

# Annual Drinking Water Quality Report 2021-22



## Aboriginal acknowledgement

South East Water proudly acknowledges the Bunurong and Wurundjeri Woi Wurrung as the Traditional Owners of the land on which we operate, and pay respect to their Elders past, present and emerging.

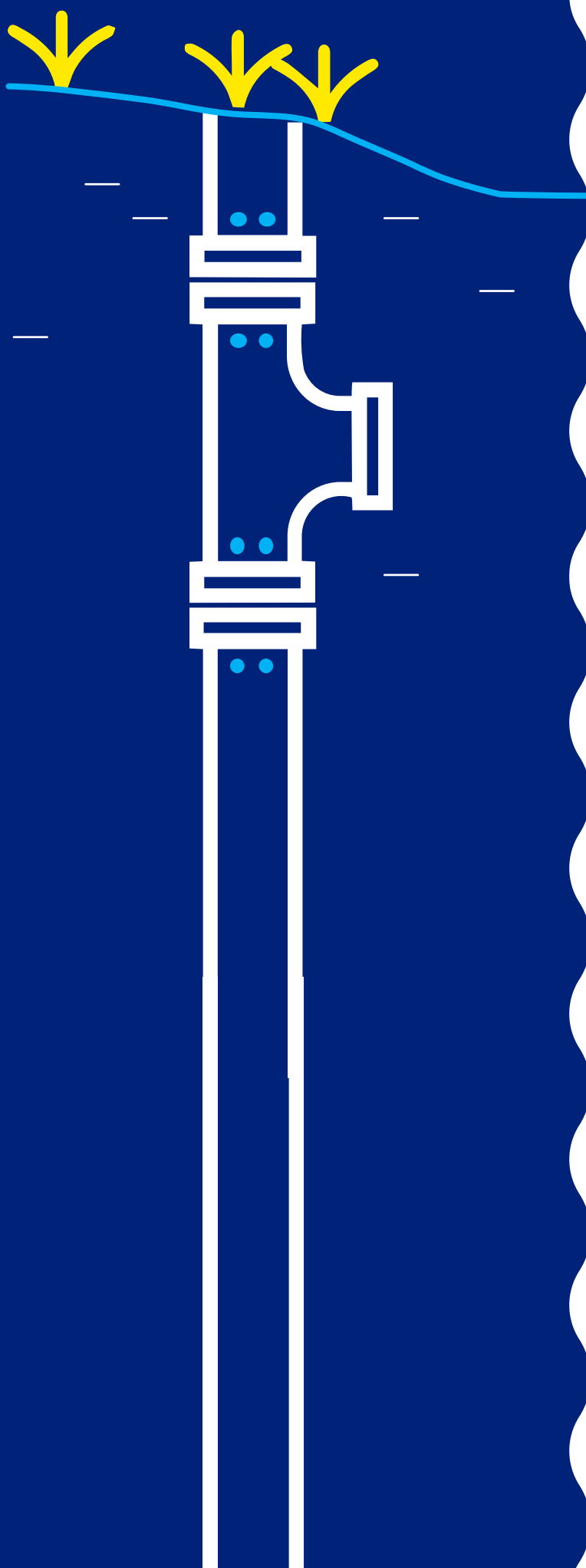
We acknowledge their songlines, cultural lore and continuing connection to the land and water.

We recognise and value their rich cultural heritage and continued contributions of Aboriginal people and communities to our society in Victoria.

**Cover:** Somerville Primary School (Bunurong Country) students tapping into water savings thanks to a South East Water \$8,000 community grant. The funding was used to upgrade the school's drinking water trough so students can easily fill up their reusable water bottles with tap water.

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## Overview

### Ever wondered where our water comes from?

We're lucky in Australia to have safe water – quite literally – running on tap. And in Victoria, we enjoy some of the best drinking water in the world. So, what's involved in getting water that starts as rain, to our customers' taps? There's more to it than you might think.

Here's a snapshot of the journey in supplying our 1.77 million people across Melbourne's south east – residential, commercial and industrial – with safe, high-quality drinking water.

### It starts north east in the Yarra Ranges

We purchase our customers' drinking water from Melbourne Water, which harvests, stores, and applies the primary treatment to the water before it arrives in our system.

A large proportion of your drinking water comes from protected or uninhabited mountain ash forests high in the Yarra Ranges. Here, more than 157,000 hectares has been reserved for the primary purpose of harvesting water. These catchments were set aside more than 100 years ago to supply high-quality water that requires minimal treatment. Melbourne is one of only 5 major cities in the world with protected catchments such as these. They're managed by Melbourne Water and Parks Victoria.

From these uppermost catchments, water flows into the Thomson and Upper Yarra reservoirs, where water may be stored for many years before being used. This is a good thing. Time allows sediment from the forests, washed in by the rain, to settle, providing natural purification – in fact, our catchments are so pristine that Melbourne Water doesn't need to filter sediment out of the water from Cardinia and Silvan reservoirs.

### And moves south to the Dandenong Ranges and Cardinia

From here, the water transfers to the Silvan and Cardinia reservoirs further south. As it leaves these reservoirs, it's disinfected to support public health. Chlorine is used to kill potentially harmful micro-organisms and fluoride is added to improve dental health (as directed by the Department of Health under the *Health (Fluoridation) Act 1973*). pH is adjusted at a level of 7 to 7.5 by adding lime to improve the taste and to reduce pipe corrosion.

The water is then transported to our supply system through a secure closed network to various covered storages and delivered to our customers' taps.

Our customers around our South Melbourne locality are supplied with some water from the Winneke Water Treatment Plant, located at Sugarloaf Reservoir. This water is harvested from both the Yarra River at Yering Gorge, as well as the Maroondah Aqueduct. It's then transferred to the Winneke plant, where it's filtered, then undergoes the same treatment as water from Silvan and Cardinia reservoirs.

Localities from Bunyip to Lang Lang, the Mornington Peninsula and Cranbourne receive water from the Tarago Reservoir and Tarago water treatment plant. Tarago is a state-of-the-art Dissolved Air Flotation and Filtration (DAFF) and ultraviolet (UV) disinfection water treatment plant. Water from the Tarago plant is fed directly into our supply system via the Tarago–Westernport pipeline.

Much of what we do our customers never see, much like the plumbing in their homes. Our distribution system operates 24 hours a day so that drinking water is there when they need it.

### **All about desalinated water**

By balancing the volume of water stored in Melbourne's reservoirs, Cardinia Reservoir can receive desalinated water. Desalinated water is drinking water produced from sea water.

Our desalinated water comes from the Victorian Desalination Plant at Wonthaggi, where sea water passes through reverse osmosis membranes and is fully treated through a series of processes (see pages 15-17).

The Victorian Desalination Project (VDP) is a Public-Private Partnership (PPP) between the Victorian Government and AquaSure. The Department of Environment, Land, Water and Planning (DELWP) manages the project on behalf of the government.

Like all drinking water, desalinated water from the plant meets the requirements of the *Australian Drinking Water Guidelines 2011*, *Safe Drinking Water Act 2003* and World Health Organisation guidelines.

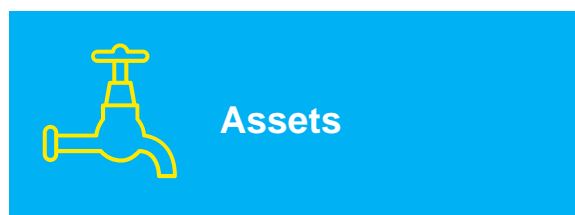
The plant's water quality specifications were determined by Melbourne's water industry and included in the contract with AquaSure by DELWP.

So that the desalinated water can join our water supplies, the plant features an 84 km underground 2-way transfer pipeline to Berwick where it connects with our existing network and mixes with our supply at Cardinia Reservoir. At the end of 2021–22, approximately 80% of water stored in Cardinia Reservoir had been sourced from the desalination plant.

Each year the Victorian Government decides how much water to order from the VDP. On 1 April 2022, the Victorian Government announced a desalination order of 15 gigalitres (15,000,000 litres) for the 2022–23 supply year to boost water storages.

On 23 September 2022, the Minister for Water ceased Melbourne's remaining desalination order (11 gigalitres; 11,000,000 million litres) for 2023–23. The order was ceased after considering advice from Melbourne Water about the current and projected weather conditions and the secure state of Melbourne's water supply.

## Our water system by numbers (for 2021-22 financial year)



9,780 km of drinking water mains

813,771 customer connections

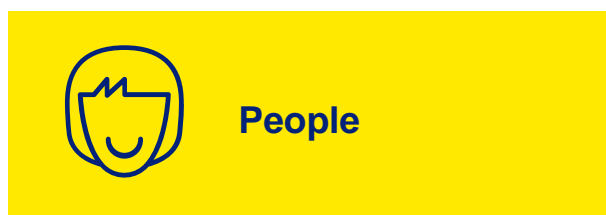
10,735 water quality samples

40 water sampling localities

82 pump stations

68 water storage facilities

23 secondary disinfection plants



1.77 million people serviced

Our customer base grew by 1.3% to 813,771

92% of our customers rely on us for their home's water and wastewater services

8% of our customers rely on us for non-household purposes (businesses, schools, etc.)

Our customers speak more than 200 languages

Our service area is the Country of the Bunurong people, and the Wurundjeri Woi Wurrung people in some areas to our north. There are more than 8,300 First Nations People living within our region

**Note:** although our customer base (i.e. total new properties) increased, our service population decreased due to the impacts of the coronavirus (COVID) pandemic. We base our service population of 1.77 million people on the Australian Bureau of Statistics 2021 Census data.

## How we supply water to our customers

Our supply system is closely linked with Melbourne Water's transfer system. These arrangements are formalised under a Bulk Water Supply Agreement. This sets out the amount and quality of water we receive from them.



## A message from our Managing Director

At South East Water, we know that our customers and community want safe and reliable services – this means clean and high quality drinking water, and the safe disposal of wastewater.

In 2021–22 we delivered over 142 billion litres of drinking water across 9,780 km of drinking water mains in our network. We provided this water as an essential service to 1.77 million people across Melbourne’s south-east who relied on us every day and every night.

We took over 10,000 water samples to test against a range of water quality standards. These are specified in Schedule 2 of the Regulations and include *Escherichia coli* (*E. coli*), trihalomethanes (a by-product of chlorine disinfection) and turbidity. Other water quality standards include minerals and elements like fluoride, copper, lead and manganese, to name a few.

### Water quality events

Across the 2021–22 year, we had 5 Section 22 reports to the Department of Health. These were for events where we suspected there was contaminated drinking water posing possible health risks. Two notifications were due to *E. coli* detections; however both were found to be false positives. Two notifications were due to damaged floating covers on our supply basins. The remaining notification was regarding a widespread complaint in Brighton East due to dirty water. We investigated each of these occurrences and found none posed a threat to public health.

We had 3 other water quality events which didn’t fall under a regulatory Section 22 but about which we consulted with the Department of Health for advice and support.

We worked closely with Melbourne Water who detected *E. coli* in Montrose Reservoir which supplies our Ferntree Gully water quality locality. We conducted a joint investigation, which also included Yarra Valley Water, and concluded there was no risk to public health for customers.

Extreme weather over the November 2021 Melbourne Cup long weekend caused Victoria’s largest single electricity outage on record. This impacted an unprecedented number of operational assets across our network. While many of our assets had generators and battery backup systems, we carefully managed and monitored them while power was slowly restored. The collaborative efforts of our teams and contractors saw us return to business as usual without major water supply interruptions.

We received multiple taste and odour complaints with the drinking water at an industrial estate in Keysborough. We identified the issue to be on their private plumbing, not our network. It was most likely caused by soil contamination on site from a hydrocarbon-based pollutant which can penetrate plastic pipes. Although on private plumbing, we coordinated communications to property owners about the situation. We continue to work closely with the Owners Corporation on the problem and possible rectification works. In addition, we consulted with Department of Health, Victorian Building Authority (VBA), Environment Protection Authority Victoria (EPA) and WorkSafe Victoria.



## **Our work to deliver healthy water for life**

This report details how we performed against the *Safe Drinking Water Act 2003*, the *Safe Drinking Water Regulations 2015* and the *Australian Drinking Water Guidelines 2011* in 2021–22.

We've detailed our results from our Water Quality Monitoring Program and explain how we're working to deliver the best quality water possible. This includes our ongoing efforts to deliver essential services and safe drinking water during periodic lockdowns because of the coronavirus (COVID-19) pandemic.

As we look towards the future, we're committed to continuing to improve the way we operate our network and deliver safe and healthy water for life for our customers, community and the environment.



