Melbourne Water

Water Quality Annual Report

2022-23

VICTORIA State Government

Melbourne Water is owned by the Victorian Government. We manage Melbourne's water supply catchments, remove and treat most of Melbourne's sewage, and manage rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region.

Melbourne Water
Enhancing Life and Liveability

About Melbourne Water

This report is provided to the Secretary of the Department of Health in accordance with Section 26 of the *Safe Drinking Water Act 2003* (Vic) for the 2022-23 financial year.

Melbourne Water (MW) makes a vital contribution to the renowned Melbourne lifestyle by underpinning human health, enhancing community well-being, supporting economic growth and balancing the natural and human-made environment.

The organisation is responsible for the supply of affordable, high-quality water, reliable sewerage, healthy waterways, integrated drainage and flood management services and cooler greener spaces, helping make greater Melbourne a fantastic place to live.

Today, the organisation employs a passionate, truly diverse, future-focused team of experts, who collaborate with a wide range of partners to skilfully balance the social, economic and liveability needs of the community with the long-term benefit of the environment.

MW has a solid history of foresight, ingenuity and best practice. Today, with a strong commitment to understanding and delivering to the needs of customers and the community, we are a leader in the delivery of an outstanding integrated system that is secure, efficient, affordable and sustainable.

Our key stakeholders are government, regulators, and our customers including other water businesses, land developers, the community and suppliers. These stakeholders and our other strategic partners, including our construction and maintenance partners and research organisations, help us achieve our objectives. We consider social, environmental and financial effects and short-term and long-term implications in all our business decisions.

We are owned by the Victorian Government, with an independent Board of Directors responsible for governance. The responsible Minister is the Minister for Water. The Environment Protection Authority Victoria and the Department of Health Victoria (DH) regulate the environmental and public health aspects of our business. The Essential Services Commission (ESC) regulates prices and monitors service performance. We work across several arms of the Victorian Government, including the Department of Energy, Environment and Climate Action (DEECA) and the Department of Treasury and Finance.

Our customers include Melbourne's retail water companies (Greater Western Water, GWW; South East Water, SEW; and Yarra Valley Water, YVW), regional water authorities (South Gippsland Water, SGW; Gippsland Water, GW; Westernport Water, WPW and Barwon Water, BW), local councils, land developers, and businesses that divert river water.

MW and the retail water companies have developed risk management systems for drinking water quality using the principles of Hazard Analysis Critical Control Points (HACCP) and the quality management system standard ISO 9001. The HACCP process systematically analyses hazards and establishes measures for their control to ensure product quality and safety. Our commitment to delivering safe and secure high quality drinking water that meets or exceeds regulatory and customer service standards is set out in our board approved Public Health Policy.

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1. Water Supply System

We manage the harvesting of water from catchments, storage of harvest, bulk water transfer, the treatment of water, and the delivery of treated water to numerous interface points with water companies such as GWW, SEW, YVW, BW, SGW and WPW (SGW and WPW receive water via the Victorian Desalination Pipeline). GW receives untreated water. In total, we supplied 453 billion litres of water in 2022-23, which is 1.3% more than last year. This volume included a small volume of untreated water directly from our aqueducts to connected customers supplied by Melbourne's retail water companies.

2. Source Water

The drinking water we supply is sourced from a combination of protected surface water catchments, unprotected surface water catchments, and seawater. Each of these source waters requires a different type of treatment to ensure that the treated water is appropriate for human consumption.

Approximately 75% of Melbourne's water is sourced from forested, protected catchments. The catchment system consists of 11 water supply catchments and five water holding storages. The catchments located within National Parks are co-managed with Parks Victoria, with management arrangements outlined in a National Parks Agreement. The catchments located within State Forest are co-managed with DEECA, a Memorandum of Understanding details the arrangements to effectively manage human activity and land use for the purposes of protecting water resources in State Forest.

The five water holding storages are solely managed by MW. Most of Melbourne's water is supplied via Silvan Reservoir which receives inflows from Thomson Reservoir, Upper Yarra Reservoir, O'Shannassy Reservoir and other small tributaries to the Yarra River. Cardinia is supplied both by the Silvan system and the Victorian Desalination Project (VDP), some of this water can then be used to supplement Silvan demand when required. Greenvale Reservoir continues to be supplied by the Silvan system. These sources are supplied to Melbourne's retail water companies unfiltered because of the high quality of water drawn from the protected catchments and large storages. As is reflected in our board approved Public Health Policy MW is committed to "protect Melbourne's existing drinking water sources through sustainable catchment management practices".

Approximately 25% of Melbourne's drinking water has been sourced from open catchments that have mixed land uses including farming, rural properties and state forests that are open to activities such as camping and four-wheel driving. Water sourced from these catchments undergoes additional treatment to that sourced from protected catchments to ensure the safety of the drinking water supply.

