	0.006	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.007	0.01	0.012	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	9.9	9.9	9.9	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	53	65	82	Monthly	12	12	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	359	359	100%
Electrical Conductivity (25°C)	µS/cm	~900	70	93	120	Fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.62	0.79	0.87	>Monthly	18	18	100%
Hardness, Total (as CaCO ₃)	mg/L	200	18	22	35	>Monthly	14	14	100%
Iron	mg/L	0.3	<0.01	0.04	0.06	>Monthly	19	19	100%
Manganese	mg/L	0.1	<0.001	0.003	0.008	>Monthly	19	19	100%
рН	units	6.5-8.5	7.1	7.3	7.7	>Weekly	244	244	100%
Temperature	°C	NA	11.1	18.2	25.3	>Weekly	239	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	41	>Weekly	356	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.031	0.04	0.051	Monthly	12	12	100%
Turbidity	NTU	5	<0.1	0.71	1	>Weekly	250	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Melton South

			Concentr	ation or valu	No of Samples				
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	N	11	13	15	>Ouarterly	13	NA	NA
Aluminium	mg/L	0.2	0.04	0.06	0.09	>Quarterly	13	13	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	0.02	>Quarterly	13	13	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	55	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	3.5	4.8	5.9	>Quarterly	13	NA	NA
Chlorine, Free	mg/L	5	0.19	0.91	1.7	Weekly	276	276	100%
Chlorine, Total	mg/L	5	0.35	1.11	1.8	Weekly	276	276	100%
Chloroform	mg/L	NA	0.01	0.02	0.044	>Monthly	55	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	1	100	Weekly	276	NA	NA
Colour, True	Pt/Co units	15	<2	<2	8	>Fortnightly	112	112	100%
Copper	mg/L	1	<0.001	<0.001	0.007	>Quarterly	8	8	100%
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.002	>Monthly	55	NA	NA
Dichlorobromomethane	mg/L	NA	0.003	0.005	0.009	>Monthly	55	NA	NA
Dissolved Oxygen	mg/L	NA	7.1	9.8	11.1	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	48	52	58	Monthly	60	60	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	276	276	100%
Electrical Conductivity (25°C)	µS/cm	~900	69	75	86	>Fortnightly	185	185	100%
Fluoride	mg/L	1.5	0.73	0.79	0.84	Monthly	32	32	100%
Hardness, Total (as CaCO ₃)	mg/L	200	13	17	24	>Monthly	73	73	100%
Iron	mg/L	0.3	0.03	0.06	0.3	>Fortnightly	150	150	100%
Lead	mg/L	0.01	<0.001	<0.001	0.002	>Quarterly	8	8	100%
Magnesium	mg/L	NA	1	1.4	1.8	>Quarterly	13	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.009	>Fortnightly	150	150	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.14	0.16	0.2	>Quarterly	7	7	100%
pH	units	6.5-8.5	7	7.4	8.3	Weekly	240	240	100%
Temperature	°C	NA	11.2	17.1	23	>Monthly	115	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	6	930	Weekly	240	NA	NA

Melton South

			Concent						
			(all sam	ples)					
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Trihalomethanes, Total	mg/L	0.25	0.015	0.027	0.055	>Monthly	55	55	100%
Turbidity	NTU	5 ¹	0.3	0.71	1.2	Weekly	240	NA	within standard
Zinc	mg/L	3	0.002	0.004	0.014	>Quarterly	8	8	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Merrimu

			Concentr	ation or valu	le				
			(all samp	les)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₂)	mg/L	NA	11	24	40	>Ouarterly	18	NA	NA
Aluminium	mg/L	0.2	0.02	0.06	0.13	>Ouarterly	17	17	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.06	>Quarterly	17	17	100%
Bromoform	mg/L	NA	< 0.001	0.001	0.002	>Monthly	40	NA	NA
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	3.9	12.2	20	>Quarterly	13	NA	NA
Chlorine, Free	mg/L	5	< 0.05	0.78	2.3	Weekly	209	209	100%
Chlorine, Total	mg/L	5	0.05	1.04	2.6	Weekly	209	209	100%
Chloroform	mg/L	NA	0.01	0.033	0.076	>Monthly	40	NA	NA
Chromium	mg/L	0.05	<0.001	< 0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	20	Weekly	209	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	156	157	100%
Copper	mg/L	1	0.002	<0.001	0.003	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.013	0.027	>Monthly	40	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.024	0.052	>Monthly	40	NA	NA
Dissolved Oxygen	mg/L	NA	7.5	9.8	11.1	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	51	237	270	Monthly	47	47	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	209	209	100%
Electrical Conductivity (25°C)	µS/cm	~900	69	270	500	>Fortnightly	156	156	100%
Fluoride	mg/L	1.5	<0.05	0.72	0.98	Monthly	80	80	100%
Hardness, Total (as CaCO ₃)	mg/L	200	14	76	130	>Monthly	65	65	100%
Iron	mg/L	0.3	<0.01	0.04	0.11	>Fortnightly	105	105	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.3	9.5	17	>Quarterly	13	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.016	>Fortnightly	105	105	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.17	0.22	>Quarterly	18	18	100%
рН	units	6.5-8.5	6.9	7.6	8.8	Weekly	201	199	98.01%
Sodium	mg/L	180	32	32	32	Annually	1	1	100%
Temperature	°C	NA	11.1	17.5	24.2	>Monthly	95	NA	NA

Merrimu

	Concentration or value								
			(all sam	ples)			No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Total Plate Count (37°C)	cfu/mL	NA	<1	4	130	Weekly	201	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.017	0.07	0.15	>Monthly	40	40	100%
Turbidity	NTU	5	<0.1	0.6 ¹	1.6	Weekly	201	NA	within standard
Zinc	mg/L	3	<0.001	0.001	0.002	>Annually	2	2	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Moonee Ponds

			Concent	ration or valu	n or value					
			(all sam	ples)			No of Sa	mples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Aluminium, Soluble	mg/L	0.2	0.02	0.03	0.04	> Quarterly	6	6	100%	
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA	
Chlorine, Free	mg/L	5	<0.05	0.39	1.1	>Weekly	249	249	100%	
Chlorine, Total	mg/L	5	0.13	0.53	1.3	>Weekly	249	249	100%	
Chloroform	mg/L	NA	0.018	0.031	0.046	Monthly	12	NA	NA	
Coliforms, Total	orgs/100mL	NA	<1	<1	2	>Weekly	249	NA	NA	
Colour, Apparent	Pt/Co units	25	<2	4	10	>Monthly	13	13	100%	
Colour, True	Pt/Co units	15	<2	<2	4	>Monthly	14	14	100%	
Dibromochloromethane	mg/L	NA	0.001	0.003	0.005	Monthly	12	NA	NA	
Dichlorobromomethane	mg/L	NA	0.005	0.009	0.012	Monthly	12	NA	NA	
Dissolved Oxygen	mg/L	NA	10.1	10.1	10.1	Annually	1	NA	NA	
Dissolved Solids, Total	mg/L	600	49	59	76	Monthly	12	12	100%	
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	249	249	100%	
Electrical Conductivity (25°C)	µS/cm	~900	65	85	110	Fortnightly	26	26	100%	
Fluoride	mg/L	1.5	0.58	0.78	0.88	>Monthly	18	18	100%	
Hardness, Total (as CaCO ₃)	mg/L	200	17	20	32	>Monthly	14	14	100%	
Iron	mg/L	0.3	0.02	0.06	0.14	>Monthly	20	20	100%	
Manganese	mg/L	0.1	0.001	0.005	0.018	>Monthly	20	20	100%	
рН	units	6.5-8.5	7.1	7.3	7.8	>Weekly	180	180	100%	
Temperature	°C	NA	11.1	18.5	26.1	>Weekly	173	NA	NA	
Total Plate Count (37°C)	cfu/mL	NA	<1	1	200	>Weekly	251	NA	NA	
Trihalomethanes, Total	mg/L	0.25	0.026	0.042	0.056	Monthly	12	12	100%	
Turbidity	NTU	5 ¹	<0.1	0.9 ¹	1.4	>Weekly	187	NA	within standard	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Mount Macedon