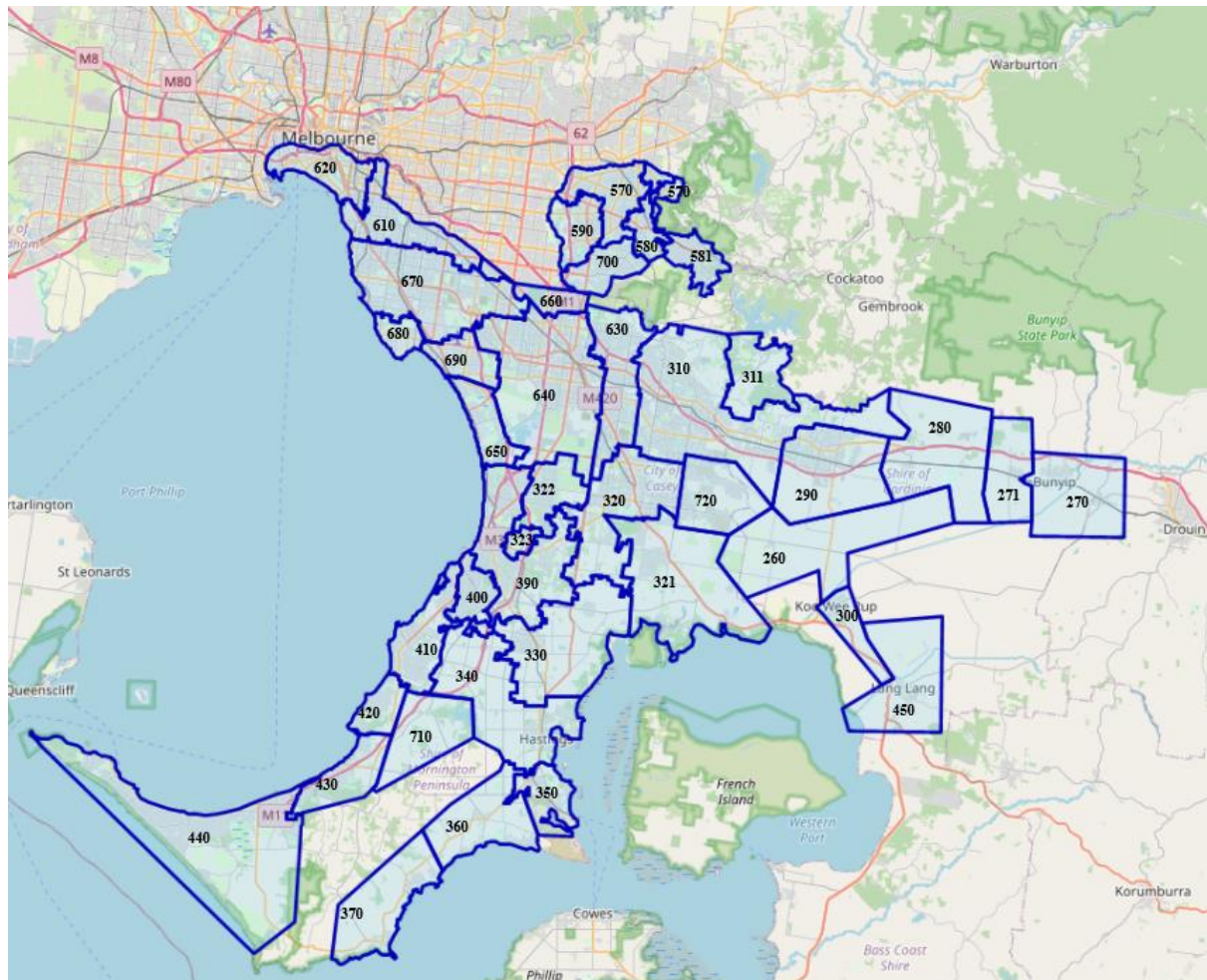
**Lara Olsen**  
Managing Director  
October 2022

## Water quality localities and services

We don't just take water from various water storages to service our customers. We use different water treatments too. This ensures our water is safe to drink and of the highest possible quality.

You can see where our water is from, and which treatment is used, by looking at the locality map below or by visiting our [online water quality checker](#).

Please note that water quality locality boundaries don't align exactly with suburbs in our service area.



## Water quality and private water services

Private water services, which have a 'supply by agreement' with us, are included in relevant localities. This is because the water supplied through your private connection is still guaranteed to meet the requirements of the *Safe Drinking Water Regulations 2015* (the Regulations).

If our customers' private connection is in Cora Lynn (locality no. 260) or Moorooduc (locality no. 710), they're supplied from large transfer pipelines (the Tarago–Westernport Pipeline for Cora Lynn and the Bittern–Dromana Pipeline for Moorooduc). As detailed in their supply agreement, these large pipelines may be shut down for maintenance reasons for extended periods of time - and that means continuous access to water can't be guaranteed.

For customers in Gembrook or on Old Menzies Creek Road in Selby, Yarra Valley Water supply the water to them. We notify them individually when they move in.

## Non-drinking water

Some of our customers receive non-drinking water from the Bunyip Main Race and Tarago Main Race. This supply isn't classified as Regulated water under the *Safe Drinking Water Act 2003* (the Act), determined in consultation with the Department of Health.

The Bunyip Main Race and Tarago Main Race are open channels, owned and operated by Melbourne Water. The water isn't disinfected or treated in any way and customers draw water into their properties for non-drinking usage (e.g. stock and domestic purposes). To manage risks associated with supplying water that's not for drinking, all Bunyip Main Race and Tarago Main Race customers have an individual supply agreement with us regarding the quality of the water that they receive.

This agreement specifically states that the water supplied isn't fit for human consumption. We also put a note that the water is 'not fit for drinking' on our customers' water bills and on any Section 32 agreement for land transfer.

The water is not publicly available and can only be accessed by the customers on an agreement.

## Our water localities

We divide our water system into 40 water sampling localities and each one is numbered.

We determine each locality by where the water comes from, how it's delivered and how it's treated. This includes areas where we boost the primary treatment through secondary disinfection. You can see a summary of the treatment processes on page 15-17.

To maintain the aesthetic quality of our customers' water, we have 23 secondary disinfection plants that deliver a balanced level of chlorine. This secondary treatment minimises fluctuations in chlorine levels that occur with changing demand and water temperature. We show the locations of these secondary disinfection plants on the map of our water supply system on page 7.

Water sampling locality number	Water sampling locality name	Towns/suburbs supplied	Population <sup>1</sup>
360	Balnarring	Balnarring, Bittern, Merricks, Merricks Beach, Somers	6,540
570	Bayswater	Bayswater, Boronia, Ferntree Gully, Knoxfield, Upper Ferntree Gully, The Basin, Wantirna, Wantirna South	73,934
680	Beaumaris	Beaumaris, Black Rock, Cheltenham	31,249
581	Belgrave	Belgrave, Belgrave Heights, Belgrave South, Selby, Upper Ferntree Gully, Tecoma, Upwey	15,939
310	Berwick	Beaconsfield, Berwick, Nar Nar Goon, Narre Warren, Narre Warren South, Narre Warren North, Officer, Pakenham	129,513
350	Bittern	Bittern, Bittern West, Crib Point, HMAS Cerberus	6,170
670	Brighton-Heatherton	Bentleigh, Bentleigh East, Brighton, Brighton East, Caulfield South, Cheltenham, Clarinda, Clayton South, Hampton, Heatherton, Highett, McKinnon, Mentone, Moorabbin, Oakleigh South, Ormond, Sandringham	242,685
270	Bunyip	Bunyip, Longwarry	4,994
322	Carrum Downs	Carrum Downs, Skye, Sandhurst	31,835
610	Caulfield	Armadale, Carnegie, Caulfield, Caulfield North, Caulfield South, Clayton, Elsternwick, Elwood, Hughesdale, Huntingdale, Murrumbeena, Oakleigh, Oakleigh South, Ormond, Prahran, Ripponlea, South Yarra, Springvale, St Kilda, St Kilda East, Toorak, Windsor	198,101
650	Chelsea	Aspendale, Aspendale Gardens, Bonbeach, Carrum, Chelsea, Chelsea Heights, Edithvale, Patterson Lakes	54,795
720	Clyde North	Cardinia, Clyde, Clyde North, Officer, Officer South	31,195

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<sup>1</sup> The population for each locality is derived by taking the number of property connections and averaging against the total population figure.

260	Cora Lynn	Bunyip, Koo Wee Rup, Nar Nar Goon, Tooradin	136
320	Cranbourne	Cranbourne, Centreville, Cranbourne East, Cranbourne North, Cranbourne West, Cranbourne South, Langwarrin, Pearcedale	81,912
640	Dandenong	Bangholme, Dandenong, Dandenong South, Dingley Village, Doveton, Keysborough, Noble Park, Springvale South	135,789
660	Dandenong North	Clayton, Dandenong North, Noble Park North, Springvale	28,432
321	Devon Meadows	Clyde, Fiveways, Warneet, Cranbourne, Blind Bight, Cannons Creek, Tooradin, Warneet	13,828
430	Dromana	Dromana, McCrae, Mt Martha, Safety Beach	23,994
580	Ferntree Gully	Boronia, Ferntree Gully, The Basin, Upper Ferntree Gully	23,627
390	Frankston	Baxter, Carrum Downs, Cranbourne, Frankston, Frankston North, Langwarrin, Seaford, Pearcedale	97,803
400	Frankston South	Baxter, Frankston, Frankston South, Mt Eliza	14,597
271	Garfield	Garfield, Garfield North	1,944
630	Hallam	Dandenong South, Doveton, Endeavour Hills, Eumemmerring, Hallam, Hampton Park, Lynbrook, Lyndhurst, Narre Warren North	74,732
340	Hastings	Bittern, Hastings	12,383
323	Karingal	Frankston	11,599
300	Koo Wee Rup	Koo Wee Rup	3,473
450	Lang Lang	Lang Lang	2,742
710	Moorooduc	Dromana, Moorooduc, Tuerong	136
690	Mordialloc	Braeside, Dingley Village, Mentone, Mordialloc, Parkdale, Waterways	35,619
410	Mornington	Mt Eliza, Mornington, Mt Martha, Osborne	49,220
420	Mount Martha	Mount Martha	10,806

290	Pakenham	Pakenham	48,656
700	Rowville	Lysterfield, Rowville	34,150
440	Rye	Blairgowrie, Cape Schanck, Fingal, McCrae, Portsea, Rosebud, Rosebud South, Capel Sound, Rye, Sorrento, St Andrews Beach, Tootgarook	84,131
370	Shoreham	Flinders, Point Leo, Shoreham	3,763
330	Somerville	Pearcedale, Somerville, Tyabb	17,873
620	South Melbourne	Albert Park, Balaclava, Middle Park, Port Melbourne, Prahran, South Melbourne, South Yarra, Southbank, St Kilda, St Kilda East, St Kilda West, Toorak, Windsor	244,949
280	Tynong	Nar Nar Goon, Nar Nar Goon North, Tynong	1,697
311	Upper Beaconsfield	Beaconsfield, Guys Hill, Officer, Upper Beaconsfield	2,198
590	Wantirna	Knoxfield, Scoresby, Wantirna, Wantirna South	26,761

# Drinking water treatment processes

Treatment plant	Source water/ Catchment	Storage	Locality supplied	Treatment processes <sup>2, 3</sup>											Added substances			
				Aeration	Organic removal	Iron/manganese/ algae removal	Coagulation/ Flocculation	Clarification / Filtration	Chlorination	UV irradiation	Fluoridation	pH correction	Reverse osmosis	Remineralisation		Sludge handling	Dissolved air flotation	
Cardinia WTP	Cardinia Reservoir supply from Wonthaggi Desalination Plant and Silvan Reservoir	Local storage tanks	290, 311, 650, 310, 322, 630, 640, 660, 670, 680, 690, 700, 260 <sup>4</sup> , 710 <sup>3</sup> , 270, 271, 280, 300, 320, 321, 323, 330, 340, 350, 360, 370, 390, 400, 410, 420, 430, 440, 450, 720, 620, 610						✓		✓	✓						Chlorine gas, Sodium hypochlorite, Fluorosilicic acid (FSA), Lime, Carbon Dioxide

<sup>2</sup> Secondary disinfection applies by South East Water by boosting sodium hypochlorite throughout network.

<sup>3</sup> South East Water is a water supplier; for a more detailed description of treatment processes refer to Melbourne Water's annual report.

<sup>4</sup> The localities of 260 and 710 are directly supplied without secondary disinfection from the Tarago–Westernport pipeline and the Bittern–Dromana pipeline, respectively. Customers supplied by private water services and supply-by-agreement conditions.

Treatment plant	Source water/ Catchment	Storage	Locality supplied	Treatment processes <sup>2,3</sup>												Added substances
				Aeration	Organic removal	Iron/manganese/ algae removal	Coagulation/ Flocculation	Clarification / Filtration	Chlorination	UV irradiation	Fluoridation	pH correction	Reverse osmosis	Remineralisation	Sludge handling	
Wonthaggi Desalination Plant	Offtake from Bass Strait	Cardinia Reservoir	See Cardinia WTP				✓	✓	✓			✓	✓	✓		Ferric sulphate, Sulphuric acid, PolyDADMAC, Chlorine gas, Sodium fluoride, Anti-scalant, Sodium hydroxide, Polyacrylamide, Sodium hypochlorite, Sodium bisulphate, Membrane cleaning chemicals (caustic, detergent, acid), Fluorosilicic acid, Hydrated lime / Carbon dioxide, Polymer
Tarago WTP	Tarago Reservoir supply from Tarago catchment	Local storage tanks	260 <sup>3</sup> , 710 <sup>3</sup> , 270, 271, 280, 300, 320, 321, 323, 330, 340, 350, 360, 370, 390, 400, 410, 420, 430, 440, 450, 720	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	Powdered activated carbon, Potassium permanganate, Aluminium chloralhydrate, PolyDADMAC, Polyacrylamide, Lime, Carbon dioxide, Fluorosilicic acid, Gaseous chlorine, Polyacrylamide, Sodium hypochlorite



Treatment plant	Source water/ Catchment	Storage	Locality supplied	Treatment processes <sup>2,3</sup>											Added substances			
				Aeration	Organic removal	Iron/manganese/ algae removal	Coagulation/ Flocculation	Clarification / Filtration	Chlorination	UV irradiation	Fluoridation	pH correction	Reverse osmosis	Remineralisation		Sludge handling	Dissolved air flotation	
Silvan WTP	Silvan Reservoir supply from Thomson Catchment, Upper Yarra Catchment, O'Shannassy Catchment, Armstrong Catchment, McMahons Catchment, Starvation Catchment, Coranderrk Catchment, Treated water from Wonthaggi Desalination plant via Cardinia	Cardinia Reservoir and Local storage tanks	580, 620, 570, 581, 590, 610						✓		✓	✓						Gaseous chlorine, Fluorosilicic acid, Lime
Winneke WTP	Sugarloaf Reservoir supply from Maroondah Reservoir, Yarra River	Sugarloaf Reservoir	620	✓			✓	✓	✓		✓	✓			✓			Aluminium sulphate Polymer, Sodium hypochlorite, Fluorosilicic acid, Lime, Polyacrylamide, Sodium hypochlorite

# How we manage risk and protect our customers' water

## Risk Management Plan

This robust plan helps us to identify and manage risks to our customers' drinking water quality. It also ensures that we meet the requirements of the Act, the Regulations and the Australian Drinking Water Guidelines 2011. It draws on our Incident Management Plan and research projects that help us to continually improve the quality of our water.

A key component of how we manage risk is our Hazard Analysis and Critical Control Point (HACCP) Plan. This plan details the specific procedures and corrective measures we use to protect water quality.

We work with Melbourne Water to optimise and integrate our HACCP plans. This ensures water quality risks are considered and managed along the whole water supply journey – from Melbourne Water's catchments to our customers' taps.

Our Risk Management Plan was audited and recertified for compliance with legislation in August 2020. There were 7 opportunities for improvement identified in the audit. These are listed below, along with the rectification works that have been completed.