The Tarago water supply catchment contains land that is privately owned, with a variety of agricultural uses. We have an interest in the protection and improvement of water quality on this private land and have worked with stakeholders, including the Baw Baw Shire Council and the Neerim District Landcare Group, to develop a Tarago Catchment Management Plan.

The open mid-Yarra River catchment feeds into Sugarloaf Reservoir, where it mixes with water from the protected Maroondah catchment before being treated at the Winneke Treatment Plant. The Yarra Glen supply is also fed from the Maroondah catchment; however, the transfer

aqueduct is not protected, meaning that a greater degree of treatment is required prior to supply.

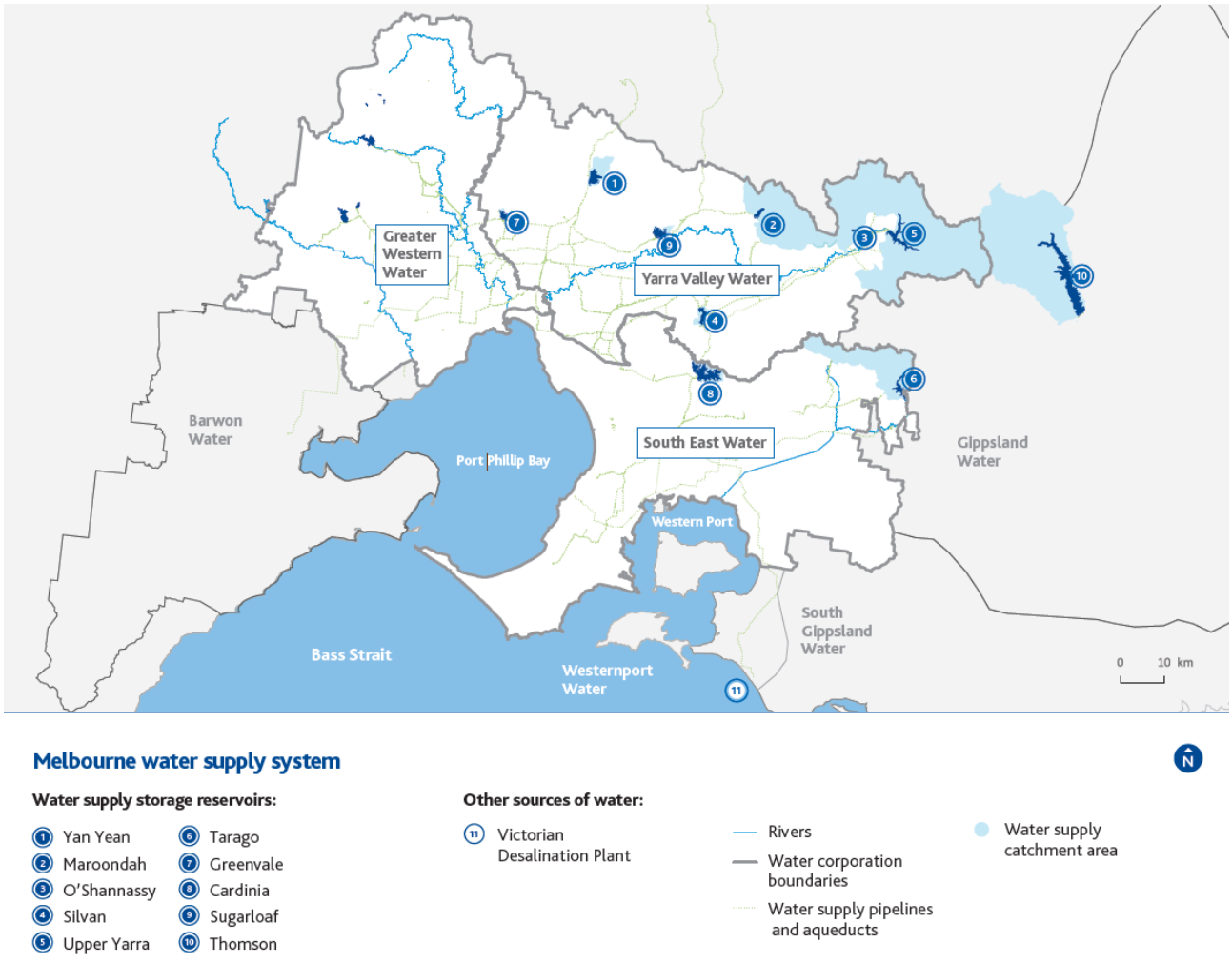
The Healesville supplies are sourced directly from nominally protected catchments without a storage reservoir to buffer water quality problems that arise from time to time. To mitigate these water quality risks these sites also have additional treatment barriers, which remove colour and turbidity as well as potential pathogens.