			Concentr	ation or valu	le				
Parameter	Unit	Guideline Value (ADWG 2011)	(all samp Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	16	22	41	>Quarterly	13	NA	NA
Aluminium	mg/L	0.2	0.03	0.08	0.1	>Quarterly	13	13	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.02	0.03	>Quarterly	13	13	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	50	NA	NA
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	< 0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	5.8	9.5	26	>Quarterly	13	NA	NA
Chlorine, Free	mg/L	5	0.31	0.96	1.6	Weekly	208	208	100%
Chlorine, Total	mg/L	5	0.44	1.1	1.7	Weekly	208	208	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	>Quarterly	6	6	100%
Chloroform	mg/L	NA	0.027	0.058	0.12	>Monthly	50	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	8	8	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	19	Weekly	208	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	168	168	100%
Copper	mg/L	1	<0.001	<0.001	<0.001	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.008	>Monthly	50	NA	NA
Dichloroacetic acid	mg/L	0.1	0.014	0.021	0.03	>Quarterly	6	6	100%
Dichlorobromomethane	mg/L	NA	0.006	0.01	0.028	>Monthly	50	NA	NA
Dissolved Oxygen	mg/L	NA	7.5	9.6	10.9	>Fortnightly	30	NA	NA
Dissolved Solids, Total	mg/L	600	56	63	68	Monthly	48	48	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	208	208	100%
Electrical Conductivity (25°C)	µS/cm	~900	84	134	410	>Fortnightly	168	168	100%
Fluoride	mg/L	1.5	0.74	0.78	0.82	Monthly	27	27	100%
Hardness, Total (as CaCO ₃)	mg/L	200	16	24	93	>Monthly	61	61	100%
Iron	mg/L	0.3	0.02	0.07	0.12	>Fortnightly	56	56	100%
Lead	mg/L	0.01	<0.001	< 0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1	1.9	7.2	>Quarterly	13	NA	NA
Manganese	mg/L	0.1	0.002	0.004	0.007	>Fortnightly	56	56	100%
Mercury	mg/L	0.001	< 0.0001	< 0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.15	0.17	>Quarterly	7	7	100%
рН	units	6.5-8.5	7.5	8.4	9.4	Weekly	208	113	54.33%

Mount Macedon

			Concent							
			(all sam	ples)			No of Samples			
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Temperature	°C	NA	5.6	14.7	21.1	>Monthly	88	NA	NA	
Total Plate Count (37°C)	cfu/mL	NA	<1	10	2,000	Weekly	208	NA	NA	
Trichloroacetic acid	mg/L	0.1	0.015	0.02	0.026	>Quarterly	6	6	100%	
Trihalomethanes, Total	mg/L	0.25	0.035	0.07	0.15	>Monthly	50	50	100%	
Turbidity	NTU	5	0.1	0.7 ¹	0.8	Weekly	208	NA	within standard	
Zinc	mg/L	3	<0.001	0.002	0.004	>Annually	2	2	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Myrniong

			Concentration or value								
			(all samp	les)			No of Samples				
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline		
Alkalinity. Total (as CaCO ₂)	mg/L	NA	36	46	57	>Ouarterly	14	NA	NA		
Aluminium	mg/L	0.2	<0.01	0.02	0.04	>Quarterly	18	18	100%		
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.03	>Quarterly	18	18	100%		
Bromoform	mg/L	NA	<0.001	0.003	0.009	>Monthly	48	NA	NA		
Cadmium	mg/L	0.002	<0.0002	< 0.0002	<0.0002	>Annually	2	2	100%		
Calcium	mg/L	NA	10	14	20	>Quarterly	9	NA	NA		
Chloride	mg/L	250	73	92	110	>Annually	2	2	100%		
Chlorine, Free	mg/L	5	<0.05	0.58	3.8	Weekly	256	256	100%		
Chlorine, Total	mg/L	5	<0.05	0.86	4.8	Weekly	256	256	100%		
Chloroform	mg/L	NA	0.002	0.041	0.085	>Monthly	48	NA	NA		
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%		
Coliforms, Total	orgs/100mL	NA	<1	<1	7	Weekly	256	NA	NA		
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	176	176	100%		
Copper	mg/L	1	<0.001	0.008	0.016	>Annually	4	4	100%		
Dibromochloromethane	mg/L	NA	<0.001	0.023	0.041	>Monthly	48	NA	NA		
Dichlorobromomethane	mg/L	NA	<0.001	0.032	0.066	>Monthly	48	NA	NA		
Dissolved Oxygen	mg/L	NA	7.4	9.5	11.2	>Fortnightly	31	NA	NA		
Dissolved Solids, Total	mg/L	600	290	312	330	Monthly	55	55	100%		
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	256	256	100%		
Electrical Conductivity (25°C)	µS/cm	~900	72	493	620	>Fortnightly	207	207	100%		
Fluoride	mg/L	1.5	<0.05	< 0.05	<0.05	Monthly	46	46	100%		
Hardness, Total (as CaCO ₃)	mg/L	200	76	100	140	>Monthly	64	64	100%		
Iron	mg/L	0.3	<0.01	0.03	0.41	>Fortnightly	98	97	98.98%		
Lead	mg/L	0.01	<0.001	< 0.001	<0.001	>Annually	4	4	100%		
Magnesium	mg/L	NA	13	17	21	>Quarterly	9	NA	NA		
Manganese	mg/L	0.1	<0.001	0.002	0.01	>Fortnightly	98	98	100%		
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%		
Nitrate (as NO ₃)	mg/L	50	0.19	0.25	0.37	>Quarterly	35	35	100%		
рН	units	6.5-8.5	6.9	7.6	8.8	Weekly	256	247	96.50%		
Sulfate (as SO ₄)	mg/L	250	49	57	64	>Annually	2	2	100%		