Opportunities noted in the 2020 audit	Status of rectification works
<p>1. <i>Bunyip tank - A minor opportunity for improvement is noted to clear up the perimeter vegetation to reduce the risk of people using it to scale the fence. This mostly applies to anything growing next to outside or through the fence. Vegetation inside the perimeter needs to be managed to reduce fire risk, or damage to the fence.</i></p>	<p><b>STATUS:</b> Complete.</p> <p>Maintenance was undertaken on site, including tree pruning and vegetation removal to address the matter.</p>
<p>2. <i>Suggest considering improving the Little Beaver database by upgrading the functionality to enable tracking of the Monitoring Program samples to avoid any future risk to South East Water failing to meet the minimum sample numbers required.</i></p>	<p><b>STATUS:</b> Complete.</p> <p>The Monitoring Program functionality in the water quality database has been enhanced to track the network sampling for regulatory and aesthetic parameters per localities. Additional functionality in our database also alerts if any water storage tank micro sampling is overdue, to ensure water source sampling is not missed.</p> <p>Funding has been proposed in the 2023-28 price period for a new software solution to replace the Little Beaver database.</p>
<p>3. <i>Due to the increase in false positives because of 'human error' from the contracted samplers. It's suggested that the field audits be increased to</i></p>	<p><b>STATUS:</b> Complete.</p> <p>Water quality field staff have doubled field audits.</p>

<p><i>monitor correct sample handling processes.</i></p>	<p>We own nearly 1,200 sample taps attached to the meter assemblies of residences through our network. If the tap is overgrown or too close to the ground, it means that a water sample collected from the tap can easily become contaminated. In response, we've embarked on an extensive and systematic program of sample tap maintenance and renewal / replacement. Every sample tap has now been inspected and placed on a yearly maintenance schedule.</p>
<p>4. <i>Water Quality Field Technician is overdue for training in High Range Free Chlorine Method DR890. The field technician received the training on 29 January 2019 however the expiry date was noted as 29 January 2020. Consideration should be given as to whether this training needs to be yearly.</i></p>	<p><b>STATUS:</b> Complete.</p> <p>This particular method for conducting a high-range free chlorine reading with the standard instrumentation is relatively simple and not dissimilar to the standard free chlorine method that the field technicians utilise on a daily basis. The field technicians receive hardcopy instructions during training on this method, which they can refer to at any time. Annual refresher training is not required.</p>
<p>5. <i>There were connection issues with the backflow database system, making it challenging and at times impossible to access information required for the audit. The system is 15 years old and rather outdated. Consideration should be given to updating or replacing the database with a more functional and reliable system.</i></p>	<p><b>STATUS:</b> Complete.</p> <p>We have upgraded our backflow management system with a more reliable and user-friendly system. The updated system links to our customer system, improving the efficiency of the ongoing backflow management.</p>
<p>6. <i>It is suggested that a continuous improvement formalised document be created to capture improvement actions from debriefs audits etc. and be addressed at stakeholder meetings.</i></p>	<p><b>STATUS:</b> Complete.</p> <p>We enter all audit items and debrief action items into our 'audit tracking' system and they're approved by management once addressed.</p>
<p>7. <i>Risk Management Plan Framework BS1026 is overdue for review, last review date 26 June 2017.</i></p>	<p><b>STATUS:</b> Complete.</p> <p>We reviewed and updated this document in June 2020.</p>

## Proactive management of our water supply

We're always thinking ahead and managing our water supply in a proactive way. Several of our supporting programs and innovative projects are linked to our HACCP Plan. You can read about some of these in this report.

### Chlorination strategy

We're actively working towards achieving a desired minimum of 0.2mg/L free chlorine residual within the majority of the water supply network.

Having sufficient chlorine to act as a disinfectant throughout the water distribution network prevents potentially harmful microorganisms regrowing in the water pipes and reduces potential taste and odour issues.

To be able to achieve this, we've developed a chlorination strategy. The strategy outlines a multipronged approach, including desktop analysis, operational changes, identification of storages with low chlorine residual, identification of sections of the network with sub-optimal hydraulic characteristics, and capital investment for supplementary disinfection.

As a first step, through collaboration with Melbourne Water, primary chlorination dosing set points have also been increased at their storages that supply water into our network.

We have subsequently implemented operational changes at our tank sites to increase the turnover of water, thus increasing the chlorine residual. The first phase of the strategy targets storages, as they are assessed as the highest risk.

Several existing secondary disinfection units have had their chlorine dosing set points increased, in a controlled and closely monitored manner, with no taste or odour issues reported by customers.

With the targeted operational optimisation approach to storages outlined above, we've seen the number of storages in our network with an average outlet free chlorine residual of <0.2mg/L significantly reduced to 5%.

The next step of the chlorination strategy implementation will be to drill down further and identify hydraulic zones with a high percentage of customer sample taps with <0.2mg/L free chlorine. Through the increase in residual levels at the tank sites, there has been an enduring increase measured at customer taps, however there are still some zones that have a high percentage of taps with low chlorine residual. We'll assess these zones for operational changes, maintenance activities, or if required, install a new secondary chlorinator at the supply entry point.

### Heat mapping tool

To compliment the chlorination strategy, we developed a tool which can be used to identify chlorine trends over time visually through a 'heat map' representation. The tool allows for chlorine targets to be set, and time scales to be viewed to differentiate between seasons. The results can be drilled down to sample tap level and individual results, to allow for targeted approaches to achieve the desired results.

### Chloroclam sensor installation

Historically, we've relied on manual samples to be able to prove tank integrity or use the data as supporting evidence of sufficient chlorine residual within the water supply. In an

effort to improve our process, we installed 'Chloroclam' continuous online monitoring on all storage outlets. The use of continuous online monitoring at storage outlets has the benefit of using the data for early detection and warning of potential issues if a trending decline in chlorine is detected, rather than waiting for a grab sample to detect a problem. We can also use the data to dynamically prioritise the ongoing water storage maintenance program.

## **Secondary disinfection units upgraded to Programmable Logic Control (PLC) technology**

We've initiated a program to enhance the technology that controls the secondary chlorination dosing throughout the network. This ensures we maintain a steady consistent disinfection residual. The enhancements presented by this project are far more advantageous in comparison to traditional dosing technologies. The benefits include additional safeguards to prevent over/under dosing along with more efficient dosing control to ensure the best quality water reaches the customer. With Department of Health's recommendation to increase the free chlorine residuals to penetrate further into the network, this project compliments our chlorination strategy. It provides more calculated dosing, addressing areas of the network with low chlorine residual, delivering chemical efficiency to minimise any aesthetic impacts on the consumer. To further protect the quality of the drinking water, the new control methodology also offers the advantage of remote access, where our water quality experts can instantly adjust chemical dosing in the case of potential water quality issues, without having to travel to site.

## **Melbourne Metropolitan Water Industry Response Plan (MMWIRP)**

In partnership with Melbourne Water, Yarra Valley Water and Greater Western Water, we operate a Metropolitan Water Industry Response Plan. It builds on our Incident Management Plan to ensure we escalate all incidents promptly and appropriately, from localised occurrences through to major events impacting multiple water corporations. This plan is regularly tested for accuracy and effectiveness and has established a Melbourne-wide protocol for all 4 water corporations to follow. The most recent example of this testing was in March 2022. We found the following items for improvement and look forward to working on this as a team:

1. Revise the Industry Response Plan into an Industry Coordination Plan that builds on the existing mutual aid arrangements, coordinates planning and provides a structure for coordinated public messaging
2. Develop a process for building an accurate and timely common operating picture where more than one corporation is affected by a disruption or contamination event
3. Finalise and approve public information guidance and templates agreed by water corporations and the Department of Health, that include clear protocols for drafting, approving, authorising and releasing messages with said timeframe
4. Clarify roles, decision-making authorities and control arrangements during water quality incidents up to and including a Class 2 major emergency
5. Develop a process for tracking resources and task information during a multi-corporation incident response

6. Build incident management capability, focusing on planning, public information and associated units

## Incident management plan

In the event that a water sample fails to conform, or a complaint is received that's deemed to be significant, we're able to declare an incident and this plan is implemented. The plan details the procedures to follow, including who to contact and inform. It also details escalation protocols and procedures for managing and controlling the incident.

## Locateus

Supporting the incident management response is our mapping tool, Locateus. This tool collates information from a number of other systems into a single map-based system, allowing for a quick visualisation of the sample taps, latest results, bursts or works in the area, hydrant usage in the area, zone boundaries, number of properties, and vulnerable or key customers.

Having all this information in one system allows us to respond to a water quality incident with confidence that all the information is available immediately. This allows us to undertake a rapid risk assessment determining any public health risk and to report to Department of Health.

## Water main renewal program

Our water main renewal program details our system to prioritise mains renewal projects. It's updated weekly with the latest field information, such as burst main locations, to help ensure we don't interrupt our customers unnecessarily – and that we're efficiently allocating our capital budget. This program not only improves water quality by reducing the number of mains bursts, it's also designed so that we can allocate and prioritise renewal or maintenance works. During 2021–22 we renewed approximately 25.4 kilometres of water mains through the program.

## Backflow prevention program

This program requires all new properties connecting to our water supply network to install an appropriate containment backflow prevention device, relevant to the level of risk, so that contaminants don't enter the system. Backflow hazard ratings are determined in accordance with the South East Water Backflow Protection Policy.

In addition, we operate a comprehensive backflow management system to ensure all industrial and commercial properties have the appropriate backflow device installed, with all testable (medium or high hazard) backflow devices scheduled for annual inspection. This inspection, carried out by a licenced Backflow tester, includes reporting of onsite test results, and is in accordance with the Water (Estimation, Supply & Sewerage) Regulations 2014.

## Hydrant permit system

We operate a HydroTrak<sup>®</sup> system where registered users can access our water supply system at designated hydrants. A HydroTrak<sup>®</sup> device is installed on registered users' vehicles and tracks who is drawing water from the network, where they are taking it from and how much they are taking. This helps to provide greater water security for our precious supply. We also use the system to monitor trends in hydrant use and reduce the number of

issues associated with unauthorised hydrant use. When the incorrect hydrant is used, such as on a small diameter main, it can cause sediment in the main to resuspend and cause discoloured water for our customers. To help prevent this, registered users can access a web-based application which allows them to identify suitable hydrants to use in their area.

## **Water quality alert agent**

We use a water quality complaints detection system to alert designated employees about water quality issues so they can investigate. The alerts are sent in instances where we receive three or more dirty water complaints from customers over 24 hours within 3km of each other. It also helps us identify and investigate when we receive 3 or more taste and odour complaints across our service region in a 24-hour period. The system ensures we can maintain our commitment to respond to each customer complaint individually. Read more about this on page 67.

## **Continuous online testing (COLT)**

Our COLT units allow real-time monitoring of water quality which can be viewed on our Supervisory Control and Data Acquisition (SCADA) network. These units are distributed throughout our system and continuously monitor water for pH, turbidity, chlorine, temperature and electrical conductivity. This enables us to have 24-hour visibility of our water quality, allowing us to confirm results are within acceptable limits, with designated employees alerted by email of any abnormal trends for investigation.

## **Drone program**

Our drone program complements our tank and storage inspection program. Proactively, we use aerial and submersible drones to inspect and assist in assessing the condition of tanks. Reactively, we can use them to inspect bird proofing and roof integrity after a storm event, where it may not be safe to undertake a manual inspection.

## **Product quality notification**

Our water quality team and other key areas of our organisation are notified of any instance where a water quality parameter is outside the optimal level. The limits for these notifications are based on more rigorous internal limits than those found in the ADWG. This ensures we strive for excellence in water quality, rather than simply satisfying the ADWG criteria. The limits are set within the water quality database, and are automatically alerted to the team member as data is uploaded. Alternatively, if the notification is based on customer complaints, an automated water quality alert agent is used (as described above). The product quality notification involves a water quality team member investigating the cause of the alert and noting corrective actions undertaken. The information is then entered into a web-based platform and sent out to nominated staff and management.

## **Routine monitoring and testing water quality**

We have a contract with ALS Group, an independent, National Association of Testing Authorities (NATA) accredited, laboratory, to collect and test all our drinking water samples.

During 2021–22 we collected more than 10,000 water quality samples from our customers' properties, our water storages and our large water mains to ensure we had a clear picture and understanding of water quality across our whole system.

These samples were tested for a range of parameters including *E. coli*, turbidity, pH, chlorine, disinfection by-products, temperature, hardness, fluoride and metals. More than 50 parameters were measured, consistent with the regulatory requirements and guidance in the ADWG. The samples were collected across the whole system, covering all areas within the 40 water sampling localities.

In 2021–22 no water quality issues arose from the disinfection or treatment of our drinking water. During the same period, we had no undertakings, exemptions or variations under the Act. There is no Regulated water under the Act being supplied to customers.

## Water quality website

In compliance with Section 23 of the Act in relation to public disclosure of water quality monitoring information, we make water quality information publicly available to all of our customers on our [website](#). This website details the most recent water quality test results from sample taps across our network. We usually publish these results within 24 hours of receiving them.

The website uses a map-based program so customers can search for an address and access the most recent result from sample taps in their area. It also provides a rolling 12-month summary of data for our entire network and each water sampling locality and shows our compliance against the Regulation's drinking water quality standards and the *Australian Drinking Water Guidelines 2011*.

Customers can also use the website to easily determine where their water is supplied from, what chemicals it has been treated with and the treatment process their water has undergone. We also provide details on water quality parameters, including information on limits, compliance and why certain parameters are tested.



## Water quality results for 2021–22

It matters to our customers, it matters to us. We're serious about making sure our customers' water is safe to drink

Our monitoring starts when Melbourne Water transfers the water to us. From there, it's sampled every step of the way, right up to our customers' homes or businesses so that they can rely on us for clean and dependable water.

So, when they turn on a tap, or press start on their dishwasher, they can be sure that everything's as it should be.

The following tables summarise the results of our monitoring program for each water sampling locality.

The data show results of routine samples taken at customer taps, water storage reservoirs, pump stations, pressure reducing stations and large water mains. It excludes any results from resamples or non-routine samples.

<b>Drinking water quality standards specified in Schedule 2 of the Regulations</b>	Including <i>Escherichia coli</i> ( <i>E. coli</i> ), trihalomethanes and turbidity.	pages 26–32
<b>Other water quality standards</b>	Including fluoride, copper, lead, manganese, inorganic compounds, organic compounds, polycyclic aromatic hydrocarbons and pesticides.	pages 33–50
<b>Aesthetic water quality</b>	Colour, pH, iron, chlorine, alkalinity.	pages 51–59

## Drinking water quality standards

Drinking water quality standards as specified in Schedule 2 of Regulations, including *E. coli*, trihalomethanes and turbidity.