Depending on the volume of water stored in Melbourne's reservoirs, Cardinia Reservoir can also receive desalinated water. The VDP comprises a 150 gigalitre/year reverse osmosis plant at Wonthaggi, an 84-kilometre underground, two-way transfer pipeline to Berwick and an 87 kilometre underground dedicated power supply from Cranbourne. The plant extracts seawater from Bass Strait near Wonthaggi. Water is fully treated via a series of processes (refer to Table 1 and Table 2 on pages 10-13 for further details). Water enters an underground transfer pipeline which connects the plant to our existing water supply network, enabling supply to Cardinia Reservoir, directly into the water network at Berwick and to offtakes along the pipeline. The pipeline is two-way, so when the plant is not in use, the pipeline can transfer water from our distribution network to connected regional water businesses, thereby ensuring security of supply.

In the 2022-23 financial year, approximately 4.2 billion litres of water was supplied by the Victorian Desalination Plant. There were no major changes in the arrangements for water supply compared to the previous financial year and the relative contribution from each source was similar to the previous year. We continued to optimise which sources we harvested from throughout the year to meet forecast demand and climate variability, as per regularly updated plans.

Figure 1 shows our supply area, supply systems and treatment processes are described in Table 1 and 2.

Figure 1 - Melbourne's water supply system



We manage the catchments and source water storages used for the supply of drinking water to the Melbourne metropolitan area. Untreated (supply by agreement) and treated drinking water is supplied to consumers by Melbourne's retail water companies. The water is monitored from catchments, through major storages and treatment plants to the interface points with the retail water companies to ensure that it meets the requirements of relevant drinking water quality guidelines and agreements with these companies.

We prioritise our actions to protect source water from contamination using our drinking water quality risk assessment. The risk assessment covers catchments, storage and service reservoirs, treatment and bulk water transfer to the interface with the retail water companies. Operational monitoring is used to provide early warning of issues which could affect drinking water quality before critical limits are reached. Examples of this monitoring include catchment inspections, manual water quality sampling and online monitoring.

We routinely monitor the water quality within the catchments and distribution system through regular sampling and analysis according to a risk-based water sampling program consistent with the requirements of regulation 8(1)(d) of the Safe Drinking Water Regulations 2015. The sampling and analysis are contracted out to external National Association of Testing Authorities accredited laboratories. The level of monitoring is designed to complement risk management and HACCP systems, meet the requirements of the Bulk Water Supply Agreements , monitor

treatment processes and assist Melbourne's retail water companies and regional water authorities' needs in meeting the Safe Drinking Water Regulations 2015.

We maintain a certified management system, HACCP, for operation of the water treatment plants and supply system to ensure the delivery of safe drinking water. This risk-based management system verifies that treatment processes are operating in accordance with design intent and are achieving the required level of pathogen reduction.

The supply areas of Melbourne's retail water companies are divided into water sampling localities and these localities can have one or more water sources during the day or year due to the demand, seasonal variation and complexity of our water supply system. The retail water companies must comply with the Safe Drinking Water Regulations in these localities as part of their licence agreement with the ESC.

Recreation in our catchments

MW continues to support a balanced approach to recreation in selected catchments and reservoir parks to allow more people to enjoy Victoria's vast natural spaces, balanced with protecting our precious drinking water for the safety of our community.

At Yan Yean Reservoir we have been working with the Wurundjeri Woi-wurrung community, the traditional custodians of the Yan Yean Reservoir catchment area, on natural resource management and on a Cultural Values Assessment for Yan Yean Reservoir. We are committed to working with the Wurundjeri Woi-wurrung to protect and celebrate their cultural heritage. This will provide an important foundation for future planning for the site.

In November 2022 Premier Daniel Andrews made an election commitment to invest in recreational facilities and required water treatment upgrades to facilitate on water boating and fishing (non-combustion powered and electric motorised vessels only) at Tarago Reservoir.

As the authority responsible for managing Tarago Reservoir, MW has been working with State and Local Government, and the Victorian Fisheries Authority's Better Boating Victoria division on the initial steps to deliver this commitment.

3. Drinking Water Treatment Processes

The water we supply to retail water companies is potable water, with the exception of:

- Gippsland Water - Untreated water from our Tarago Reservoir is fed into GW's treatment plants and then into supply for consumption by the customers.
- South Gippsland Water – Water from the VDP is supplied to SGW via the Victorian Desalination Pipeline. This water is retreated in SGW's treatment plants prior to being supplied to customers to ensure it meets water quality standards.
- Supply by Agreement Customers – some customers directly connect to our untreated water assets. The retail water companies have processes to ensure these customers are informed that their water is not suitable for drinking.

Water treatment plants are located where water from open storages first enters the distribution system. Whilst long retention times in storage reservoirs and primary disinfection plants help inactivate microorganisms such as pathogenic bacteria, protozoa and viruses in the untreated water, additional treatment barriers are required depending on the risk level of the water.