Myrniong

			Concent	ration or valu	Ie					
			(all sam	ples)			No of Samples			
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Temperature	°C	NA	9.9	15.8	22.9	>Monthly	105	NA	NA	
Total Plate Count (37°C)	cfu/mL	NA	<1	2	160	Weekly	225	NA	NA	
Trihalomethanes, Total	mg/L	0.25	0.018	0.1	0.19	>Monthly	48	48	100%	
Turbidity	NTU	5 ¹	<0.1	0.3 ¹	12	Weekly	256	NA	within standard	
Zinc	mg/L	3	<0.001	0.002	0.005	>Annually	4	4	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Parkville

			Concentration or value						
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.02	0.03	0.04	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.45	1.2	>Weekly	406	406	100%
Chlorine, Total	mg/L	5	0.08	0.58	1.4	>Weekly	406	406	100%
Chloroform	mg/L	NA	0.015	0.029	0.039	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	11	>Weekly	406	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	6	>Monthly	11	11	100%
Colour, True	Pt/Co units	15	<2	<2	2	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.001	0.004	0.006	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.008	0.01	0.012	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	7.4	7.4	7.4	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	59	68	76	Monthly	12	12	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	>Weekly	406	406	100%
Electrical Conductivity (25°C)	µS/cm	~900	75	98	120	Fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.63	0.8	0.88	>Monthly	17	17	100%
Hardness, Total (as CaCO ₃)	mg/L	200	19	23	34	>Monthly	14	14	100%
Iron	mg/L	0.3	0.01	0.04	0.06	>Monthly	19	19	100%
Manganese	mg/L	0.1	0.001	0.003	0.006	>Monthly	19	19	100%
рН	units	6.5-8.5	7	7.3	7.7	>Weekly	275	275	100%
Temperature	°C	NA	10.4	18.4	25.8	>Weekly	273	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	2	>Weekly	403	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.031	0.043	0.049	Monthly	12	12	100%
Turbidity	NTU	5 ¹	<0.1	0.61	1.6	>Weekly	282	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Richmond

			Concent	ration or valu					
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.03	0.03	0.04	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	0.09	0.46	2.2	>Weekly	143	143	100%
Chlorine, Total	mg/L	5	0.16	0.59	2.2	>Weekly	143	143	100%
Chloroform	mg/L	NA	0.047	0.053	0.063	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	8	>Weekly	143	NA	NA
Colour, Apparent	Pt/Co units	25	<2	4	8	>Monthly	13	13	100%
Colour, True	Pt/Co units	15	<2	2	8	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	<0.001	< 0.001	0.002	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.008	0.009	0.011	Monthly	12	NA	NA
Dissolved Solids, Total	mg/L	600	42	48	75	Monthly	12	12	100%
E. coli	orgs/100mL	Zero (0)	0	0	14	>Weekly	143	143	100%
Electrical Conductivity (25°C)	µS/cm	~900	56	71	110	Fortnightly	27	27	100%
Fluoride	mg/L	1.5	0.58	0.75	0.85	>Monthly	19	19	100%
Hardness, Total (as CaCO ₃)	mg/L	200	12	17	26	>Monthly	14	14	100%
Iron	mg/L	0.3	0.02	0.07	0.09	>Monthly	20	20	100%
Manganese	mg/L	0.1	0.001	0.004	0.007	>Monthly	20	20	100%
рН	units	6.5-8.5	7.2	7.4	7.8	>Weekly	109	109	100%
Temperature	°C	NA	12.4	18.6	24.7	>Weekly	101	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	50	>Weekly	143	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.057	0.062	0.075	Monthly	12	12	100%
Turbidity	NTU	5 ¹	<0.1	1.1 ¹	2.4	>Weekly	118	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps 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 These sample results were confirmed as false positive samples. Refer to Section 4.1 of this report for details.

Riddells Creek

			Concentr	ation or valu	le				
		Guideline Value	(all samp	Average	•••	Frequency	No of Sa	mples	Performance against standard/
Parameter	Unit	(ADWG 2011)	win	Average	Max	of Sampling	Iotal	Passing	guideline
Alkalinity, Iotal (as $CaCO_3$)	mg/L	NA	12	1/	39	>Quarterly	11	NA	NA
Aluminium	mg/L	0.2	0.03	0.06	0.08	>Quarterly	11	11	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	0.01	>Quarterly	11	11	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	38	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	4.3	7.7	28	>Quarterly	11	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.85	1.6	Weekly	155	155	100%
Chlorine, Total	mg/L	5	0.06	1.04	1.8	Weekly	155	155	100%
Chloroacetic acid	mg/L	0.15	<0.005	< 0.005	< 0.005	Quarterly	4	4	100%
Chloroform	mg/L	NA	0.014	0.039	0.09	>Monthly	38	NA	NA
Chromium	mg/L	0.05	<0.001	< 0.001	<0.001	>Annually	6	6	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	16	Weekly	155	Ν	Ν
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	125	125	100%
Copper	mg/L	1	0.002	0.002	0.002	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.009	>Monthly	38	NA	NA
Dichloroacetic acid	mg/L	0.1	0.01	0.015	0.024	Quarterly	4	4	100%
Dichlorobromomethane	mg/L	NA	0.004	0.008	0.029	>Monthly	38	NA	NA
Dissolved Oxygen	mg/L	NA	7.5	9.7	11	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	49	58	68	Monthly	34	34	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	155	155	100%
Electrical Conductivity (25°C)	µS/cm	~900	70	115	430	>Fortnightly	125	125	100%
Fluoride	mg/L	1.5	0.73	0.79	0.87	Monthly	22	22	100%
Hardness, Total (as CaCO ₃)	mg/L	200	16	22	110	>Monthly	45	45	100%
Iron	mg/L	0.3	0.01	0.06	0.34	>Fortnightly	50	49	98.00%
Lead	mg/L	0.01	<0.001	< 0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.1	2	8.7	>Quarterly	11	NA	NA
Manganese	mg/L	0.1	0.001	0.004	0.049	>Fortnightly	50	50	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.13	0.15	0.18	>Quarterly	7	7	100%
pH	units	6.5-8.5	7.2	8	9.3	Weekly	155	129	83.23%

Riddells Creek

			Concent							
			(all sam	ples)			No of Samples			
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Temperature	°C	NA	9.4	16.1	20.8	>Monthly	64	NA	NA	
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	130	Weekly	155	NA	NA	
Trichloroacetic acid	mg/L	0.1	0.012	0.014	0.019	Quarterly	4	4	100%	
Trihalomethanes, Total	mg/L	0.25	0.02	0.05	0.13	>Monthly	38	38	100%	
Turbidity	NTU	5 ¹	<0.1	0.7 ¹	4.4	Weekly	155	NA	within standard	
Zinc	mg/L	3	<0.001	0.001	0.002	>Annually	2	2	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Rockbank