### Escherichia coli (E. coli) results

The drinking water we supplied at each locality complied with the *Safe Drinking Water Regulations 2015* standard of no *Escherichia coli* per 100 millilitres of drinking water. *E. coli* is a coliform bacteria that indicates a high probability of recent faecal contamination of the drinking water. *E. coli* is found in large numbers in the faeces of human and other warm-blooded animals, although only a few strains of *E. coli* are human pathogens.

The table below is a summary of all *E. coli* results as part of our monitoring program for each water sampling locality. The data in the table shows results of routine samples taken at customer taps, water storage reservoirs, pump stations, pressure reducing stations and large water mains.

Water sampling locality		Frequency of sampling	Number of samples	Maximum result (orgs/100mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met (s.18)
Locality	Locality name					
360	Balnarring	Weekly	261	0	0	0
570	Bayswater	Weekly	419	0	0	0
680	Beaumaris	Weekly	120	0	0	0
581	Belgrave	Weekly	468	0	0	0
310	Berwick	Weekly	630	0	0	0
350	Bittern	Weekly	208	0	0	0
670	Brighton / Heatherton	Weekly	482	0	0	0
270	Bunyip	Weekly	159	0	0	0
322	Carrum Downs	Weekly	170	0	0	0
610	Caulfield	Weekly	423	0	0	0
650	Chelsea	Weekly	223	0	0	0
720	Clyde North	Weekly	106	0	0	0
260	Cora Lynn	Weekly	198	0	0	0
320	Cranbourne	Weekly	333	0	0	0
640	Dandenong	Weekly	367	1	1	0

Water sampling locality		Frequency of sampling	Number of samples	Maximum result (orgs/100mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met (s.18)
Locality	Locality name					
660	Dandenong North	Weekly	108	0	0	0
321	Devon Meadows	Weekly	106	0	0	0
430	Dromana	Weekly	470	0	0	0
580	Ferntree Gully	Weekly	104	0	0	0
390	Frankston	Weekly	336	0	0	0
400	Frankston South	Weekly	380	0	0	0
271	Garfield	Weekly	208	0	0	0
630	Hallam	Weekly	317	0	0	0
340	Hastings	Weekly	156	0	0	0
323	Karingal	Weekly	209	0	0	0
300	Koo Wee Rup	Weekly	213	0	0	0
450	Lang Lang	Weekly	318	0	0	0
710	Moorooduc	Weekly	104	0	0	0
690	Mordialloc	Weekly	181	0	0	0
410	Mornington	Weekly	266	1	1	0
420	Mount Martha	Weekly	304	0	0	0
290	Pakenham	Weekly	299	0	0	0
700	Rowville	Weekly	234	0	0	0
440	Rye	Weekly	442	0	0	0
370	Shoreham	Weekly	210	0	0	0
330	Somerville	Weekly	208	0	0	0
620	South Melbourne	Daily	474	0	0	0
280	Tynong	Weekly	158	0	0	0
311	Upper Beaconsfield	Weekly	259	0	0	0
590	Wantirna	Weekly	104	0	0	0
<b>Business total</b>			<b>10735</b>	<b>2</b>	<b>2</b>	<b>0</b>

Note: Sample numbers per locality are based on the population, with more samples required with greater population as per the Australian Drinking Water Guidelines recommendations.

## Trihalomethane results

We complied with the *Safe Drinking Water Regulations 2015* standard that total trihalomethane levels must not exceed 0.25mg/L. All results were less than or equal to 0.11mg/L. Trihalomethanes (THMs) are by-products that form when water is disinfected with chlorine.

Water sampling locality		Frequency of sampling	Number of samples	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality number	Locality name					
360	Balnarring	Monthly	12	0.034	0.049	0
570	Bayswater	Monthly	12	0.068	0.086	0
680	Beaumaris	Monthly	12	0.017	0.019	0
581	Belgrave	Monthly	12	0.089	0.11	0
310	Berwick	Monthly	12	0.013	0.019	0
350	Bittern	Monthly	12	0.033	0.049	0
670	Brighton / Heatherton	Fortnightly	24	0.023	0.058	0
270	Bunyip	Monthly	12	0.058	0.073	0
322	Carrum Downs	Monthly	12	0.013	0.018	0
610	Caulfield	Monthly	12	0.051	0.061	0
650	Chelsea	Monthly	12	0.019	0.034	0
720	Clyde North	Monthly	12	0.011	0.015	0
260	Cora Lynn	Monthly	12	0.052	0.068	0
320	Cranbourne	Monthly	12	0.013	0.015	0
640	Dandenong	Monthly	12	0.021	0.048	0
660	Dandenong North	Monthly	12	0.057	0.07	0
321	Devon Meadows	Monthly	12	0.014	0.021	0
430	Dromana	Monthly	12	0.046	0.06	0
580	Ferntree Gully	Monthly	13	0.055	0.072	0
390	Frankston	Fortnightly	24	0.016	0.026	0
400	Frankston South	Monthly	13	0.025	0.038	0
271	Garfield	Monthly	12	0.052	0.063	0

Water sampling locality		Frequency of sampling	Number of samples	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality number	Locality name					
630	Hallam	Monthly	12	0.014	0.025	0
340	Hastings	Monthly	12	0.040	0.052	0
323	Karingal	Monthly	12	0.017	0.027	0
300	Koo Wee Rup	Monthly	12	0.061	0.085	0
450	Lang Lang	Monthly	13	0.079	0.097	0
710	Moorooduc	Monthly	12	0.041	0.062	0
690	Mordialloc	Monthly	13	0.020	0.028	0
410	Mornington	Monthly	12	0.051	0.079	0
420	Mount Martha	Monthly	12	0.049	0.069	0
290	Pakenham	Monthly	12	0.016	0.024	0
700	Rowville	Monthly	12	0.053	0.099	0
440	Rye	Monthly	12	0.049	0.066	0
370	Shoreham	Monthly	12	0.031	0.044	0
330	Somerville	Monthly	12	0.015	0.027	0
620	South Melbourne	Monthly	12	0.046	0.059	0
280	Tynong	Monthly	12	0.058	0.088	0
311	Upper Beaconsfield	Monthly	13	0.018	0.024	0
590	Wantirna	Monthly	12	0.065	0.079	0
<b>Business total</b>			<b>509</b>	<b>0.037</b>	<b>0.110</b>	<b>0</b>

## Turbidity results

We complied with the *Safe Drinking Water Regulations 2015* standard for turbidity, which sets the 95th percentile of results for samples in any 12-month period must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU).

Turbidity is caused by the presence of fine suspended matter such as silt and clay in the water. High turbidity can give the water a cloudy or muddy appearance and can lessen the effectiveness of disinfection.

Water sampling locality		Frequency of sampling	Number of samples	Maximum (NTU)	95 <sup>th</sup> percentile (mg/L)	Number of 95th percentile of results in any 12 months above standard (s.18)
Locality number	Locality name					
360	Balnarring	Weekly	53	0.5	0.40	0
570	Bayswater	Weekly	52	1.2	1.10	0
680	Beaumaris	Weekly	54	0.6	0.40	0
581	Belgrave	Weekly	52	1.2	1.00	0
310	Berwick	Weekly	54	0.5	0.40	0
350	Bittern	Weekly	54	0.5	0.40	0
670	Brighton / Heatherton	Weekly	52	1.0	0.70	0
270	Bunyip	Weekly	52	0.3	0.20	0
322	Carrum Downs	Weekly	52	0.7	0.40	0
610	Caulfield	Weekly	52	1.2	1.00	0
650	Chelsea	Weekly	54	0.5	0.50	0
720	Clyde North	Weekly	53	7.2	0.54	0
260	Cora Lynn	Weekly	52	1.2	0.34	0
320	Cranbourne	Weekly	53	0.5	0.40	0
640	Dandenong	Weekly	53	1.7	0.68	0
660	Dandenong North	Weekly	52	1.6	1.10	0
321	Devon Meadows	Weekly	53	0.7	0.40	0
430	Dromana	Weekly	52	1.7	0.35	0
580	Ferntree Gully	Weekly	53	1.4	1.20	0
390	Frankston	Weekly	52	0.4	0.40	0

Water sampling locality		Frequency of sampling	Number of samples	Maximum (NTU)	95 <sup>th</sup> percentile (mg/L)	Number of 95th percentile of results in any 12 months above standard (s.18)
Locality number	Locality name					
400	Frankston South	Weekly	52	0.4	0.40	0
271	Garfield	Weekly	52	0.2	0.10	0
630	Hallam	Weekly	52	0.4	0.40	0
340	Hastings	Weekly	52	0.3	0.30	0
323	Karingal	Weekly	52	0.7	0.40	0
300	Koo Wee Rup	Weekly	53	0.3	0.20	0
450	Lang Lang	Weekly	53	0.3	0.20	0
710	Moorooduc	Weekly	52	0.5	0.35	0
690	Mordialloc	Weekly	52	0.5	0.50	0
410	Mornington	Weekly	52	0.3	0.30	0
420	Mount Martha	Weekly	52	1.5	0.45	0
290	Pakenham	Weekly	52	1.5	0.45	0
700	Rowville	Weekly	52	1.2	1.04	0
440	Rye	Weekly	52	0.5	0.30	0
370	Shoreham	Weekly	52	0.6	0.35	0
330	Somerville	Weekly	52	0.4	0.40	0
620	South Melbourne	Weekly	53	1.2	0.90	0
280	Tynong	Weekly	52	0.3	0.20	0
311	Upper Beaconsfield	Weekly	52	0.7	0.30	0
590	Wantirna	Weekly	52	1.3	1.10	0
<b>Business total</b>			<b>2097</b>	<b>7.2</b>	<b>0.51</b>	<b>0</b>

## Compliance summary for drinking water quality standards

For this reporting year, and the 2 years prior, we've supplied water that complied with the requirements of the regulations for all water sampling localities.

Parameter	Percentage of localities supplied with compliant water			Percentage of customers supplied with compliant water		
	2021–22	2020–21	2019–20	2021–22	2020–21	2019–20
<i>Escherichia coli</i>	100%	98%	100%	100%	99.8%	100%
Trihalomethanes	100%	100%	100%	100%	100%	100%
Turbidity	100%	100%	100%	100%	100%	100%



## Other water quality standards results

### Fluoride, chlorine, arsenic, copper, lead, manganese, inorganic parameters and organic parameters

These tables summarise the results of the other water quality standards in our monitoring program that could pose a risk to human health. These standards are measured against the *Australian Drinking Water Guidelines 2011* criteria. Many of these parameters only require infrequent sampling because the results don't vary significantly, from year-to-year, or from locality-to-locality, for the same source water.

Specific results for arsenic, copper, lead and manganese have been shown not to change in Melbourne's water. For this reason, we've taken random samples in groups of localities with similar source water to achieve the monitoring spread across our distribution system in 2021-22.

We compare all our data in the following tables to the previous 2 years' data, with no discernible differences noted in averages when analysed and trended.

All levels have remained consistently below the maximums specified in the Australian Drinking Water Guidelines 2011 over the 3-year period. Results for 2019–20 and 2020–21 are available in our respective annual water quality reports on our website.

## Fluoride

We met the drinking water standard for fluoride, which stipulates all individual results must not exceed 1.5mg/L. Under s.5(3) of the *Health (Fluoridation) Act 1973* fluoride added to drinking water must not result in an average optimum concentration in excess of 1.0 mg/L.

We add fluoride to the water to improve dental health – a requirement of the *Health (Fluoridation) Act 1973*. Melbourne Water has a number of fluoridation plants that supplies water to our service area. We list localities supplied from each fluoridation plant in the table on pages 15-17.

Water sampling locality		Number of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality number	Locality name					
360	Balnarring	12	0.77	0.80	0.85	0
570	Bayswater	12	0.54	0.75	0.87	0
680	Beaumaris	13	0.73	0.80	0.91	0
581	Belgrave	12	0.72	0.78	0.85	0
310	Berwick	12	0.65	0.78	0.91	0
350	Bittern	12	0.79	0.82	0.85	0
670	Brighton / Heatherton	12	0.72	0.79	0.88	0
270	Bunyip	12	0.65	0.82	0.88	0
322	Carrum Downs	12	0.68	0.81	0.9	0
610	Caulfield	12	0.65	0.78	0.93	0
650	Chelsea	12	0.62	0.80	0.89	0
720	Clyde North	12	0.6	0.80	0.85	0
260	Cora Lynn	12	0.58	0.78	0.89	0
320	Cranbourne	12	0.6	0.80	0.89	0
640	Dandenong	12	0.73	0.80	0.85	0
660	Dandenong North	12	0.54	0.76	0.86	0
321	Devon Meadows	12	0.77	0.82	0.87	0
430	Dromana	12	0.73	0.79	0.84	0
580	Ferntree Gully	12	0.35	0.79	0.93	0
390	Frankston	12	0.64	0.82	0.86	0
400	Frankston South	12	0.74	0.81	0.87	0

Water sampling locality		Number of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality number	Locality name					
271	Garfield	12	0.70	0.83	0.9	0
630	Hallam	12	0.72	0.83	0.91	0
340	Hastings	12	0.71	0.81	0.86	0
323	Karingal	12	0.76	0.81	0.88	0
300	Koo Wee Rup	12	0.67	0.82	0.9	0
450	Lang Lang	13	0.75	0.83	0.87	0
710	Moorooduc	12	0.78	0.82	0.86	0
690	Mordialloc	12	0.73	0.80	0.85	0
410	Mornington	12	0.77	0.81	0.87	0
420	Mount Martha	16	0.74	0.80	0.86	0
290	Pakenham	12	0.60	0.79	0.89	0
700	Rowville	13	0.67	0.77	0.84	0
440	Rye	12	0.73	0.81	0.87	0
370	Shoreham	12	0.74	0.80	0.84	0
330	Somerville	12	0.73	0.81	0.88	0
620	South Melbourne	12	0.69	0.79	0.84	0
280	Tynong	12	0.79	0.83	0.88	0
311	Upper Beaconsfield	12	0.77	0.81	0.86	0
590	Wantirna	12	0.66	0.77	0.85	0
<b>Business total</b>		<b>487</b>	<b>0.35</b>	<b>0.8</b>	<b>0.93</b>	<b>0</b>

## Chlorine

We met the *Australian Drinking Water Guidelines 2011* criteria for chlorine, which suggests a health limit of 5 mg/L. Less than 1.5 mg/L is added to drinking water at any point in our network through our secondary treatment units. The fundamental requirement is to maintain effective disinfection and a consistent concentration of chlorine. Chlorine levels are higher in the water sampling localities that are closer to where the treatment occurs as chlorine levels gradually decline over time.