Chlorination and ultraviolet (UV) irradiation are the methods we use to disinfect the water. Chlorination is the most common form of disinfection used to treat Melbourne's water supply, with chlorination plants located at all of the major water treatment plants. Chlorination is effective against viruses and bacteria and provides a residual to control biofilm growth in the downstream network. We also operate six UV irradiation disinfection plants, which provide effective initial disinfection, but do not provide a disinfection residual for protection against downstream biofilm growth. UV disinfection at Tarago is discussed below. At Warburton (Martyr Road), Woori Yallock and Launching Place (Lusatia Park), East Warburton (Brahams Road and Lyrebird Avenue) and Yarra Junction, UV disinfection at each site provides primary disinfection, and sodium hypochlorite addition provides secondary disinfection.

Water from unprotected catchments is treated by filtration in addition to chlorine disinfection, to ensure protozoa removal. We operate two large filtration plants. Winneke is a sand filtration plant that treats water at the outlet of Sugarloaf Reservoir. It incorporates processes including coagulation, clarification, filtration and chemical addition for fluoridation, chlorination and pH correction. The Tarago Water Treatment Plant at Drouin West is gravity fed and incorporates processes including permanganate pre-dosing, coagulation, Dissolved Air Flotation and Filtration, UV irradiation and chemical addition for pH correction, fluoridation and chlorination. At the Tarago Water Treatment Plant, UV irradiation is used as an additional barrier downstream of filtration to ensure the inactivation of protozoa.

There are three membrane filtration plants; two that supply Healesville (Frogley and Cresswell Water Treatment Plants) and one that supplies Yarra Glen. These plants remove particles in the untreated water from their respective aqueduct sources to ensure that parameters such as turbidity and colour are reduced to acceptable levels, particularly during storm events. In addition, pathogens attached to the filtered particles are removed. Reducing the turbidity also ensures more effective chlorine disinfection of the filtered water.

Water from the Victorian Desalination Plant is treated via a series of processes which include filtration, reverse osmosis, disinfection and fluoridation.

The Yan Yean Water Treatment Plant is not currently in operation while a capital project to upgrade the plant and reintroduce treated Yan Yean water into supply during the second half of 2023 continues to progress.

Eleven fluoridation plants are operated at the direction of DH to promote improved dental health outcomes in the community. The operation of the fluoridation plants is a statutory requirement under the *Health (Fluoridation) Act 1973* (Vic). These 11 plants are:

- Seven fluorosilicic acid plants operating at: Silvan (three plants), Cardinia (two plants), Winneke (one plant) and Tarago (one plant)
- Two sodium fluoride solution plants operating at Monbulk and Kallista
- The Yan Yean fluorosilicic acid plant (not currently in operation).
- The Victorian Desalination Plant which uses fluorosilicic acid. AquaSure operates the Victorian Desalination Plant under a public private partnership project managed by DEECA.

Secondary disinfection chlorination plants are also located at a number of points within the treated water network. The primary purpose of secondary disinfection is to provide an additional barrier to protect against minor ingress into the distribution network. Secondary benefits include increased chlorine residuals downstream of treated water storages, prevention

of taste and odour problems and minimisation of biofilm growth within the closed distribution system where the water has already been treated by primary disinfection.

Tables 1 – 2 describe the water treatment sources, treatment processes and substances added at each treatment plant.

Table 1: Summary of water supply systems and areas serviced

Water Supply System	Source Water / Catchment	Storage	Treatment Plant	Treatment Storages	Area Supplied *(Retail water company supplied)*
Cardinia	Transfer from Silvan Reservoir without being treated at Silvan water treatment plant Treated water from Desalination plant	Cardinia Reservoir	Cardinia	N/A	Mornington Peninsula and south eastern suburbs. Note: pump station at Cardinia can also pump water back to Silvan Reservoir *(South East Water, Yarra Valley Water, South Gippsland Water and Westernport Water)*
Victorian Desalination Plant	Desalination plant offtake from Bass Strait	Direct to supply or Cardinia Reservoir	Wonthaggi Desalination Plant	Cardinia Reservoir / direct supply to townships	Capable of supplying primarily Mornington Peninsula, south eastern suburbs and South Gippsland area through direct delivery points and contributing to water businesses connected to the Melbourne Water supply through Cardinia Reservoir which is blended with catchment supplies. (*South East Water, Yarra Valley Water, South Gippsland Water and Westernport Water)*
Greenvale	Transfer from Silvan Reservoir (after treated at Silvan), or from Winneke water treatment plant. See Silvan and Winneke water supply systems	Greenvale Reservoir	Greenvale St Albans	N/A	Western suburbs and Sunbury/Melton *(Greater Western Water, Yarra Valley Water, Barwon Water)*
			Greenvale-Yuroke	N/A	
Lower Yarra Valley Townships	Maroondah Catchment	Maroondah Reservoir	Yarra Glen	Yarra Glen Service Reservoir	Yarra Glen *(Yarra Valley Water)*