			Concentration or value								
			(all samp	les)			No of Sa	mples			
		Guideline							Performance		
		Value		. .		Frequency		- · ·	against standard/		
Parameter	Unit Table de	tailing parameters sampled, va	_{lues} Min	Average	Max	of Sampling [®]	Total ²	Passing	guideline		
Alkalinity, Total (as CaCO ₃)	mg/L samples	, frequency and performance a	gainst	12	13	>Quarterly	16	NA	100%		
Aluminium	mg/L standard	ls for Rookbank water sampling	g locality.A	0.06	0.1	>Quarterly	14	14	100%		
Aluminium, Soluble	mg/L	0.2	<0.01	0.01	0.07	>Quarterly	13	13	NA		
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	>Monthly	43	NA	100%		
Cadmium	mg/L	0.002	<0.0002	< 0.0002	<0.0002	>Annually	2	2	NA		
Calcium	mg/L	NA	3.5	4.1	5.4	>Quarterly	16	NA	100%		
Chlorine, Free	mg/L	5	0.11	0.98	1.6	Weekly	211	211	100%		
Chlorine, Total	mg/L	5	0.22	1.2	1.9	Weekly	211	211	NA		
Chloroform	mg/L	NA	0.009	0.013	0.025	>Monthly	43	NA	100%		
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	NA		
Coliforms, Total	orgs/100mL	NA	<1	<1	100	Weekly	211	NA	100%		
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	124	124	100%		
Copper	mg/L	1	0.004	0.007	0.009	>Annually	4	4	NA		
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.002	>Monthly	43	NA	NA		
Dichlorobromomethane	mg/L	NA	0.003	0.004	0.007	>Monthly	43	NA	NA		
Dissolved Oxygen	mg/L	NA	7.5	9.8	11.3	>Fortnightly	38	NA	100%		
Dissolved Solids, Total	mg/L	600	47	50	56	Monthly	48	48	100%		
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	211	211	100%		
Electrical Conductivity (25°C)	μS/cm	~900	65	72	84	>Fortnightly	171	171	100%		
Fluoride	mg/L	1.5	0.71	0.78	0.83	Monthly	34	34	100%		
Hardness, Total (as $CaCO_3$)	mg/L	200	14	17	24	>Monthly	64	64	100%		
Iron	mg/L	0.3	0.03	0.05	0.09	>Fortnightly	119	119	100%		
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	6	6	NA		
Magnesium	mg/L	NA	1.2	1.5	1.9	>Quarterly	16	NA	100%		
Manganese	mg/L	0.1	0.001	0.002	0.022	>Fortnightly	119	119	100%		
Mercury	mg/L	0.001	<0.0001	< 0.0001	<0.0001	>Annually	2	2	100%		
Nitrate (as NO ₂)	mg/L	50	0.13	0.15	0.17	>Ouarterly	9	9	100%		
H	units	6.5-8.5	6.9	7.5	8.4	Weekly	211	211	100%		
Sodium	mg/L	180	5.3	5.8	6.9	>Ouarterly	6	6	100%		
Sulfate (as SO ₄)	mg/L	250	2	2	2	>Annually	2	2	NA		

Rockbank

Parameter	Concentration or value								
			(all sam	ples)			No of Sa		
	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Temperature	°C	NA	10.5	16.5	21.4	>Monthly	90	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	2	90	Weekly	211	NA	100%
Trihalomethanes, Total	mg/L	0.25	0.011	0.018	0.034	>Monthly	43	43	within standard
Turbidity	NTU	5	0.3	0.71	2.3	Weekly	211	NA	100%
Zinc	mg/L	3	0.002	0.004	0.004	>Quarterly	6	6	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Romsey

			Concentr	ation or valı	Ie				
			(all samp	les)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	25	34	38	>Quarterly	28	NA	NA
Aluminium	mg/L	0.2	<0.01	0.01	0.1	>Quarterly	27	27	100%
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	<0.01	>Quarterly	27	27	100%
Ammonia	mg/L	0.5	<0.002	0.144	0.34	Weekly	173	173	100%
Bromoform	mg/L	NA	<0.001	<0.001	0.002	>Monthly	66	NA	NA
Cadmium	mg/L	0.002	< 0.0002	<0.0002	<0.0002	>Annually	8	8	100%
Calcium	mg/L	NA	4.4	8.5	11	>Quarterly	27	NA	NA
Chloride	mg/L	250	54	56	58	Annually	2	2	100%
Chlorine, Free	mg/L	5	<0.05	0.36	1.9	Weekly	364	364	100%
Chlorine, Total	mg/L	5	0.07	1.01	2.2	Weekly	364	364	100%
Chloroform	mg/L	NA	0.001	0.014	0.067	>Monthly	66	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	8	8	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	21	Weekly	333	NA	NA
Colour, True	Pt/Co units	15	<2	4	12	>Fortnightly	263	270	100%
Copper	mg/L	1	<0.001	<0.001	0.014	>Annually	8	8	100%
Dibromochloromethane	mg/L	NA	<0.001	0.006	0.027	>Monthly	66	NA	NA
Dichlorobromomethane	mg/L	NA	<0.001	0.01	0.047	>Monthly	66	NA	NA
Dissolved Oxygen	mg/L	NA	7.2	9.7	11.4	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	140	171	200	Monthly	83	83	100%
E. coli	orgs/100mL	Zero (0)	0	0	0	Weekly	333	333	100%
Electrical Conductivity (25°C)	µS/cm	~900	140	247	290	>Fortnightly	263	263	100%
Fluoride	mg/L	1.5	0.05	0.07	0.2	Monthly	57	57	100%
Hardness, Total (as CaCO ₃)	mg/L	200	27	50	73	>Monthly	105	105	100%
Iron	mg/L	0.3	<0.01	0.01	0.05	>Fortnightly	175	175	100%
Lead	mg/L	0.01	<0.001	<0.001	0.001	>Annually	8	8	100%
Magnesium	mg/L	NA	3.8	6.7	8.9	>Quarterly	27	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.032	>Fortnightly	175	175	100%
Mercury	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	>Annually	8	8	100%
Monochloramine	mg/L	3	<0.05	0.54	1.4	Weekly	308	308	100%
Nitrate (as NO ₃)	mg/L	50	0.051	0.13	0.27	>Quarterly	173	173	100%

Romsey

			Concent	ration or valu	le				
			(all sam	ples)			No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
рН	units	6.5-8.5	7.1	7.5	7.9	Weekly	364	364	100%
Temperature	°C	NA	8	14.9	22.4	>Monthly	153	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	1	90	Weekly	333	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.001	0.029	0.13	>Monthly	66	66	100%
Turbidity	NTU	5 ¹	<0.1	0.1 ¹	0.3	Weekly	364	NA	within standard
Zinc	mg/L	3	<0.001	0.005	0.014	>Annually	8	8	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Strathmore