Chlorine is the primary disinfectant used in Melbourne’s water supply. Chlorine is added to destroy any harmful micro-organisms, such as pathogenic bacteria. It is measured as ‘free chlorine residual’.

Water sampling locality		Frequency of sampling	Number of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
360	Balnarring	Weekly	261	<0.05	0.62	1.1	Yes
570	Bayswater	Weekly	419	<0.05	0.40	1.1	Yes
680	Beaumaris	Weekly	120	0.49	0.67	0.98	Yes
581	Belgrave	Weekly	468	<0.05	0.34	1.2	Yes
310	Berwick	Weekly	630	<0.05	0.69	1.2	Yes
350	Bittern	Weekly	208	<0.05	0.69	0.98	Yes
670	Brighton / Heatherston	Daily	482	0.09	0.61	1.0	Yes
270	Bunyip	Weekly	159	0.06	0.47	0.97	Yes
322	Carrum Downs	Weekly	170	0.37	0.78	1.2	Yes
610	Caulfield	Daily	423	<0.05	0.36	0.80	Yes
650	Chelsea	Weekly	222	0.15	0.65	0.97	Yes
720	Clyde North	Weekly	106	0.48	0.77	1.1	Yes
260	Cora Lynn	Weekly	198	<0.05	0.30	0.9	Yes
320	Cranbourne	Weekly	333	0.22	0.81	1.3	Yes
640	Dandenong	Daily	367	0.1	0.60	1.0	Yes
660	Dandenong North	Weekly	108	<0.05	0.26	0.7	Yes
321	Devon Meadows	Weekly	106	0.42	0.80	1.4	Yes
430	Dromana	Weekly	520	<0.05	0.43	1.1	Yes

Water sampling locality		Frequency of sampling	Number of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
580	Ferntree Gully	Weekly	104	<0.05	0.33	0.79	Yes
390	Frankston	Weekly	336	<0.05	0.69	1.6	Yes
400	Frankston South	Weekly	380	<0.05	0.71	1.4	Yes
271	Garfield	Weekly	210	0.39	0.70	1.1	Yes
630	Hallam	Weekly	317	<0.05	0.77	1.3	Yes
340	Hastings	Weekly	156	0.53	0.84	1.1	Yes
323	Karingal	Weekly	209	0.4	0.65	2.0	Yes
300	Koo Wee Rup	Weekly	213	<0.05	0.48	0.86	Yes
450	Lang Lang	Weekly	318	<0.05	0.56	1.6	Yes
710	Moorooduc	Weekly	104	0.52	0.87	1.2	Yes
690	Mordialloc	Weekly	181	0.05	0.47	0.85	Yes
410	Mornington	Weekly	266	0.23	0.68	1.1	Yes
420	Mount Martha	Weekly	304	<0.05	0.56	1.2	Yes
290	Pakenham	Weekly	299	0.09	0.74	1.0	Yes
700	Rowville	Weekly	234	<0.05	0.50	1.2	Yes
440	Rye	Weekly	392	<0.05	0.69	1.2	Yes
370	Shoreham	Weekly	210	0.06	0.62	0.98	Yes
330	Somerville	Weekly	208	0.21	0.57	1.0	Yes
620	South Melbourne	Daily	474	<0.05	0.38	0.76	Yes
280	Tynong	Weekly	158	0.08	0.44	0.87	Yes
311	Upper Beaconsfield	Weekly	259	0.22	0.65	1.1	Yes
590	Wantirna	Weekly	104	<0.05	0.46	0.9	Yes
<b>Business total</b>			<b>10736</b>	<b>&lt;0.05</b>	<b>0.59</b>	<b>2.0</b>	<b>Yes</b>

## Arsenic

Drinking water we supplied complied with the *Australian Drinking Water Guidelines 2011* health-related guideline value for arsenic of 0.01mg/L.

Arsenic is a naturally occurring element that can be introduced into water through the dissolution of minerals and ores (where it exists mainly in the sulphide form) or from industrial effluent and atmospheric deposition (through the burning of fossil fuels and waste incineration).

Water sampling locality		Number of samples	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
581	Belgrave	1	0	<0.001	<0.001	<0.001	Yes
310	Berwick	1	0	<0.001	<0.001	<0.001	Yes
670	Brighton / Heatherton	1	0	<0.001	<0.001	<0.001	Yes
410	Mt Eliza	1	0	<0.001	<0.001	<0.001	Yes
620	South Melbourne	1	0	<0.001	<0.001	<0.001	Yes
<b>Business total</b>		<b>5</b>	<b>0</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>Yes</b>

## Copper

Drinking water we supplied complied with the *Australian Drinking Water Guidelines 2011* health-related guideline value for copper of 2mg/L.

Copper can occur naturally in catchments as it is widely distributed in rocks and soils as carbonate and sulphide minerals. Copper can cause the water to appear blue or green, which may stain appliances and clothing.

Water sampling locality		Number of samples	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality number	Locality name						
570	Bayswater	2	0	0.005	0.006	0.007	0
581	Belgrave	1	0	0.003	0.003	0.003	0
310	Berwick	2	0	0.007	0.013	0.018	0
670	Brighton / Heatherton	2	0	0.011	0.02	0.03	0
610	Caulfield	1	0	0.019	0.019	0.019	0
320	Cranbourne	2	0	0.01	0.019	0.028	0
640	Dandenong	1	0	0.025	0.025	0.025	0
660	Dandenong North	2	0	0.003	0.007	0.01	0
340	Hastings	1	0	0.006	0.006	0.006	0
690	Mordialloc	1	0	0.03	0.03	0.03	0
420	Mt Martha	1	0	0.005	0.005	0.005	0
440	Rye	1	0	0.013	0.013	0.013	0
620	South Melbourne	2	0	0.025	0.027	0.029	0
590	Wantirna	1	0	0.019	0.019	0.019	0
<b>Business total</b>		<b>20</b>	<b>0</b>	<b>0.003</b>	<b>0.018</b>	<b>0.03</b>	<b>0</b>

## Lead

Drinking water we supplied complied with the *Australian Drinking Water Guidelines 2011* health-related guideline value for lead of 0.01mg/L.

Lead can be present in drinking water as a result of dissolution from natural sources or from household plumbing systems containing lead. The amount of lead dissolved will depend on a number of factors including pH, water hardness and the standing time of the water.

Water sampling locality		Number of samples tested	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
570	Bayswater	2	0	<0.001	<0.001	<0.001	Yes
581	Belgrave	1	0	<0.001	<0.001	<0.001	Yes
310	Berwick	2	0	<0.001	<0.001	<0.001	Yes
670	Brighton / Heatherton	2	0	<0.001	<0.001	<0.001	Yes
610	Caulfield	1	0	<0.001	<0.001	<0.001	Yes
320	Cranbourne	2	0	<0.001	<0.001	0.001	Yes
640	Dandenong	1	0	<0.001	<0.001	<0.001	Yes
660	Dandenong North	2	0	<0.001	<0.001	<0.001	Yes
340	Hastings	1	0	<0.001	<0.001	<0.001	Yes
690	Mordialloc	1	0	<0.001	<0.001	<0.001	Yes
420	Mt Martha	1	0	<0.001	<0.001	<0.001	Yes
440	Rye	1	0	<0.001	<0.001	<0.001	Yes
620	South Melbourne	2	0	<0.001	<0.001	<0.001	Yes
590	Wantirna	1	0	<0.001	<0.001	<0.001	Yes
<b>Business total</b>		<b>20</b>	<b>0</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.001</b>	<b>Yes</b>



## Manganese

Drinking water we supplied complied with the *Australian Drinking Water Guidelines 2011* health-related guideline value for manganese of 0.5mg/L.

Manganese is naturally present in the environment in various water-soluble states. At concentrations exceeding 0.1mg/L, manganese imparts an undesirable taste to water and stains plumbing fixtures and laundry. All sample results were well below the *Australian Drinking Water Guidelines 2011* limit. For Manganese, the samples are taken randomly in groups of localities, rather than within each locality, to achieve the monitoring spread. Details of the specific locations can be provided upon request.

Sampling locations are random and change each year.

Water sampling locality		Number of samples	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
570	Bayswater	5	0	0.003	0.006	0.013	Yes
680	Beaumaris	4	0	<0.001	<0.001	0.001	Yes
581	Belgrave	2	0	0.003	0.004	0.005	Yes
310	Berwick	4	0	<0.001	0.001	0.003	Yes
670	Brighton / Heatherton	11	0	<0.001	0.001	0.004	Yes
270	Bunyip	1	0	<0.001	<0.001	<0.001	Yes
322	Carrum Downs	1	0	<0.001	<0.001	<0.001	Yes
610	Caulfield	6	0	0.002	0.003	0.006	Yes
260	Cora Lynn	1	0	0.003	0.003	0.003	Yes
320	Cranbourne	3	0	<0.001	0.002	0.004	Yes
640	Dandenong	2	0	<0.001	0.004	0.007	Yes
660	Dandenong North	6	0	0.003	0.005	0.007	Yes
321	Devon Meadows	1	0	0.003	0.003	0.003	Yes
430	Dromana	1	0	0.003	0.003	0.003	Yes

Water sampling locality		Number of samples	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
580	Ferntree Gully	2	0	0.004	0.004	0.004	Yes
390	Frankston	2	0	<0.001	<0.001	<0.001	Yes
271	Garfield	1	0	0.001	0.001	0.001	Yes
340	Hastings	1	0	0.005	0.005	0.005	Yes
690	Mordialloc	2	0	<0.001	0.003	0.006	Yes
410	Mornington	1	0	<0.001	<0.001	<0.001	Yes
420	Mount Martha	2	0	<0.001	<0.001	<0.001	Yes
290	Pakenham	1	0	<0.001	<0.001	<0.001	Yes
440	Rye	1	0	<0.001	<0.001	<0.001	Yes
370	Shoreham	1	0	<0.001	<0.001	<0.001	Yes
620	South Melbourne	9	0	0.001	0.003	0.005	Yes
280	Tynong	1	0	<0.001	<0.001	<0.001	Yes
311	Upper Beaconsfield	2	0	<0.001	<0.001	<0.001	Yes
590	Wantirna	5	0	0.003	0.004	0.005	Yes
<b>Business total</b>		<b>79</b>	<b>0</b>	<b>&lt;0.001</b>	<b>0.003</b>	<b>0.013</b>	<b>Yes</b>

## Boron

Drinking water we supplied complied with the *Australian Drinking Water Guidelines 2011* health-related guideline value for boron of 4mg/L.

Boron can be present in drinking water through the natural leaching of boron-containing minerals, or by contamination of water sources. All sample results were well below the *Australian Drinking Water Guidelines 2011* limit. For Boron, the samples are taken randomly in groups of localities, rather than within each locality, to achieve the monitoring spread.

Water sampling locality		Number of samples	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
570	Bayswater	5	0	<0.02	0.05	0.09	Yes
680	Beaumaris	4	0	0.24	0.26	0.26	Yes
581	Belgrave	2	0	<0.02	0.05	0.09	Yes
310	Berwick	4	0	0.22	0.25	0.29	Yes
670	Brighton / Heatherton	11	0	0.15	0.24	0.28	Yes
270	Bunyip	1	0	<0.02	<0.02	<0.02	Yes
322	Carrum Downs	1	0	0.28	0.28	0.28	Yes
610	Caulfield	6	0	0.03	0.1	0.13	Yes
260	Cora Lynn	1	0	<0.02	<0.02	<0.02	Yes
320	Cranbourne	3	0	0.27	0.3	0.32	Yes
640	Dandenong	2	0	0.25	0.25	0.26	Yes
660	Dandenong North	6	0	<0.02	0.04	0.09	Yes
321	Devon Meadows	1	0	0.28	0.28	0.28	Yes
430	Dromana	1	0	0.25	0.25	0.25	Yes
580	Ferntree Gully	2	0	<0.02	<0.02	<0.02	Yes
390	Frankston	2	0	0.24	0.27	0.3	Yes
271	Garfield	1	0	<0.02	<0.02	<0.02	Yes

Water sampling locality		Number of samples	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
340	Hastings	1	0	0.29	0.29	0.29	Yes
690	Mordialloc	2	0	0.25	0.25	0.25	Yes
410	Mornington	1	0	0.19	0.19	0.19	Yes
420	Mount Martha	2	0	0.14	0.15	0.15	Yes
290	Pakenham	1	0	0.24	0.24	0.24	Yes
440	Rye	1	0	0.21	0.21	0.21	Yes
370	Shoreham	1	0	0.26	0.26	0.26	Yes
620	South Melbourne	9	0	<0.02	0.1	0.13	Yes
280	Tynong	1	0	<0.02	<0.02	<0.02	Yes
311	Upper Beaconsfield	2	0	0.26	0.27	0.28	Yes
590	Wantirna	5	0	<0.02	<0.02	0.05	Yes
<b>Business total</b>		<b>79</b>	<b>0</b>	<b>&lt; 0.02</b>	<b>0.15</b>	<b>0.32</b>	<b>Yes</b>

## Inorganic parameters

The following tables summarise the results of inorganic parameters in our monitoring program that may pose a risk to human health.

These parameters are measured against the *Australian Drinking Water Guidelines 2011* (ADWG) criteria, health-based guideline values – if available (N/A indicates that a guideline value has not been set). For these parameters, the samples are taken randomly in groups of localities, rather than within each locality, to achieve the monitoring spread. Details of the specific locations can be provided upon request. All results are in mg/L unless otherwise indicated after the parameter name.

Parameter	Number of samples	Minimum mg/L	Average mg/L	Maximum mg/L	ADWG guideline value	Complying with ADWG (Yes/No)
Ammonia	10	<0.002	<0.002	0.003	0.5	Yes
Calcium	25	3.5	6.6	10	N/A	N/A
Chloride	5	6	8.4	14	250	Yes
Dissolved Oxygen	19	9	9.8	10.8	N/A	N/A
Electrical Conductivity (uS/cm)	1047	52	89	200	~780	Yes
Hardness	25	13	20	31	200	Yes
Magnesium	25	0.5	0.8	1.3	N/A	N/A
Potassium	5	0.4	0.6	0.9	N/A	N/A
Silica	5	3	4.8	6.7	80	N/A
Sodium	5	4.5	5.4	7.9	180	Yes

Note: N/A indicates that a guideline value has not been set.