Water Supply System	Source Water / Catchment	Storage	Treatment Plant	Treatment Storages	Area Supplied *(Retail water company supplied)*
Lower Yarra Valley Townships	Coranderrk and Graceburn Catchments	N/A	Cresswell	Cresswell Service Reservoir	Healesville *(Yarra Valley Water)*
			Frogley	Frogley Service Reservoir	
Silvan	Thomson Catchment Upper Yarra Catchment O'Shannassy Catchment Armstrong Catchment McMahons Catchment Starvation Catchment Coranderrk Catchment Treated water from Desalination plant via Cardinia	Silvan Reservoir	Silvan-Olinda Silvan-Preston Silvan-Waverley	N/A	Eastern, central, northern & western suburbs, including Seville and Wandin *(Greater Western Water, South East Water, Yarra Valley Water)*
			Monbulk	Monbulk Service Reservoir 1 & 2	Monbulk, Silvan, Sherbrooke, Sassafras, Ferny Creek, Olinda, Mount Dandenong *(Yarra Valley Water)*
			Kallista	Johns Hill Service Reservoir	Emerald, Kallista, Menzies Creek, Cockatoo *(Yarra Valley Water)*
Tarago	Tarago Catchment	Tarago Reservoir	Tarago	Tarago Clearwater Reservoir	Neerim South, Drouin/Warragul *(Gippsland Water)* Mornington Peninsula, West Gippsland townships, southern suburbs *(South East Water)*
Upper Yarra Valley Townships	Thomson Catchment Upper Yarra Catchment	Thomson Reservoir Upper Yarra Reservoir	Brahams Rd Lusatia Park Lyrebird Martyr Rd Yarra Junction	N/A	Woori Yallock, Launching Place, Yarra Junction, Warburton, East Warburton *(Yarra Valley Water)*
Winneke	Transfer from Maroondah Reservoir, Yarra River, Goulburn River[1]	Sugarloaf Reservoir	Winneke	Winneke Clearwater Reservoir	Northern, eastern, central & western suburbs *(Greater Western Water, South East Water, Yarra Valley Water)*

Table 2: Water treatment processes and added substances at each drinking water treatment plant

Water Supply System	Treatment Plant	Treatment Process	Added Substances	Role of Each Process
Cardinia	Cardinia 1400 Cardinia 1700	Chlorination	Chlorine gas / Sodium hypochlorite[1]	Disinfection
		Fluoridation	Fluorosilicic acid	Provide dental health benefit
		pH Correction	Hydrated Lime	pH correction
Victorian Desalination Plant	Wonthaggi Desalination Plant	Coagulation /Flocculation	Ferric sulphate / Sulphuric acid / Polydadmac	Improve performance of filtration
		Filtration (Drum screens, dual media pressure filters, cartridge filters	-	Protect RO membranes
		Reverse Osmosis	Antiscalant / Sodium hydroxide/ Sodium bisulphite	Removal of salts from the water
		Reverse Osmosis Cleaning	Membrane cleaning chemicals (caustic, detergent, acid)	Maximise performance of RO
		Chlorination	Chlorine gas	Disinfection
		Fluoridation	Fluorosilicic acid	Provide dental health benefit
		Remineralisation	Hydrated lime / Carbon dioxide	Stabilise water and pH correction
		Membrane preservation	Sodium bisulphite	Protect membranes when not in use
		Sludge thickening/dewatering	Polymer	Washwater recovery
Greenvale	Greenvale St Albans Greenvale Yuroke	Chlorination	Sodium hypochlorite	Disinfection
Lower Yarra Valley Townships	Cresswell Frogley Yarra Glen	Coagulation / flocculation	Aluminium chlorohydrate	Colour & organics removal
		Membrane ultrafiltration	-	Remove pathogens/turbidity
		Membrane cleaning	Citric acid / Sodium hypochlorite	Optimise membrane performance
		Chlorination	Sodium hypochlorite	Disinfection
		pH correction	Sodium carbonate	pH correction
Silvan	Silvan-Olinda Silvan-Preston	Chlorination	Chlorine gas / Sodium hypochlorite[4]	Disinfection
		Fluoridation	Fluorosilicic acid	Provide dental health benefit

[1] Occasional use of Sodium hypochlorite when required as additional residual or when Chlorine gas dosing is offline.