			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.02	0.04	0.05	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.24	0.58	>Weekly	96	96	100%
Chlorine, Total	mg/L	5	0.09	0.36	0.71	>Weekly	96	96	100%
Chloroform	mg/L	NA	0.038	0.046	0.05	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	<1	>Weekly	96	NA	NA
Colour, Apparent	Pt/Co units	25	<2	4	6	>Monthly	13	13	100%
Colour, True	Pt/Co units	15	<2	3	4	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.003	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.007	0.009	0.012	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	10.6	10.6	10.6	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	42	47	53	Monthly	12	12	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	96	96	100%
Electrical Conductivity (25°C)	µS/cm	~900	60	67	79	Fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.46	0.75	0.9	>Monthly	19	19	100%
Hardness, Total (as CaCO ₃)	mg/L	200	15	17	22	>Monthly	14	14	100%
Iron	mg/L	0.3	0.02	0.07	0.08	>Monthly	20	20	100%
Manganese	mg/L	0.1	0.003	0.004	0.005	>Monthly	20	20	100%
рН	units	6.5-8.5	7	7.4	7.7	>Weekly	75	75	100%
Temperature	°C	NA	12	18.2	23.3	>Weekly	68	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	4	>Weekly	97	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.046	0.056	0.062	Monthly	12	12	100%
Turbidity	NTU	5	0.3	1 ¹	1	>Weekly	82	NA	within standard

Requirements of r13(1) Safe Drinking Water Regulations 2015 were not met for Strathmore locality 2022-23 for the monitoring according to our risk management plan. Refer to Section 6.6 for details.

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Sunbury

			Concentration or value							
			(all samp	les)			No of Sa	mples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Alkalinity. Total (as CaCO ₂)	mg/L	NA	11	13	16	>Ouarterly	22	NA	NA	
Aluminium	mg/L	0.2	0.03	0.06	0.1	>Ouarterly	25	25	100%	
Aluminium, Soluble	mg/L	0.2	<0.01	<0.01	0.06	>Quarterly	24	24	100%	
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	>Monthly	79	NA	NA	
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	>Annually	2	2	100%	
Calcium	mg/L	NA	3.6	4.3	6.1	>Quarterly	21	NA	NA	
Chlorine, Free	mg/L	5	<0.05	0.83	2	Weekly	404	404	100%	
Chlorine, Total	mg/L	5	0.09	1.04	2.2	Weekly	404	404	100%	
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	Annually	2	2	100%	
Chloroform	mg/L	NA	0.006	0.02	0.057	>Monthly	79	NA	NA	
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	4	4	100%	
Coliforms, Total	orgs/100mL	NA	<1	<1	100	Weekly	404	NA	NA	
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	202	202	100%	
Copper	mg/L	1	<0.001	< 0.001	0.005	>Annually	8	8	100%	
Dibromochloromethane	mg/L	NA	<0.001	0.001	0.005	>Monthly	79	NA	NA	
Dichloroacetic acid	mg/L	0.1	0.01	0.01	0.01		2	2	100%	
Dichlorobromomethane	mg/L	NA	0.002	0.005	0.018	>Monthly	79	NA	NA	
Dissolved Oxygen	mg/L	NA	7.1	9.8	11.5	>Fortnightly	37	NA	NA	
Dissolved Solids, Total	mg/L	600	47	53	85	Monthly	84	84	100%	
E. coli	orgs/100mL	Zero(0)	0	0	14	Weekly	404	404	100%	
Electrical Conductivity (25°C)	µS/cm	~900	67	85	430	>Fortnightly	294	294	100%	
Fluoride	mg/L	1.5	<0.05	0.77	0.86	Monthly	56	56	100%	
Hardness, Total (as CaCO ₃)	mg/L	200	14	18	41	>Monthly	106	106	100%	
Iron	mg/L	0.3	0.01	0.05	0.1	>Fortnightly	194	194	100%	
Lead	mg/L	0.01	<0.001	0.002	0.017	>Annually	10	9	90.00%	
Magnesium	mg/L	NA	1.2	1.4	1.7	>Quarterly	21	NA	NA	
Manganese	mg/L	0.1	0.001	0.003	0.01	>Fortnightly	195	195	100%	
Mercury	mg/L	0.001	< 0.0001	<0.0001	<0.0001	>Annually	2	2	100%	
Nitrate (as NO ₃)	mg/L	50	0.14	0.15	0.17	>Quarterly	9	9	100%	
рН	units	6.5-8.5	7	7.6	8.9	Weekly	369	364	98.64%	

Sunbury

			Concentration or value							
			(all sam	ples)			No of Sa	mples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline	
Sodium	mg/L	180	5.3	5.7	6.3	>Quarterly	7	7	100%	
Sulfate (as SO ₄)	mg/L	250	2	2	2	>Annually	2	2	100%	
Temperature	°C	NA	10.3	16.4	22.5	>Monthly	160	NA	NA	
Total Plate Count (37°C)	cfu/mL	NA	<1	1	180	Weekly	369	NA	NA	
Trichloroacetic acid	mg/L	0.1	0.014	0.016	0.018	>Annually	2	2	100%	
Trihalomethanes, Total	mg/L	0.25	0.009	0.027	0.079	>Monthly	79	79	100%	
Turbidity	NTU	5 ¹	<0.1	0.7	0.9	Weekly	369	NA	within standard	
Zinc	mg/L	3	0.001	0.003	0.005	>Annually	10	10	100%	

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps 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 These sample results were confirmed as false positive samples. Refer to Section 4.1 of this report for details.

Taylors Lakes

			Concent	ration or valu	Ie				
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	<0.01	0.03	0.08	> Quarterly	13	13	100%
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	Monthly	24	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.63	1.1	>Weekly	289	289	100%
Chlorine, Total	mg/L	5	<0.05	0.77	1.2	>Weekly	289	289	100%
Chloroform	mg/L	NA	0.01	0.035	0.073	Monthly	24	NA	NA
Coliforms, Total	orgs/100ml	NA	<1	<1	100	>Weekly	289	NA	NA
Colour, Apparent	Pt/Co units	25	<2	6	18	>Monthly	20	20	100%
Colour, True	Pt/Co units	15	<2	3	10	>Monthly	28	28	100%
Dibromochloromethane	mg/L	NA	<0.001	0.002	0.002	Monthly	24	NA	NA
Dichlorobromomethane	mg/L	NA	0.003	0.007	0.011	Monthly	24	NA	NA
Dissolved Solids, Total	mg/L	600	47	54	62	Monthly	25	25	100%
E. coli	orgs/100ml	Zero(0)	0	0	0	>Weekly	289	289	100%
Electrical Conductivity (25°C)	µS/cm	~900	68	79	92	Fortnightly	46	46	100%
Fluoride	mg/L	1.5	0.72	0.77	0.84	>Monthly	31	31	100%
Hardness, Total (as CaCO ₃)	mg/L	200	9	18	25	>Monthly	28	28	100%
Iron	mg/L	0.3	0.04	0.12	0.39	>Monthly	32	31	96.88%
Manganese	mg/L	0.1	0.001	0.009	0.033	>Monthly	32	32	100%
рН	units	6.5-8.5	7	7.4	8.5	>Weekly	209	209	100%
Temperature	°C	NA	9.4	17.4	23.2	>Weekly	195	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	2	140	>Weekly	292	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.014	0.043	0.087	Monthly	24	24	100%
Turbidity	NTU	5 ¹	0.3	1.3 ¹	9.3	>Weekly	215	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Toolern Vale