## Organic parameters

The following tables summarise the results of organic parameters in our monitoring program that may pose a risk to human health.

These parameters are measured against the *Australian Drinking Water Guidelines 2011* (ADWG) criteria, health-based guideline values – if available (N/A indicates that a guideline value has not been set). For these parameters, the samples are taken randomly in groups of localities, rather than within each locality, to achieve the monitoring spread. Details of the specific locations can be provided upon request.

Parameter	Number of samples	Minimum mg/L	Average (mg/L)	Maximum (mg/L)	ADWG guideline value (mg/L)	Complying with ADWG (Yes/No)
<b>Trihalomethanes</b>						
Dibromochloromethane	529	< 0.001	0.003	0.012	N/A	N/A
Bromoform	529	< 0.001	< 0.001	< 0.001	N/A	N/A
Dichlorobromomethane	529	0.002	0.009	0.028	N/A	N/A
Chloroform	529	0.003	0.024	0.094	N/A	N/A
<b>Chlorophenols</b>						
2 chlorophenol	20	< 0.001	< 0.001	< 0.001	0.3	Yes
2,4 dichlorophenol	20	< 0.001	< 0.001	< 0.001	0.2	Yes
2,4,6 trichlorophenol	20	< 0.001	< 0.001	< 0.001	0.02	Yes
Pentachlorophenol	20	< 0.001	< 0.001	< 0.001	0.01	Yes
<b>Polycyclic Aromatic Hydrocarbons</b>						
Benzo(a)pyrene	5	<0.000002	<0.000002	<0.000002	0.00001	Yes
<b>Volatile Organic Compounds</b>						
Benzene	20	< 0.001	< 0.001	< 0.001	0.001	Yes
Carbon Tetrachloride	20	< 0.001	< 0.001	< 0.001	0.003	Yes
Chlorobenzene	20	< 0.001	< 0.001	< 0.001	0.3	Yes
1,2-dichlorobenzene	20	< 0.001	< 0.001	< 0.001	1.5	Yes
1,3-dichlorobenzene	20	< 0.001	< 0.001	< 0.001	0.02	Yes
1,4-dichlorobenzene	20	< 0.001	< 0.001	< 0.001	0.04	Yes
1,1-dichloroethane	20	< 0.001	< 0.001	< 0.001	N/A	N/A
1,2-dichloroethane	20	< 0.001	< 0.001	< 0.001	0.003	Yes

Parameter	Number of samples	Minimum mg/L	Average (mg/L)	Maximum (mg/L)	ADWG guideline value (mg/L)	Complying with ADWG (Yes/No)
1,1-dichloroethene	20	< 0.001	< 0.001	< 0.001	0.03	Yes
cis-1,2-dichloroethene	20	< 0.001	< 0.001	< 0.001	0.06	Yes
trans-1,2-dichloroethene	20	< 0.001	< 0.001	< 0.001	0.06	Yes
Dichloromethane	20	< 0.001	< 0.001	< 0.001	0.004	Yes
cis-1,3-dichloropropene	20	< 0.001	< 0.001	< 0.001	0.1	Yes
trans-1,3-dichloropropene	20	< 0.001	< 0.001	< 0.001	0.1	Yes
Ethylbenzene	20	< 0.001	< 0.001	< 0.001	0.3	Yes
Styrene	20	< 0.001	< 0.001	< 0.001	0.03	Yes
Tetrachloroethene	20	< 0.001	< 0.001	< 0.001	0.05	Yes
Toluene	20	< 0.001	< 0.001	< 0.001	0.8	Yes
1,2,3-trichlorobenzene	20	< 0.001	< 0.001	< 0.001	0.03	Yes
1,2,4-trichlorobenzene	20	< 0.001	< 0.001	< 0.001	0.03	Yes
o -Xylene	20	< 0.001	< 0.001	< 0.001	0.6	Yes
m&p -Xylene	20	< 0.002	< 0.002	< 0.002	0.6	Yes

Note: N/A indicates that a guideline value has not been set.

## Pesticides

The following tables summarise the results of pesticides in our monitoring program that may pose a risk to human health.

These parameters are measured against the *Australian Drinking Water Guidelines 2011* (ADWG) criteria, health-based guideline values – if available (N/A indicates that a guideline value has not been set).

For these parameters, the samples are taken randomly in groups of localities, rather than within each locality, to achieve the monitoring spread. Details of the specific locations can be provided upon request.

Parameter	Number of samples	Minimum mg/L	Average mg/L	Maximum mg/L	ADWG guideline value (mg/L)	Complying with ADWG (Yes/No)
2,4,5-T	5	<0.00001	<0.00001	<0.00001	0.1	Yes
2,4,6-T	5	<0.00001	<0.00001	<0.00001	N/A	N/A
2,4-D	5	<0.00001	<0.00001	<0.00001	0.03	Yes
2,4-DB	5	<0.00001	<0.00001	<0.00001	N/A	N/A
2,6-D	5	<0.00001	<0.00001	<0.00002	N/A	N/A
4-CPA	5	<0.00001	<0.00002	<0.00006	N/A	N/A
Aldrin	5	< 0.00001	< 0.00001	< 0.00001	0.0003 <sup>5</sup>	Yes
Ametryn	5	< 0.002	< 0.002	< 0.002	0.07	Yes
AMPA	5	< 0.03	< 0.03	< 0.03	N/A	N/A
Atrazine	5	< 0.002	< 0.002	< 0.002	0.02	Yes
Bentazone	5	<0.00001	<0.00001	<0.00001	0.4	Yes
BHC (Alpha Isomer)	5	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
BHC (Beta Isomer)	5	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
BHC (Delta Isomer)	5	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
Bromoxynil	5	<0.00001	<0.00001	<0.00002	0.01	Yes
Chlordane	5	< 0.00001	< 0.00001	< 0.00001	0.002	Yes
cis-Chlordane	5	< 0.00001	< 0.00001	< 0.00001	0.002	Yes
Clopyralid	5	<0.00005	<0.00005	<0.00005	2	Yes

<sup>5</sup> Combined Dieldrin and Aldrin



Parameter	Number of samples	Minimum mg/L	Average mg/L	Maximum mg/L	ADWG guideline value (mg/L)	Complying with ADWG (Yes/No)
DDD	5	< 0.00006	< 0.00006	< 0.00006	N/A	N/A
DDE	5	< 0.00006	< 0.00006	< 0.00006	N/A	N/A
DDT	5	< 0.00006	< 0.00006	< 0.00006	0.009	Yes
Dicamba	5	<0.00001	<0.00001	<0.00001	0.1	Yes
Dichlorprop	5	<0.00001	<0.00001	<0.00001	0.1	Yes
Dieldrin	5	< 0.00001	< 0.00001	< 0.00001	0.0003 <sup>6</sup>	Yes
Dinoseb	5	<0.00001	<0.00001	<0.00001	N/A	N/A
Endosulphan I	5	< 0.00005	< 0.00005	< 0.00005	0.02	Yes
Endosulphan II	5	< 0.00005	< 0.00005	< 0.00005	0.02	Yes
Endosulphan Sulphate	5	< 0.00005	< 0.00005	< 0.00005	0.02	Yes
Endrin	5	< 0.0001	< 0.0001	< 0.0001	N/A	N/A
Endrin Aldehyde	5	< 0.0001	< 0.0001	< 0.0001	N/A	N/A
Endrin Ketone	5	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
Fluroxypyr	5	<0.00001	<0.00001	<0.00001	N/A	N/A
Glyphosate	5	< 0.03	< 0.03	< 0.03	1	Yes
Heptachlor	5	< 0.00005	< 0.00005	< 0.00005	0.0003	Yes
Heptachlor epoxide	5	< 0.00005	< 0.00005	< 0.00005	0.0003	Yes
Hexachlorobenzene	5	< 0.000002	< 0.000002	< 0.000002	N/A	N/A
Lindane	5	< 0.00005	< 0.00005	< 0.00005	0.01	Yes
MCPA	5	<0.00001	<0.00001	<0.00001	0.04	Yes
MCPB	5	<0.00001	<0.00001	<0.00001	N/A	N/A
Mecoprop	5	<0.00001	<0.00001	<0.00001	N/A	N/A
Methoxychlor	5	< 0.0002	< 0.0002	< 0.0002	0.3	Yes
Oxy-Chlordane	5	< 0.00001	< 0.00001	< 0.00001	0.002	Yes
Picloram	5	<0.0001	<0.0001	<0.0001	0.3	Yes
Prometon	5	< 0.002	< 0.002	< 0.002	N/A	N/A
Prometryne	5	< 0.002	< 0.002	< 0.002	N/A	N/A

<sup>6</sup> Combined Dieldrin and Aldrin

Parameter	Number of samples	Minimum mg/L	Average mg/L	Maximum mg/L	ADWG guideline value (mg/L)	Complying with ADWG (Yes/No)
Propazine	5	< 0.002	< 0.002	< 0.002	0.05	Yes
Silvex (2,4,5-TP)	5	<0.00001	<0.00001	<0.00001	N/A	N/A
Simazine	5	< 0.002	< 0.002	< 0.002	0.02	Yes
Simetryn	5	< 0.002	< 0.002	< 0.002	N/A	N/A
Terbutylazine	5	< 0.002	< 0.002	< 0.002	0.01	Yes
Terbutryn	5	< 0.002	< 0.002	< 0.002	0.4	Yes
trans-Chlordane	5	< 0.00001	< 0.00001	< 0.00001	0.002	Yes
Triclopyr	5	<0.00001	<0.00001	<0.00001	0.02	Yes

# Aesthetic water quality results

## *Colour, pH, iron, and alkalinity*

The following tables summarise the results of the aesthetic water quality parameters in our monitoring program that don't pose a risk to human health.

We measure these standards against the *Australian Drinking Water Guidelines 2011* (ADWG) criteria if available. Many of these parameters only require infrequent sampling because the results don't vary significantly, from year to year, or from locality to locality, for the same source water.

We compare all our data in the following tables to the previous 2 years' data, with no discernible differences noted in averages when analysed and trended.

All levels have remained consistently below the maximums specified in the ADWG over the 3-year period. Results for 2019–20 and 2020–21 are available in our respective annual water quality reports on our [website](#).

## Colour (apparent) results

Colour is caused by dissolved organic matter (humic and fulvic acids), which originate from the soils and decaying vegetation from the catchments. There are two ways to measure colour: 'true' colour is measured after filtering the water to remove the particulate matter (turbidity) and 'apparent' colour is measured without filtration and is more like what our customers see. We use apparent colour.

Water sampling locality		Frequency of sampling	Number of samples tested	Minimum (HU)	Average (HU)	Maximum (HU)	Complying with ADWG <sup>7</sup> (Yes/No)
Locality number	Locality name						
360	Balnarring	Fortnightly	26	<2	<2	2	Yes
570	Bayswater	Fortnightly	26	4	5.3	8	Yes
680	Beaumaris	Fortnightly	26	<2	<2	2	Yes
581	Belgrave	Fortnightly	26	<2	5.0	6	Yes
310	Berwick	Fortnightly	27	<2	<2	4	Yes
350	Bittern	Fortnightly	26	<2	<2	2	Yes
670	Brighton / Heatherton	Fortnightly	27	<2	<2	6	Yes
270	Bunyip	Fortnightly	26	<2	<2	6	Yes
322	Carrum Downs	Fortnightly	26	<2	<2	4	Yes
610	Caulfield	Fortnightly	26	<2	4.5	6	Yes
650	Chelsea	Fortnightly	26	<2	<2	2	Yes
720	Clyde North	Fortnightly	26	<2	2	20 <sup>8</sup>	Yes
260	Cora Lynn	Fortnightly	26	<2	<2	4	Yes
320	Cranbourne	Fortnightly	27	<2	<2	4	Yes
640	Dandenong	Fortnightly	26	<2	<2	4	Yes
660	Dandenong North	Fortnightly	26	4	6.1	14	Yes
321	Devon Meadows	Fortnightly	26	<2	<2	4	Yes

<sup>7</sup> The ADWG value is 15 HU for true colour, however as we use Apparent Colour, there is no limit set. Majority of the results were found to be below the true colour limit.

<sup>8</sup> The apparent colour could be 20 HU, if both true colour and turbidity are at the guideline values (i.e. true colour of 15 HU and turbidity of 5 NTU).

Water sampling locality		Frequency of sampling	Number of samples tested	Minimum (HU)	Average (HU)	Maximum (HU)	Complying with ADWG <sup>7</sup> (Yes/No)
Locality number	Locality name						
430	Dromana	Fortnightly	26	<2	<2	4	Yes
580	Ferntree Gully	Fortnightly	26	<2	5.2	8	Yes
390	Frankston	Fortnightly	26	<2	<2	4	Yes
400	Frankston South	Fortnightly	26	<2	<2	4	Yes
271	Garfield	Fortnightly	26	<2	<2	2	Yes
630	Hallam	Fortnightly	26	<2	<2	4	Yes
340	Hastings	Fortnightly	26	<2	<2	1	Yes
323	Karingal	Fortnightly	26	<2	<2	4	Yes
300	Koo Wee Rup	Fortnightly	26	<2	<2	2	Yes
450	Lang Lang	Fortnightly	26	<2	<2	2	Yes
710	Moorooduc	Fortnightly	26	<2	<2	2	Yes
690	Mordialloc	Fortnightly	26	<2	<2	4	Yes
410	Mornington	Fortnightly	26	<2	<2	1	Yes
420	Mount Martha	Fortnightly	26	<2	<2	2	Yes
290	Pakenham	Fortnightly	26	<2	<2	2	Yes
700	Rowville	Fortnightly	26	<2	3.3	6	Yes
440	Rye	Fortnightly	25	<2	<2	1	Yes
370	Shoreham	Fortnightly	26	<2	<2	4	Yes
330	Somerville	Fortnightly	28	<2	<2	4	Yes
620	South Melbourne	Fortnightly	26	4	4.6	6	Yes
280	Tynong	Fortnightly	26	<2	<2	2	Yes
311	Upper Beaconsfield	Fortnightly	26	<2	<2	4	Yes
590	Wantirna	Fortnightly	26	<2	5.2	8	Yes
<b>Business total</b>			<b>1044</b>	<b>&lt;2</b>	<b>&lt;2</b>	<b>20</b>	<b>Yes</b>

## pH results

We met the ADWG criteria for pH<sup>9</sup>, which suggests a pH range of 6.5 to 8.5 and up to 9.2 for areas where new cement-lined pipes are present. Cement-lined pipes are common in our service area.