	Silvan-Waverley	pH correction	Hydrated Lime	pH correction
	Monbulk Kallista	Chlorination	Sodium hypochlorite	Disinfection
		Fluoridation	Sodium fluoride	Provide dental health benefit
Tarago	Tarago	Pre-treatment chemical dosing	Powdered activated carbon / hydrated lime / carbon dioxide	Optimise treatment plant performance
		Coagulation/flocculation	Aluminium chlorohydrate / PolyDADMAC / Polyacrylamide	Improve filter performance
		Dissolved air flotation filtration (DAFF)	-	Removal of pathogens/turbidity
		Chlorination	Chlorine gas	Disinfection
		Ultraviolet (UV) irradiation	-	Disinfection
		Fluoridation	Fluorosilicic acid	Provide dental health benefit
		pH correction	Hydrated Lime / Carbon dioxide	pH correction
		Sludge thickening / dewatering	Polyacrylamide	Washwater recovery
		Iron / manganese removal	Potassium permanganate	Removal of iron and manganese
Upper Yarra Valley Townships	Brahams Rd Lusatia Park Lyrebird Ave Martyr Rd Yarra Junction	Ultraviolet (UV) irradiation	-	Disinfection
		Chlorination	Sodium hypochlorite	Secondary disinfection to provide a chlorine residual to customer tap
Winneke	Winneke Treatment Plant	Coagulation / flocculation	Aluminium sulphate / Polymer	Colour & organics removal
		Clarification	-	Remove pathogens / turbidity
		Rapid media filtration	-	Remove pathogens / turbidity
		Chlorination	Sodium Hypochlorite	Disinfection
		Fluoridation	Fluorosilicic acid	Provide dental health benefit
		pH correction	Hydrated Lime	Optimise disinfection, and pH correction
		Sludge thickening / dewatering	Polyacrylamide	Washwater recovery
Distribution network	Various secondary treatment plants	Secondary disinfection	Sodium hypochlorite	Secondary disinfection
		Alkalinity adjustment	Sodium Hydroxide/Hydrated lime/Carbon Dioxide	Optimise alkalinity, pH correction

4. Improvement Initiatives

MW aims to continually improve our management of drinking water quality risks to maintain safe supply, adapt to change and enhance resilience. Improvement initiatives are underpinned and guided by MW's *Drinking Water Quality Strategy*.

4.1 Drinking Water Quality Strategy

MW's *Drinking Water Quality Strategy* has been updated and re-published on MW's website in 2023. The updated strategy builds on the previous 2017 Drinking Water Quality Strategy, which shaped and enabled significant improvements in drinking water quality risk management over the last five years. It outlines an approach that maintains and builds on the achievements and legacy assets of the past, while planning approaches and solutions suitable for the future. The 2023 Drinking Water Quality Strategy retains and builds on the objectives of the previous strategy to drive continuity of supply, source management actions, to continue innovating and building trust with our customers, regulators and stakeholders, and to build resilience to extreme events.

4.2 Implementing Upgrades and Renewals

MW's Drinking Water Quality Improvement Program (DWQIP) tracks, prioritises and facilitates delivery of improvement actions related to the Drinking Water Quality Management System (DWQMS). DWQIP was initially formed from the findings of MW's Disinfection Control Effectiveness Review (DCER) that focused on the effectiveness of our disinfection control, the DWQMS Review that benchmarked our DWQMS against the Australian Drinking Water Guidelines and, the actions arising from the 2020 Silvan disinfection failure investigation. Since then DWQIP has grown to include the actions described in MW's *Drinking Water Quality Strategy,* actions identified by the Melbourne Metropolitan water company Joint Action Plan and, Opportunities For Improvement identified during the most recent Safe Drinking Water Act risk management plan audit. Incorporating these improvement opportunities into a cohesive action plan avoid duplication and ensures systematic implementation of improvements under appropriate and consistent governance arrangements.

After its launch in the 2021-22 financial year, DWQIP continues to progress and deliver projects across the drinking water supply system with a focus on systematic, coordinated and risk-based prioritisation. In the 2022-23 financial year 36 projects (15% of the current program) were delivered through intra-organisational and inter-organisational collaboration with our customers and regulators.

Key initiatives being delivered via DWQIP include:

- Drinking Water Quality Risk Register Review - At the core of our Drinking Water Quality Management System is our drinking water quality risk register. The purpose of this risk register is to quantify, document, track and communicate all existing and emerging, operational and strategic risks to drinking water quality and the controls that Melbourne Water uses to manage them.

  Opportunities to improve MW's risk register beyond compliance to industry leading were identified in 2021 by an external review of our Drinking Water Quality Management System

across the 12 elements of the Australian Drinking Water Guidelines. In response in 2022-23, MW has initiated a project to re-structure the risk register to enhance alignment between our risk register and those of our customers, which will support an increasingly coordinated and systematic catchment to tap approach to managing drinking water quality risks. This is supported by a parallel project to review and update MW's water supply catchment sanitary surveys, as part of our Health Based Target approach to supply of drinking water.

- Silvan Pathogen Monitoring Program Review – This significant program of work aims to provide improved analytical method sensitivity and specificity on closed catchment water source pathogen in order to inform improved risk mitigation, public health assessment and economic benefit.

  Phase 1 of the study aims to validate broadly applicable methods for improving quantification of microbial risks within closed catchment water sources by undertaking a case study approach within the Silvan Reservoir catchment. Importantly, this is a stepped process of validating and adapting methodologies to ensure targeted measures are implemented. Phase 2 of this work will include roll-out of the validated methods within the Silvan Reservoir catchment.

- The Joint Action Plan - Melbourne Water continues to work in collaboration with DH, DEECA and metropolitan retail water companies on a Joint Action Plan, allowing a sector wide approach to drinking water quality improvements and ensure public health is protected. The recent Safe Drinking Water Act risk management plan audit completed in April 2023 assessed several joint action plan projects to have been effectively implemented in meeting the intent of the action.