			Concentr (all samp	ation or valı les)	Ie		No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Max	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity, Total (as CaCO ₃)	mg/L	NA	12	23	37	>Quarterly	9	NA	NA
Aluminium	mg/L	0.2	0.02	0.07	0.14	>Quarterly	9	9	100%
Aluminium, Soluble	mg/L	0.2	<0.01	0.03	0.05	>Quarterly	9	9	100%
Bromoform	mg/L	NA	<0.001	<0.001	0.002	>Monthly	26	NA	NA
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	4.2	10.4	17	>Quarterly	9	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.76	1.7	Weekly	106	106	100%
Chlorine, Total	mg/L	5	0.07	0.98	2.1	Weekly	106	106	100%
Chloroform	mg/L	NA	0.025	0.041	0.066	>Monthly	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	30	Weekly	106	NA	NA
Colour, True	Pt/Co units	15	<2	<2	6	>Fortnightly	86	86	100%
Copper	mg/L	1	0.002	0.005	0.008	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.013	0.024	>Monthly	26	NA	NA
Dichlorobromomethane	mg/L	NA	0.005	0.025	0.048	>Monthly	26	NA	NA
Dissolved Oxygen	mg/L	NA	8.3	9.9	11.5	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	240	255	260	Monthly	24	24	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	106	106	100%
Electrical Conductivity (25°C)	µS/cm	~900	69	263	400	>Fortnightly	86	86	100%
Fluoride	mg/L	1.5	0.32	0.75	0.94	Monthly	17	17	100%
Hardness, Total (as CaCO ₃)	mg/L	200	16	76	120	>Monthly	38	38	100%
Iron	mg/L	0.3	<0.01	0.05	0.21	>Fortnightly	43	43	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.3	6.5	13	>Quarterly	9	NA	NA
Manganese	mg/L	0.1	<0.001	0.002	0.007	>Fortnightly	43	43	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.11	0.16	0.18	>Quarterly	9	9	100%
pH	units	6.5-8.5	7.1	7.6	8.6	Weekly	106	105	99.06%
Temperature	°C	NA	10.9	17.1	23	>Monthly	46	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	13	Weekly	106	NA	NA

Toolern Vale

			Concent	ration or valu	le				
			(all sam	ples)			No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Trihalomethanes, Total	mg/L	0.25	0.032	0.08	0.14	>Monthly	26	26	100%
Turbidity	NTU	5 ¹	<0.1	0.8 ¹	1.3	Weekly	106	NA	within standard
Zinc	mg/L	3	0.002	0.004	0.006	>Annually	2	2	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Tullamarine

			Concent						
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.01	0.02	0.02	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	0.06	0.61	1	>Weekly	103	103	100%
Chlorine, Total	mg/L	5	0.1	0.76	1.3	>Weekly	103	103	100%
Chloroform	mg/L	NA	0.008	0.016	0.025	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	100	>Weekly	103	NA	NA
Colour, Apparent	Pt/Co units	25	<2	3	10	>Monthly	13	13	100%
Colour, True	Pt/Co units	15	<2	<2	6	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.001	0.002	0.004	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.003	0.005	0.01	Monthly	12	NA	NA
Dissolved Oxygen	mg/L	NA	11	11	11	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	48	59	76	Monthly	12	12	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	103	103	100%
Electrical Conductivity (25°C)	µS/cm	~900	69	80	110	Fortnightly	27	27	100%
Fluoride	mg/L	1.5	0.74	0.78	0.87	>Monthly	20	20	100%
Hardness, Total (as CaCO ₃)	mg/L	200	15	20	32	>Monthly	14	14	100%
Iron	mg/L	0.3	0.03	0.07	0.39	>Monthly	21	20	95.24%
Manganese	mg/L	0.1	0.001	0.003	0.005	>Monthly	21	21	100%
рН	units	6.5-8.5	7	7.5	8.5	>Weekly	77	77	100%
Temperature	°C	NA	10.7	17.6	23	>Weekly	70	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	8	440	>Weekly	103	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.012	0.022	0.039	Monthly	12	12	100%
Turbidity	NTU	5 ¹	<0.1	1 ¹	2.1	>Weekly	86	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality

Werribee

			Concent						
			(all sam	oles)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.02	0.02	0.03	> Quarterly	22	22	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	38	NA	NA
Chlorine, Free	mg/L	5	<0.05	0.51	1	>Weekly	490	490	100%
Chlorine, Total	mg/L	5	0.05	0.64	1.2	>Weekly	490	490	100%
Chloroform	mg/L	NA	0.019	0.031	0.055	Monthly	38	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	13	>Weekly	490	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	6	>Monthly	27	27	100%
Colour, True	Pt/Co units	15	<2	<2	2	>Monthly	40	40	100%
Dibromochloromethane	mg/L	NA	0.003	0.005	0.008	Monthly	38	NA	NA
Dichlorobromomethane	mg/L	NA	0.008	0.013	0.018	Monthly	38	NA	NA
Dissolved Oxygen	mg/L	NA	10.6	10.6	10.6	Annually	1	NA	NA
Dissolved Solids, Total	mg/L	600	61	70	78	Monthly	36	36	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	490	490	100%
Electrical Conductivity (25°C)	µS/cm	~900	84	101	120	Fortnightly	65	65	100%
Fluoride	mg/L	1.5	0.68	0.81	0.91	>Monthly	43	43	100%
Hardness, Total (as CaCO ₃)	mg/L	200	15	22	31	>Monthly	40	40	100%
Iron	mg/L	0.3	0.01	0.03	0.07	>Monthly	45	45	100%
Manganese	mg/L	0.1	< 0.001	0.003	0.007	>Monthly	45	45	100%
рН	units	6.5-8.5	7.1	7.5	8.4	>Weekly	340	340	100%
Temperature	°C	NA	12.5	18.3	25.5	>Weekly	328	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	4	>Weekly	486	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.033	0.049	0.074	Monthly	38	38	100%
Turbidity	NTU	5 ¹	<0.1	0.51	2	>Weekly	349	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps for the specific water sampling locality