Water sampling locality		Frequency of sampling	Number of samples tested	Minimum	Average	Maximum	Complying with ADWG (Yes / No)
Locality Number	Locality name						
360	Balnarring	Fortnightly	26	7.4	7.7	8.0	Yes
570	Bayswater	Fortnightly	26	7.2	7.4	7.7	Yes
680	Beaumaris	Fortnightly	26	7.2	7.4	7.7	Yes
581	Belgrave	Fortnightly	26	7.2	7.7	8.7	Yes
310	Berwick	Fortnightly	27	7	7.5	7.8	Yes
350	Bittern	Fortnightly	26	7.4	7.7	8.6	Yes
670	Brighton / Heatherton	Fortnightly	27	7.2	7.4	7.6	Yes
270	Bunyip	Fortnightly	26	7.3	7.5	7.8	Yes
322	Carrum Downs	Fortnightly	26	7.3	7.5	7.8	Yes
610	Caulfield	Fortnightly	26	7.1	7.3	7.4	Yes
650	Chelsea	Fortnightly	26	7.1	7.5	7.7	Yes
720	Clyde North	Fortnightly	26	7.2	7.4	7.6	Yes
260	Cora Lynn	Fortnightly	26	7.2	7.4	7.6	Yes
320	Cranbourne	Fortnightly	27	7.2	7.5	7.8	Yes
640	Dandenong	Fortnightly	26	7.3	7.5	8.0	Yes
660	Dandenong North	Fortnightly	26	7	7.3	7.6	Yes
321	Devon Meadows	Fortnightly	26	7.2	7.5	7.8	Yes

<sup>9</sup> pH is a measure of the acidic or alkaline nature of the water

Water sampling locality		Frequency of sampling	Number of samples tested	Minimum	Average	Maximum	Complying with ADWG (Yes / No)
Locality Number	Locality name						
430	Dromana	Fortnightly	26	7.4	7.6	8.1	Yes
580	Ferntree Gully	Fortnightly	26	7.2	7.3	7.4	Yes
390	Frankston	Fortnightly	26	7.2	7.5	7.9	Yes
400	Frankston South	Fortnightly	26	7.5	7.6	7.8	Yes
271	Garfield	Fortnightly	26	7.3	7.5	7.8	Yes
630	Hallam	Fortnightly	26	7.2	7.5	7.8	Yes
340	Hastings	Fortnightly	26	7.4	7.6	7.8	Yes
323	Karingal	Fortnightly	26	7.1	7.5	7.9	Yes
300	Koo Wee Rup	Fortnightly	26	7.4	7.5	7.7	Yes
450	Lang Lang	Fortnightly	26	7.3	7.5	7.7	Yes
710	Moorooduc	Fortnightly	26	7.1	7.5	7.7	Yes
690	Mordialloc	Fortnightly	26	7.2	7.5	7.7	Yes
410	Mornington	Fortnightly	26	7.2	7.6	7.8	Yes
420	Mount Martha	Fortnightly	26	7.4	7.7	7.9	Yes
290	Pakenham	Fortnightly	26	7.2	7.4	7.7	Yes
700	Rowville	Fortnightly	26	7.2	7.5	8.5	Yes
440	Rye	Fortnightly	26	7.4	7.8	8.3	Yes
370	Shoreham	Fortnightly	26	7.6	8.1	9.0	Yes
330	Somerville	Fortnightly	28	7.3	7.5	7.7	Yes
620	South Melbourne	Fortnightly	26	7.2	7.3	7.5	Yes
280	Tynong	Fortnightly	26	7.3	7.5	7.8	Yes
311	Upper Beaconsfield	Fortnightly	26	7.5	7.7	8.1	Yes
590	Wantirna	Fortnightly	26	7.2	7.4	7.6	Yes

Water sampling locality		Frequency of sampling	Number of samples tested	Minimum	Average	Maximum	Complying with ADWG (Yes / No)
Locality Number	Locality name						
<b>Business total</b>			<b>1045</b>	<b>7.0</b>	<b>7.5</b>	<b>9.0</b>	<b>Yes</b>



## Iron results

We met the ADWG criteria for iron, which suggests an aesthetic limit of 0.3mg/L except for one sample. There is no health limit specified in ADWG for iron.

Iron can occur naturally in the water from the catchment area soils. Iron can discolour the water and cause staining problems for plumbing fixtures and laundry.

Water sampling locality		Frequency of sampling	Number of Samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes / No)
Locality number	Locality name						
360	Balnarring	Fortnightly	26	<0.01	0.02	0.03	Yes
570	Bayswater	Fortnightly	26	0.06	0.07	0.09	Yes
680	Beaumaris	Fortnightly	26	0.01	0.02	0.03	Yes
581	Belgrave	Fortnightly	26	0.06	0.08	0.13	Yes
310	Berwick	Fortnightly	27	<0.01	0.02	0.03	Yes
350	Bittern	Fortnightly	26	<0.01	0.02	0.03	Yes
670	Brighton / Heatherton	Fortnightly	27	0.01	0.03	0.08	Yes
270	Bunyip	Fortnightly	26	<0.01	0.02	0.2	Yes
322	Carrum Downs	Fortnightly	26	<0.01	0.02	0.04	Yes
610	Caulfield	Fortnightly	26	0.04	0.06	0.1	Yes
650	Chelsea	Fortnightly	26	0.02	0.03	0.04	Yes
720	Clyde North	Fortnightly	26	<0.01	0.03	0.36	No
260	Cora Lynn	Fortnightly	26	<0.01	<0.01	0.03	Yes
320	Cranbourne	Fortnightly	26	<0.01	0.02	0.03	Yes
640	Dandenong	Fortnightly	26	0.01	0.03	0.07	Yes
660	Dandenong North	Fortnightly	26	0.06	0.08	0.17	Yes
321	Devon Meadows	Fortnightly	26	<0.01	0.02	0.04	Yes
430	Dromana	Fortnightly	26	<0.01	0.01	0.03	Yes
580	Ferntree Gully	Fortnightly	26	0.06	0.07	0.09	Yes
390	Frankston	Fortnightly	26	<0.01	0.02	0.03	Yes
400	Frankston South	Fortnightly	26	<0.01	0.02	0.04	Yes

Water sampling locality		Frequency of sampling	Number of Samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes / No)
Locality number	Locality name						
271	Garfield	Fortnightly	26	<0.01	<0.01	0.02	Yes
630	Hallam	Fortnightly	26	0.01	0.02	0.1	Yes
340	Hastings	Fortnightly	26	<0.01	0.01	0.03	Yes
323	Karingal	Fortnightly	26	<0.01	0.02	0.03	Yes
300	Koo Wee Rup	Fortnightly	26	<0.01	<0.01	0.03	Yes
450	Lang Lang	Fortnightly	26	<0.01	<0.01	0.02	Yes
710	Moorooduc	Fortnightly	26	<0.01	0.01	0.03	Yes
690	Mordialloc	Fortnightly	26	0.01	0.02	0.04	Yes
410	Mornington	Fortnightly	26	<0.01	0.02	0.03	Yes
420	Mount Martha	Fortnightly	26	<0.01	0.01	0.03	Yes
290	Pakenham	Fortnightly	26	0.01	0.02	0.03	Yes
700	Rowville	Fortnightly	26	0.02	0.05	0.1	Yes
440	Rye	Fortnightly	26	<0.01	0.01	0.02	Yes
370	Shoreham	Fortnightly	26	<0.01	0.02	0.03	Yes
330	Somerville	Fortnightly	28	<0.01	0.02	0.04	Yes
620	South Melbourne	Fortnightly	26	0.04	0.06	0.08	Yes
280	Tynong	Fortnightly	26	<0.01	<0.01	0.02	Yes
311	Upper Beaconsfield	Fortnightly	26	0.01	0.02	0.05	Yes
590	Wantirna	Fortnightly	26	0.06	0.07	0.09	Yes
<b>Business total</b>			<b>1044</b>	<b>&lt;0.01</b>	<b>0.03</b>	<b>0.36</b>	<b>No</b>

## Alkalinity results

Alkalinity is a measure of the water's ability to maintain a balanced pH. pH is an important factor in water quality and measuring alkalinity provides additional useful information on how pH is likely to change within the system. Melbourne's water supplies typically have low alkalinity. We measure alkalinity as mg/L of calcium carbonate equivalent. To minimise undesirable build-up of scale in hot water systems, total hardness (as calcium carbonate) in drinking water should not exceed 200 mg/L.

Water sampling locality		Number of samples tested	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying with ADWG (Yes/No)
Locality number	Locality name						
570	Bayswater	2	0	12	12.5	13	Yes
581	Belgrave	1	0	11	11	11	Yes
310	Berwick	2	0	22	23.5	25	Yes
670	Brighton / Heatherton	2	0	21	23.5	26	Yes
610	Caulfield	1	0	14	14	14	Yes
320	Cranbourne	2	0	22	23.5	25	Yes
640	Dandenong	1	0	21	21	21	Yes
660	Dandenong North	2	0	12	12.5	13	Yes
340	Hastings	1	0	26	26	26	Yes
690	Mordialloc	1	0	23	23	23	Yes
420	Mt Martha	1	0	29	29	29	Yes
440	Rye	1	0	25	25	25	Yes
620	South Melbourne	2	0	14	14.5	15	Yes
590	Wantirna	1	0	13	13	13	Yes
<b>Business total</b>		<b>20</b>	<b>0</b>	<b>11</b>	<b>19</b>	<b>29</b>	<b>Yes</b>

# Regulatory reporting to the Department of Health

Section 18 of the Act:

*'A water supplier must notify the Secretary in writing if it becomes aware that the drinking water it is supplying to another person does not comply, or is not likely to comply, with any relevant water quality standard and must do so within 10 days after it becomes aware of that fact.'*

*During 2021–22, we didn't report any water quality events to the Department of Health pursuant to Section 18 of the Act.*

Section 22 of the Act:

*'(1) This section applies if an officer of a water supplier believes or suspects, on reasonable grounds that water supplied, or to be supplied, for drinking purposes –*

- a. May be the cause of an illness; or*
- b. May be the means by which an illness is being, has been or will be, transmitted; or*
- c. May contain any pathogen, substance, chemical or blue-green algae toxin, whether alone or in combination, at levels that may pose a risk to human health; or*
- d. May cause widespread public complaint.'*

*'(2) On forming that belief or suspicion, the officer must immediately report his or her belief or suspicion to the Secretary, and must make the report in the form required by the Secretary.'*

During 2021–22, we reported 5 water quality events to the Department of Health pursuant to Section 22 of the Act.

Two Section 22 reports were due to *E. coli* detections, however both were found to be false positive. A **false positive sample** means a sample that is found, after analysis conducted in accordance with regulation 14 met all circumstances, isn't representative of the water supply in that area. A common example of this could be sample contamination from the sample tap assembly, or contamination during the sampling process.

Two of the Section 22 reports originated as a consequence of damage to floating covers on supply basins.

The remaining notification was a result of widespread complaints in Brighton East due to dirty water.

## Section 22 reports

### Mornington *E. coli* detection

A routine sample collected in Mornington on 26 August 2021 returned a positive result of 1 org/100mL *E. coli*. The sample tap is located within the Mornington locality. Source water for this locality is from our reservoir at Eliza Drive, Mt Eliza, which is filled from Melbourne Water's Mornington Reservoir. Mornington Reservoir is supplied from a mix of both Cardinia Reservoir and Tarago Water Treatment Plant.

We conducted an inspection of the Eliza Drive basin, while Melbourne Water conducted an inspection of Mornington Reservoir. No issues were found at either site. Due to no samples being taken from Eliza Drive at the same time as the original customer tap sample, we decided to take a conservative approach. We isolated the Eliza Drive basin until it could be sampled and ruled out as a possible source of contamination.

We inspected the sample tap with the positive *E. coli* result and it was found to be very close to muddy debris and less than 100mm above the ground surface. The sample tap also had overhanging vegetation near the tap.

After receiving notification of the *E. coli* detection, a follow-up sample was collected from the detection site and additional samples from the network and Eliza Drive basin. Melbourne Water also conducted sampling at Mornington Reservoir. After these samples were collected, a flushing program was implemented to bring supply in directly from Mornington Reservoir. After flushing was performed, samples were again collected at the designated sample locations.

The resample results all returned with results showing no presence of *E. coli*, both before and after corrective action. Due to these results, our investigation and consultation with the Department of Health, the result collected on 1 October was deemed a false positive sample and therefore not representative of the water supply.

## **Widespread public complaints – Brighton East dirty water event**

We received numerous dirty (brown) water complaints from customers located in the Mordialloc locality on the evening of 1 September 2021. The number of complaints increased the following morning which led us to notify the Department of Health on the basis of it being a widespread public complaint. The cumulative number of complaints totalled 43 over the 2-day period.

The impact to the water supply arose from a repair to a leaking water main that was determined unsuitable for repair without shutting down the water main. Due to the water main being a large diameter, the shutdown caused flow reversals in the surrounding streets, resulting in resuspension of the natural sediment in the main. While this water was safe to drink, we recognise that the discoloration would have been unpleasant for customers.

We dispatched a team of field employees to monitor the extent of the issue, with a focus on vulnerable customers.

We enacted a communication plan to inform the customers in the area via social media. The discoloration subsided during the day, and we advised customers to flush their own taps if any dirty water remained.

## **Noble Park *E. coli* detection**

A routine sample collected in Noble Park on 1 October 2021 returned a positive result of 1 org/100mL *E. coli*. The sample tap is located within the Dandenong Locality. Source water for this locality comes from Cardinia Reservoir via Melbourne Water's Dandenong Tank.

Melbourne Water conducted an inspection of the Dandenong tank with no issues found.

Another sample from the same locality was also taken on the same day, which didn't detect *E. coli*.

After receiving notification of the *E. coli* detect, a further sample was collected from the detection site and additional samples from the network. Melbourne Water arranged sampling of Dandenong tank. After these samples were collected, a flushing program was implemented. After flushing was performed, samples were collected again at the designated sample locations.

The resample results all returned with no presence of *E. coli*, both before and after corrective action. Due to these results, our investigation and consultation with the Department of Health, the result collected on 1 October was deemed a false positive sample and therefore not representative of supply.