Capital projects supporting the DWQIP and improved water quality outcomes:

- Disinfection resilience and reliability projects including:
  - Work on the Mt Evelyn Water Treatment Plant, which will provide additional disinfection resilience to the Silvan supply, continues to progress. Construction of this plant is scheduled to begin in 2024 with provisional commissioning in 2025. In the meantime while this project progresses we have further enhanced the reliability of the Silvan emergency dosing units.
  - The Cardinia Emergency Dosing Unit designed to provide an additional layer of treatment resilience to the plant was completed in April 2023.
  - MW have worked with suppliers in partnership with YVW to make Programmable Logic Controllers configuration changes to increase the UV reactor treatment capacity for Brahams, Lyrebird and Lusatia Park treatment plants, in response to lessons learnt during an incident in January 2023. Further improvements to plant resilience for the 5 small UV 'Valley plants' are continuing into the 2023-24 financial year.
- A number of treatment upgrades have been completed or are underway at the Winneke treatment plant including:
  - a fluoride plant upgrade that was completed in April 2023.
  - an ultraviolet disinfection upgrade due to be delivered during 2024.

  - Partial media replacement and underdrain improvements to improve the condition of the Winneke Filters has also been underway during the 2022-23 financial year. As of the end of this report period 11 of 16 filters have had a partial media replacement, improving filter performance and resilience. Partial media replacement of the remaining filters will be completed in the 2023-24 financial year.
  - A longer term filter upgrade project has also been identified. This has an approved business case and has been scheduled into the future capital delivery program.
- Finally construction of an upgrade to Yan Yean Treatment Plant designed to manage historic taste and odour problems is nearing completion with commissioning set to begin in 2023.

5. Issues

5.1 Widespread Customer Complaints

There was one event causing or with the potential to cause widespread customer complaint reportable under section 22 of the *Safe Drinking Water Act 2003* which impacted our customer YVW in 2022-23.

On 20 December 2022, MW undertook isolation of the M78 water main to facilitate repair of a leaking ferrule. This resulted in 92 low pressure or no water complaints during the isolation and a further 55 dirty water complaints once the main was returned to service in YVW's Ivanhoe water sampling locality.

YVW informed DH verbally of this issue on 20 December 2022 and submitted a written section 22 report on 21 December 2022. The primary items of concern were resuspension of naturally occurring sediments causing discoloured water. To mitigate these risks YVW conducted mains flushing followed by water quality sampling to verify its effectiveness.

Investigation determined that the alternative supply intended to provide water during the outage did not operate due to a control valve failing to open, in turn caused by an error in the schematic of the M78 showing the pressure instrument controlling the valve in the wrong location.

Key learnings from this incident include:

- Verifying the correct location and operation of the pressure instrument and control valve for the alternative supply before updating the schematic.
- Modification of the shutdown and reinstatement plan for this location to include introducing the alternative supply 24 hours prior to the outage to verify it is working correctly.

Additional details are contained in YVW's drinking water quality report 2022-23.

5.2 Fluoride Notifications

MW made one notification to DH and the retail water companies during the reporting period as required by the *Code of Practice for Fluoridation of Drinking Water Supplies* (Vic).

- DH were notified of a Winneke fluoride plant planned outage from 28 November 2022 until 01 December 2022 to enable works on the new Winneke fluoride plant. This outage was

unavoidable to deliver the upgraded Fluoride plant, works were scheduled to minimise the length of the outage as best as practicable.

6. Emergency, Incident and Event Management

6.1 Issues with Known or Suspected Water Contamination

MW reported one instance of known or suspected contamination as required by Section 22 of the *Safe Drinking Water Act 2003*:

Lyrebird Ave Suspected Inadequate Disinfection

Two distribution network bursts occurred in the East Warburton supply zone downstream of the Lyrebird Ave water treatment plant on 11 January 2023. Both UV and Chlorine disinfection were operating throughout the burst events however the large increase in flow caused by the bursts exceeded the validated treatment window of the plant resulting in suspected inadequate disinfection for 4 hours and 12 minutes in the morning and again for 46 minutes in the afternoon impacting 9 occupied customer connections.

As the UV disinfection plant was operating outside of its validated window, and uncertainty of whether actual primary disinfection was achieved for the 9 occupied property connections located closest to the treatment plant, the Department of Health (DH) was verbally notified of the event on 11 January 2023 and a written section 22 report form was submitted on 12 January 2023. YVW also separately reported this incident to DH.

A joint incident management team was formed between MW and YVW to manage the incident. Following the joint event investigation and technical analysis of the UV disinfection system it was found that there was ultimately no public health risk presented at the time and adequate UV disinfection was maintained throughout the event, however, our systems were not configured appropriately to show this at the time due to the burst flows. This has been rectified on site.

A joint debrief between MW, YVW and DH was also held by an independent facilitator.