3 No. of samples collected is more than the frequency due to multiple sites sampled in the locality
Werribee South

			Concent	ration or valu	Ie				
			(all sam	oles)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.01	0.02	0.03	> Quarterly	15	15	100%
Bromoform	mg/L	NA	<0.001	< 0.001	<0.001	Monthly	30	NA	NA
Chlorine, Free	mg/L	5	0.1	0.52	1.4	>Weekly	144	144	100%
Chlorine, Total	mg/L	5	0.18	0.66	1.6	>Weekly	144	144	100%
Chloroform	mg/L	NA	0.02	0.031	0.048	Monthly	30	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	<1	>Weekly	144	NA	NA
Colour, Apparent	Pt/Co units	25	<2	<2	6	>Monthly	20	20	100%
Colour, True	Pt/Co units	15	<2	<2	4	>Monthly	37	37	100%
Dibromochloromethane	mg/L	NA	0.003	0.005	0.008	Monthly	30	NA	NA
Dichlorobromomethane	mg/L	NA	0.007	0.012	0.018	Monthly	30	NA	NA
Dissolved Solids, Total	mg/L	600	63	74	82	Monthly	34	34	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	144	144	100%
Electrical Conductivity (25°C)	µS/cm	~900	85	106	120	Fortnightly	56	56	100%
Fluoride	mg/L	1.5	0.68	0.81	0.87	>Monthly	36	36	100%
Hardness, Total (as CaCO ₃)	mg/L	200	18	25	36	>Monthly	37	37	100%
Iron	mg/L	0.3	0.01	0.03	0.06	>Monthly	37	37	100%
Manganese	mg/L	0.1	<0.001	0.002	0.005	>Monthly	37	37	100%
рН	units	6.5-8.5	7.3	7.6	8.4	>Weekly	124	124	100%
Temperature	°C	NA	10.5	17.7	21.9	>Weekly	112	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	2	>Weekly	142	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.035	0.048	0.064	Monthly	30	30	100%
Turbidity	NTU	5 ¹	<0.1	0.5 ¹	0.8	>Weekly	130	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps 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

Williamstown

			Concent	ration or valu	Ie				
			(all sam	ples)			No of Sa	mples	
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Aluminium, Soluble	mg/L	0.2	0.02	0.03	0.04	> Quarterly	6	6	100%
Bromoform	mg/L	NA	<0.001	<0.001	<0.001	Monthly	12	NA	NA
Chlorine, Free	mg/L	5	0.06	0.39	0.78	>Weekly	193	193	100%
Chlorine, Total	mg/L	5	0.1	0.51	0.89	>Weekly	193	193	100%
Chloroform	mg/L	NA	0.018	0.029	0.044	Monthly	12	NA	NA
Coliforms, Total	orgs/100mL	NA	<1	<1	<1	>Weekly	193	NA	NA
Colour, Apparent	Pt/Co units	25	<2	2	6	>Monthly	11	11	100%
Colour, True	Pt/Co units	15	<2	<2	4	>Monthly	14	14	100%
Dibromochloromethane	mg/L	NA	0.002	0.004	0.006	Monthly	12	NA	NA
Dichlorobromomethane	mg/L	NA	0.009	0.011	0.013	Monthly	12	NA	NA
Dissolved Solids, Total	mg/L	600	53	66	75	Monthly	12	12	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	>Weekly	193	193	100%
Electrical Conductivity (25°C)	µS/cm	~900	79	97	110	Fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.61	0.81	0.89	>Monthly	18	18	100%
Hardness, Total (as CaCO ₃)	mg/L	200	18	21	26	>Monthly	14	14	100%
Iron	mg/L	0.3	0.01	0.04	0.07	>Monthly	19	19	100%
Manganese	mg/L	0.1	0.001	0.002	0.004	>Monthly	19	19	100%
рН	units	6.5-8.5	7.1	7.3	7.8	>Weekly	140	140	100%
Temperature	°C	NA	12.5	18.5	25.1	>Weekly	134	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	5	>Weekly	191	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.034	0.044	0.06	Monthly	12	12	100%
Turbidity	NTU	5 ¹	<0.1	0.51	0.7	>Weekly	147	NA	within standard

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps 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

Woodend

			Concentration or value				No of Somplos		
Parameter	Unit	Guideline Value (ADWG 2011)	(all samp	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Alkalinity Total (as $CaCO_{2}$)	mg/l	NA	16	28	44	>Ouarterly	21	A	NA
Aluminium	mg/L	0.2	0.02	0.04	0.1	>Ouarterly	18	18	100%
Aluminium. Soluble	mg/L	0.2	< 0.01	0.02	0.04	>Ouarterly	18	18	100%
Bromoform	mg/L	NA	< 0.001	0.001	0.004	>Monthly	43	NA	NA
Cadmium	mg/L	0.002	< 0.0002	< 0.0002	< 0.0002	>Annually	2	2	100%
Calcium	mg/L	NA	2.6	3.3	4	>Ouarterly	16	NA	NA
Chloride	mg/L	250	20	28	39	>Monthly	14	14	100%
Chlorine, Free	mg/L	5	<0.05	0.81	1.6	Weekly	220	220	100%
Chlorine, Total	mg/L	5	0.09	1.09	1.9	Weekly	220	220	100%
Chloroform	mg/L	NA	0.006	0.029	0.066	>Monthly	43	NA	NA
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	>Annually	2	2	100%
Coliforms, Total	orgs/100mL	NA	<1	<1	4	Weekly	220	NA	NA
Colour, True	Pt/Co units	15	<2	<2	4	>Fortnightly	169	169	100%
Copper	mg/L	1	0.001	0.004	0.007	>Annually	2	2	100%
Dibromochloromethane	mg/L	NA	0.001	0.013	0.029	>Monthly	43	NA	NA
Dichlorobromomethane	mg/L	NA	0.004	0.021	0.051	>Monthly	43	NA	NA
Dissolved Oxygen	mg/L	NA	8	9.9	11.5	>Fortnightly	31	NA	NA
Dissolved Solids, Total	mg/L	600	57	167	220	Monthly	49	49	100%
E. coli	orgs/100mL	Zero(0)	0	0	0	Weekly	220	220	100%
Electrical Conductivity (25°C)	µS/cm	~900	85	245	330	>Fortnightly	169	169	100%
Fluoride	mg/L	1.5	<0.05	0.04	0.12	Monthly	34	34	100%
Hardness, Total (as CaCO ₃)	mg/L	200	12	28	46	>Monthly	66	66	100%
Iron	mg/L	0.3	<0.01	0.01	0.1	>Fortnightly	120	120	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	>Annually	2	2	100%
Magnesium	mg/L	NA	1.9	3.5	5.7	>Quarterly	16	NA	NA
Manganese	mg/L	0.1	<0.001	0.003	0.014	>Fortnightly	120	120	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	>Annually	2	2	100%
Nitrate (as NO ₃)	mg/L	50	0.007	0.07	0.15	>Quarterly	21	21	100%
рН	units	6.5-8.5	7.1	7.6	8.2	Weekly	213	213	100%
Sodium	mg/L	180	21	34.3	46	Quarterly	4	4	100%

Woodend

			Concentration or value						
			(all samples)				No of Samples		
Parameter	Unit	Guideline Value (ADWG 2011)	Min	Average	Мах	Frequency of Sampling ³	Total ²	Passing	Performance against standard/ guideline
Temperature	°C	NA	7.8	14.6	20.9	>Monthly	89	NA	NA
Total Plate Count (37°C)	cfu/mL	NA	<1	<1	3	Weekly	212	NA	NA
Trihalomethanes, Total	mg/L	0.25	0.018	0.064	0.15	>Monthly	43	43	100%
Turbidity	NTU	5	<0.1	0.11	0.6	Weekly	213	NA	within standard
Zinc	mg/L	3	<0.001	0.002	0.004	>Annually	2	2	100%

1 Based on 95th percentile result

2 No. of samples includes routine program at network taps 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

Appendix B. Summary of treated water supply volumes

Summary of Melbourne Water and Local GWW raw water supplies

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
City West Water								
Silvan Reservoir	20%	26%	23%	24%	15%	14%	10%	12%
Greenvale Reservoir	22%	24%	15%	14%	12%	20%	12%	15%
Sugarloaf Reservoir	58%	53%	62%	62%	73%	66%	78%	73%
Western Water								
Greenvale Reservoir (WW)	2%	39%	76%	65%	67%	64%	73%	72%
Rosslynne Reservoir	37	35	7	14	8	5	6	0.1
Merrimu Reservoir	53	24	11	15	15	15	15	11
Local supplies*	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).