Corrective actions conducted during the incident included:

- Network burst repairs
- Water quality sampling to verify extent of customers supplied with inadequately disinfected water
- Notification to affected customers
- Establishment of temporary supply to customers close to Lyrebird Avenue Water Treatment Plant to increase disinfection capability in case of further bursts, while key treatment capacity and redundancy improvements were being actioned

A root cause investigation was carried out which determined that this incident had the following root causes:

- The UV treatment plant was only configured for normal peak flows and not burst flows.
- Incorrect alarms in place to identify burst flow events impacting plant performance.

- Tools used to determine treatment operating efficacy relied on manual analysis and interpretation leading to a delay in escalation of the incident.

The following corrective actions were undertaken to prevent a recurrence of such an incident:

- Modelled maximum burst flows and then reconfigured UV treatment plant control system to cope with these calculated maximum burst flows. This was supported by updates to instrument ranging, scaling, alarming and process controls.
- Incident disinfection calculation tools were reviewed and enhanced to more rapidly identify treatment failures.
- Reviewed emergency response and notification procedures to ensure accuracy of contact details and improve guidance around initial risk assessment and timeliness for escalation.

Further work to enhance operational resilience of the Lyrebird plant and similar plants in the region includes:

- Applying the improvements identified for Lyrebird Avenue UV treatment to similar treatment plants.
- Considering the feasibility of improving/upgrading the treatment process for secondary chlorination to be able to achieve primary disinfection as a secondary disinfection barrier.

7. Risk Management Plan Audit Results

In 2023 MW's drinking water risk management plan was audited against the requirements of the *Safe Drinking Water Act 2003* (the Act) and Safe Drinking Water Regulations 2015 (the Regulations) for the period 1 January2021 to 31 December 2022. The audit found Melbourne Water to be fully compliant with the requirements of the Act and the Regulations and noted four Opportunities For Improvement (OFI). A copy of the audit certificate is provided in the appendix to this document.

MW has committed to corrective actions to address each of the four Opportunities For Improvement (OFIs) identified during the previous audit, the OFIs are summarised in Table 3 along with the associated corrective actions.

MW was also recertified for HACCP by BSI during 2023, no OFIs or non-conformances were identified. The final certificate was not available at the time of writing for this report.

Table 3: 2023 RMP (Risk Management Plan) Audit Opportunities for Improvement

Opportunity for Improvement	Corrective Action	Completion Date
Review and improve MW's spares identification processes.	Review and improve spares identification and management-related procedural documents to ensure critical spares for maintaining supply of safe drinking water are appropriately identified during routine Maintenance Strategy Determination Reviews (including identification of re-order points) and for all new assets.	Due for completion during 2023-24
Review with suppliers, supply chain resilience and criticality	Set up a Third-Party Risk Management Framework, which would include how we manage MW's Supply Chain Risks (SCRM) related to water quality. Update the Procurement Framework in line with the Third-party Risk management framework and establishment of category management practices at Melbourne Water. Establishment of a Category management practice and category manager for "Directs" category at Melbourne Water.	Due for completion during 2024-25
Review bushfire controls for the Silvan treatment plant and similar treatment plants, including deluge system and tree proximity.	Review bushfire controls for Silvan treatment plants and associated emergency assets that are vulnerable to bushfire and identify any upgrades required. Review bushfire controls for all other treatment plants and emergency assets that are vulnerable to bushfire and identify any upgrades required.	Due for completion during 2024-25
Ensure adequate internet coverage and adequate computer screens.	Identify and implement required updates to the IT facilities at remote treatment plants.	Due for completion during 2023-24

8. Exemptions under Section 8 of the Act

No exemptions were in place during the year.

9. Undertakings under Section 30 of the Act

No undertakings were entered into or completed during the year and there were none in place from previous years.

10. Further information

This report and further information regarding drinking water quality is available on our website at www.melbournewater.com.au or by contacting the customer service team:

Telephone:	131 722
Translation Service:	131 450
Speak and Listen:	1300 555 727
Fax:	(03) 9600 1192
Email:	enquiry@melbournewater.com.au
Mail:	Melbourne Water PO Box 4342 Melbourne, Victoria 3001

Appendix

Regulation 10

Schedule 1 - Risk Management Plan Audit Certificate

Safe Drinking Water Regulations 2015

Certificate Number: 193

Audit Period: 1st January 2021 to 31st December 2022

To: Matthew Higginbotham
Drinking Water Quality Management Systems Lead
Melbourne Water
990 La Trobe Street
Docklands
Melbourne 3008

Australian Business Number (ABN): 81 945 386 953

I, Thomas Teunissen, after conducting a risk management plan audit of the water supplied by Melbourne Water, am of the opinion that:

Melbourne Water has complied with the obligations imposed by Section 8(1) of the ***Safe Drinking Water Act 2003*** during the audit period.

Date: 19th April 2023

Signature of approved auditor:

Thomas Teunissen