Appendix C. Risk Management Plan Audit Certificates

Risk Management Plan Audit Certificate Safe Drinking Water Regulations 2015

Certificate Number: 183 Audit period: 1 January 2021 – 31 December 2022

To: Maree Lang Managing Director Greater Western Water 36 Macedon Street SUNBURY VIC 3429

Australian Business Number (ABN): 70 066 902 467

I, James Howey, after conducting a risk management plan audit of the water supplied by Greater Western Water, am of the opinion that Greater Western Water *has not* complied with the obligations imposed by section 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

There were four minor non-compliances identified as follows:

Mary AL

- Preventive measures in accordance with Section 9(1)(b) of the Safe Drinking Water Act 2003 were not
 fully implemented. A number of water agency owned testable backflow prevention devices were not
 tested in the required timeframe.
- The risk management plan was not implemented in its entirety in accordance with Section 7(1)(a) of the Safe Drinking Water Act 2003. The water quality monitoring program was not fully implemented as a number of samples were missed.
- Competency requirements for personnel contracted by Greater Western Water were not specified in accordance with Regulation 8(1)(f) of the Safe Drinking Water Regulations 2015.
- Actions implemented at the Romsey Water Filtration Plant, to address an identified treatment deficit, were found to be non-compliant with the requirements of Regulation 8(1)(g) of the Safe Drinking Water Regulations 2015 for the management of short-term water quality risk.

James Howey

28/4/2023

Appendix D. 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.

	Sampling	
Parameter	Frequency	Water Quality Standard
Alkalinity, Total as CaCO₃	Monthly	aesthetic limit is 200mg/L
Aluminium, filtered	Monthly	currently no recommended health guideline value set
Aluminium, Total as Al	Monthly	currently no recommended health guideline value set
Ammonia	Weekly	aesthetic limit is 0.5mg/L
Bicarbonate Alkalinity as CaCO ₃	Monthly	aesthetic limit is 200mg/L
Bromodichlormethane	Monthly	should not exceed 0.25mg/L
Bromoform	Monthly	should not exceed 0.25mg/L
Cadmium	Quarterly	should not exceed 0.002mg/L
Calcium	Monthly	currently no recommended health guideline value set
Carbonate Alkalinity as CaCO ₃	Monthly	aesthetic limit is 200mg/L
Chlorine, Total	Weekly	should not exceed 5mg/L
Chlorine, Free	Weekly	Limit based on Chlorine, Total
Chloroacetic acid	Quarterly	should not exceed 0.15mg/L
Chloroform	Monthly	should not exceed 0.25mg/L
Chromium	Quarterly	should not exceed 0.05mg/L
Coliforms, Total	Weekly	currently no recommended health guideline value set
Colour, True	Fortnightly	should not exceed 15HU
Copper	Quarterly	should not exceed 1mg/L
Dibromochloromethane	Monthly	should not exceed 0.25mg/L
Dichloroacetic acid	Quarterly	should not exceed 0.1mg/L
Dissolved Organic Carbon	Monthly	currently no recommended health guideline value set
Dissolved Oxygen (Field)	Weekly	currently no recommended health guideline value set
Electrical Conductivity @ 25C	Fortnightly	aesthetic limit is 940µS/cm
Enterococci	Weekly	should not exceed 0orgs/100mL
Hardness, as CaCO ₃	Monthly	aesthetic limit is 200mg/L
Heterotrophic Plate Count, 37C	Weekly	currently no recommended health guideline value set
Hydroxide Alkalinity as CaCO3	Monthly	aesthetic limit is 200mg/L
Iron, Filtered	Weekly	Limit based on Iron, Total
Iron, total as Fe	Weekly	aesthetic limit is 0.3mg/L
Lead	Quarterly	should not exceed 0.01mg/L
Magnesium, as Mg	Monthly	currently no recommended health guideline value set
Manganese,Filtered (Soluble)	Weekly	Limit based on Manganese, Total

	Sampling	
Parameter	Frequency	Water Quality Standard
Manganese, total as Mn	Weekly	Aesthetic limit should not exceed 0.1mg/L, should not
		exceed 0.5mg/L
Mercury, as Hg	Quarterly	should not exceed 0.001mg/L
Monochloramine	Weekly	should not exceed 3mg/L
Nickel	Quarterly	should not exceed 0.02mg/L
Nitrate	Weekly	should not exceed 50mg/L
Nitrite	Weekly	should not exceed 3mg/L
рН	Weekly	aesthetic limits are no less than 6.5 and no greater than 8.5
Phosphorus, Reactive as P	Quarterly	should not exceed 1mg/L
Silica, Non Reactive	Quarterly	currently no recommended health guideline value set
Silica, Reactive	Quarterly	currently no recommended health guideline value set
Sodium	Monthly	aesthetic limit should not exceed 180mg/L
Sulfate	Annually	aesthetic limit should not exceed 250mg/L
Trichloroacetic acid	Quarterly	should not exceed 0.1mg/L
Trihalomethanes	Monthly	must not exceed 0.25mg/L (reference Safe Drinking Water
		Regulations 2015)
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	Quarterly	currently no recommended health guideline value set
Zinc	Quarterly	should not exceed 3mg/L

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 (NH ₃)	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) (BGA)	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 (NH_2Cl) , 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.
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.
Disinfection	Inactivation (killing) of pathogens or organisms capable of causing infectious disease by chemical or physical processes, including chlorination.
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. <i>E. coli</i> can be killed by standard disinfection practices.
False Positive sample <i>E. coli</i> result	<i>E.</i> 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 <i>E.</i> 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 WFP, Rosslynne WFP 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.
Hazard Analysis and Critical Control Point (HACCP)	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
National Association	NATA is Australia's national laboratory accreditation authority. NATA accreditation
of Testing Authorities (NATA)	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.
Nitrate (NO ₃₋)	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.
рН	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	Water that is intended for human consumption or for purposes connected with human
(drinking water)	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 Section 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.
Southern Rural Water (SRW)	The 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 filtration plant (WP)	Drinking water treatment plant.
Water quality standard	A quality standard specified for drinking water by regulations made for the purposes of Section 17 of the <i>Safe Drinking Water Act 2003</i> .
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.



Greater Western Water

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