## Tyabb Service Reservoir floating cover tear

On 1 November 2021, Melbourne Water notified us of the potential for contamination of the drinking water supply on 31 October 2021 due to a tear in the floating cover on the west basin of the Tyabb Reservoir. We worked with Melbourne Water to jointly notify the Department of Health of the tear and risk assessment. We subsequently submitted a Section 22 report to the Department of Health on 1 November 2021. Melbourne Water also submitted a Section 22 report to the Department of Health on 1 November 2021.

The impacted water quality localities are the immediate supplies downstream of Tyabb Reservoir: Balnarring, Bittern, Dromana, Hastings, Mornington, Mount Martha and Shoreham.

Upon completing a regular weekly drinking water quality and security inspection of the Tyabb reservoir secondary dosing plant on Monday 1 November, the operator conducting the inspection noticed a 20cm tear in the floating cover of the West basin. Investigation revealed that the most likely cause of the tear was high winds dislodging some equipment including the dewatering pump basket and foot valve assembly from the cover in the early morning of Friday 29 October. We assumed that any surface water that had pooled on the cover in the area of the tear could have entered the basin.

The west basin was isolated from supply, water samples taken from the basin for analysis and a rapid risk assessment completed. We provided recent sample results from the water supply downstream of the Tyabb basin in Balnarring, Bittern, Dromana, Hastings, Mornington, Mount Martha and Shoreham water quality localities.

The secondary disinfection plant at Tyabb was operating normally during the period of interest (inlet free chlorine setpoint of 1.20mg/l and outlet readings of between 0.85 – 1.1mg/L) and the reservoir fence was secure with no signs of animal ingress. We concluded that physical and chemical hazards to water quality were unlikely to be present and the only likely causes of biological contamination was bacteria from birds. Calculations based on the minimum measured outlet free chlorine residual and minimum basin residence time found a minimum Ct of 98 mg.min/L. This is more than sufficient to kill the bacterial pathogens of concern, as such a boil water advisory notice was not required.

Subsequent analysis of the water samples taken from the basin and the downstream water localities (Balnarring, Bittern, Dromana, Hastings, Mornington, Mount Martha and Shoreham) supported this assessment. We found residual chlorine concentrations between 0.9 and 1.0mg/L, physical and chemical characteristics within the normal range and no positive detections of *E. coli* or coliforms for all samples.

Following repair of the cover and subsequent physical, chemical and microbiological sampling, the west basin was returned to service. We assessed the risk of this fault recurring

at other basins with a similar design. Where required, we make modifications to reduce the risk of recurrence. An additional protocol for service reservoir inspections following storm events has also been implemented for both Melbourne Water and our organisation.

## Armagh Road basin floating cover tear

On 3 November 2021, an inspection of the Armagh Road Basin floating cover revealed a tree branch had fallen onto the cover during the storm event on 29 October. This resulted in 2 tears approximately 20cm and 30cm long on the floating cover. We had recently replaced the cover, so the surface of the cover was clean. We'd also cleaned the basin floor at the time of the basin cover replacement.

We immediately notified the Department of Health of the tear and risk assessment and subsequently submitted a Section 22 report on 3 November 2021.

Possible contamination of the basin could have been through ingress from the floating cover surface (low possibility due to the cover being newly installed) or from the tree branches themselves. There were no signs of animal ingress on the cover surface and the fence line was secure. Likely contamination risk would be from bird faeces, e.g., ducks, with associated pathogens e.g., *Campylobacter*. Free chlorine residual within the basin remained at approximately 0.5mg/L, which is adequate to treat any possible risks.

The area is supplied by Cardinia WTP, through to Frankston Reservoir, where secondary disinfection occurs at Frankston South chlorinator, then to Humphries Road basin where it's again dosed via a secondary disinfection unit.

We immediately isolated the Armagh Road basin from supply, with alternate supply to the area fed directly from Humphries Road basin. Sampling from the outlet and immediate downstream customer sample taps occurred. We also conducted flushing at the ends of the reticulation network to ensure the water within the zone turned over and Humphries Road basin was supplying into the area.

Following repair of the cover and subsequent physical, chemical and microbiological sampling, we returned the basin into service. We implemented a protocol for service reservoir inspections following storm events, with the requirement for notification of any fallen branches to be investigated immediately. In this incident, the fallen branch had been blown onto the cover from quite a distance away, so proactive tree pruning wouldn't have had any impact in preventing the event.

## Other incidents reported to the Department of Health

There were several other incidents reported to the Department of Health that didn't fall under a regulatory Section 22 disclosure and reporting requirements. However, we consulted with the Department of Health about these incidents as they could impact on public health.

### Significant storm event

Extreme weather over the Melbourne Cup long-weekend in November 2021 caused Victoria's largest single electricity outage on record. An extended loss of power to our power dependant water and sewer network assets, and water recycling plants has the potential to cause multiple disruptions to customer water supply, and sewer spills into the environment.

During this event, an unprecedented number of operational assets across our water and sewer network were impacted. At its peak, the widespread power outage impacted 40 water and 90 sewer sites.

While many of our assets had on-site generators and battery backup systems, we had to carefully manage and monitor them while power was slowly restored. Repairs to damaged pipework caused by fallen trees were prioritised to ensure that maintenance repair crews could work safely amid downed power lines, and damage to customer property was responded to as quickly as possible.

The scale of this incident demanded a collaborative effort from state, regional and municipal levels. We stood up an incident management team with more than 50 of our people working in a 24/hr cycle across an 8-day period to make sure our services kept running for customers.

Energy suppliers reported that it was the largest power outage in the state's history, with over 500,000 outages. We opened a direct dialogue with the energy companies during the event to help them prioritise and restore power to all our assets and customers.

The collaborative efforts of our teams and contractors saw us return to business as usual without major water supply interruptions to customers or sewer spills into the environment.

### Montrose Reservoir *E. coli* detection

On 11 December 2021, Melbourne Water notified us of a water sample from their routine monitoring program detected *E. coli* (1 Orgs/100mL). The sample was taken from a sample tap located on the outlet of the Montrose Reservoir. This reservoir supplies our Ferntree Gully water quality locality.

Results showed a free chlorine residual of 0.94 mg/L, which is consistent with typical results for this reservoir supplied from the Silvan Water Treatment Plant.

Melbourne Water verified there was no breach of integrity of the drinking water system including the water treatment plant. There was no significant risk to public health.

We worked with Yarra Valley Water and Melbourne Water to complete a joint investigation. Additional samples were tested from the downstream localities.

The Melbourne Water investigation and analysis of historical laboratory results and treatment plant performance showed that the water treatment processes and distribution network were operating within specifications. All follow-up samples from the 3 water corporations didn't detect *E. coli*.



Based on the investigation and subsequent sample test results it was concluded the original sample wasn't representative of the water supplied to customers and no further preventative actions were required.

Melbourne Water submitted a Section 22 report to the Department of Health for this event however an assessment was made that there was no risk to public health for our organisation or Yarra Valley Water, based on the evidence at the time.

## Keysborough internal water contamination event

On 2 May 2022, multiple businesses advised us of an unusual taste and odour with the drinking water at an industrial estate in Keysborough. We attended the site and found a strong petrochemical odour in the internal ring main, which was part of the private customer plumbing supplying the estate. We checked the water supplying the estate and also confirmed the backflow at the property boundary was installed and fully functional. The incoming supply was also checked to ensure the problem was isolated to the internal water main. As it was a privately-owned plumbing main supplying the industrial customers, we contacted the Owners Corporation and met with their plumber to offer advice to investigate and potentially rectify the issue.

On 30 June 2022, businesses in the estate contacted us again. After attending the property, we discovered that the strong petrochemical odour was still present.

A Section 22 report wasn't required to be submitted for this incident as the issue related to the private customer pipework. We did determine the magnitude of the problem was important enough to notify the Department of Health to make them aware of the situation.

We were confident from our site investigations that the South East Water supply to the boundary of the business park was safe, as the high hazard backflow device was operational. However, due to the chemical smell at some of the meters, we decided, in conjunction with the Department of Health, to adopt a precautionary approach and isolate the supply at each property. To assist the customer, we also provided an alternative supply for the occupants to use until the problem could be rectified.

As such, we communicated to each unit owner via text message and letter (hand delivered and emailed). We advised we isolated their drinking water supply, to have their plumbing checked for backflow and cross connection, not to drink or use the water, and that there was a standpipe/tap where everyone could access safe drinking water.

We consulted with the Department of Health, Victorian Building Authority (VBA), Environment Protection Authority Victoria (EPA) and WorkSafe Victoria about this event. We worked together to assist the Owners Corporation on identifying the problem and possible rectification works.

The most likely cause of the contamination was soil contamination on site, with a hydrocarbon-based pollutant. Hydrocarbons can easily penetrate most plastic pipes, and while the levels of contaminants detected were not of a health concern, they were aesthetically unpleasant and in breach of the aesthetic limit within the Australian Drinking Water Guidelines.

As the problem relates to private customer plumbing and isn't a South East Water asset, we have no authority to rectify the problem.

Hydrocarbon contamination on private property can happen on residential properties, as well. Several situations can cause this – for example, a customer washing a paint brush with

paint thinners at their front garden tap, a car or boat parked on the front lawn with a petrol leak or a driveway that's been recently sealed. Any hydrocarbon-based contamination over a plastic (polyethylene pipe) can penetrate straight through the pipe and taint the water.

Over 2022–23, we'll explore ways to communicate this problem to the industry, to improve awareness of the risks to the water supply on private property.

## Water quality complaints

Our water quality complaints remained below the Essential Services Commission target (0.27 per 100 properties), with a yearly result of 0.12 per 100 properties.

The biggest improvement in complaint numbers compared to last year was attributed to a reduction in 'brown' and 'white' water complaints. This means we're operating the network smarter and more efficiently, working closer with Melbourne Water during operational outages and changes and monitoring our system better.

The table below compares complaints for previous years.

Type of complaint	Number of complaints			Comparison with previous reporting periods	Comments
	2019-20	2020-21	2021-22		
Alleged illness	17	16	13	Decreased from previous reporting periods.	No illness complaints have been found to be attributed to the water supply.
Dirty water (Brown, Blue, Black, Yellow)	447	604	600	Slight decrease in number of complaints from previous year.	Brown / black water can be caused by resuspending the natural sediment in pipes after water supply disruption; we worked closely with our maintenance team and contractors to reduce this. Blue and yellow water are caused by old copper / galvanised pipes which is common in Melbourne homes.
Taste and odour	199	234	230	Slight decrease compared to the last year.	Most of these complaints are attributed to chlorine which fluctuates seasonally through our network.
White water	120	106	61	Large decrease from previous years.	White water is due to entrained air which occurs mostly when a main is recharged following leak repairs or other work. We worked closely with the maintenance team to reduce these events.
Other	64	48	62	Increase from previous reporting periods.	These complaints cover broad types of enquiries, from pH to requests for data.
<b>Total</b>	<b>847</b>	<b>1008</b>	<b>966</b>		

We try to minimise the number of complaints we receive by:

- preventing and responding to water quality complaints in a timely manner
- ensuring all major shutdowns are conducted at night to reduce impact on the system
- working closely with our contractor to improve the shutdown and recharging of water mains following bursts
- working with the water carters to ensure only correct hydrants are used to fill the tankers
- maintaining a fully-closed system
- working closely with our wholesaler, Melbourne Water, to ensure all major construction works have minimal impact on water quality
- using secondary chlorinators for low level secondary disinfection
- using COLT units at key locations around our system
- using a water quality alert system to provide early warnings of potential incidents
- ensuring all new mains are swabbed, flushed and chlorinated where required and tested for several key water quality parameters by an independent laboratory so that we start with a clean asset before connections are made.

We're committed to ensuring all complaints are dealt with in an appropriate and timely manner.

Our dedicated and highly-trained call centre staff handle all customer complaints about water quality. In all instances, the nature of the complaint determines our response, ranging from detailed investigative work to providing technical information.

Our specialised field employees respond to customer complaints with appropriate knowledge and skills to ensure customer satisfaction.

The following table shows a summary of all water quality complaints by water sampling locality.

## Responding to our customers continued

Locality number	Locality name	Customer count <sup>10</sup>	Brown	Blue	Black	White <sup>11</sup>	Yellow	Chlorine	Earthy	Musty	Petro-chemical	Stale	odour and taste	Other	Suspect Illness	Other	Reporting Total	Complaints (per 100 customers)
260	Cora Lynn	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
270	Bunyip	2,122	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.05
271	Garfield	826	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0.24
280	Tynong	721	2	2	0	0	0	0	0	0	0	0	0	0	0	1	5	0.69
290	Pakenham	20,676	37	0	0	7	2	1	1	1	7	0	1	1	3	0	61	0.30
300	Koo-Wee-Rup	1,476	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	0.14
310	Berwick	55,036	34	3	0	4	1	14	1	0	2	1	6	0	5	0	71	0.13
311	Upper Beaconsfield	934	0	1	0	1	0	0	0	0	0	0	1	0	0	0	3	0.32
320	Cranbourne	34,808	38	0	0	3	3	3	0	1	1	0	11	0	5	0	65	0.19
321	Devon Meadows	5,876	2	0	0	0	0	0	0	0	0	1	3	0	1	0	7	0.12
322	Carrum Downs	13,528	13	1	0	0	1	2	0	0	0	0	2	1	0	0	20	0.15
323	Karingal	4,929	3	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0.08
330	Somerville	7,595	5	0	0	1	0	1	0	0	0	0	1	0	1	0	9	0.12
340	Hastings	5,262	0	0	1	0	0	0	0	1	0	0	1	0	1	0	4	0.08
350	Bittern	2,622	4	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0.19
360	Balnarring	2,779	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.04
370	Shoreham	1,599	2	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0.19
390	Frankston	41,561	6	0	0	5	4	9	1	1	1	0	5	0	4	0	36	0.09

<sup>10</sup> Customer count refers to property connections.

<sup>11</sup> White water is caused by trapped air in pressurised mains.

Locality number	Locality name	Customer count <sup>10</sup>	Brown	Blue	Black	White <sup>11</sup>	Yellow	Chlorine	Earthy	Musty	Petro-chemical	Stale	odour and taste	Other	Suspect Illness	Other	Reporting Total	Complaints (per 100 customers)
400	Frankston Sth	6,203	7	0	0	1	0	2	0	0	0	0	2	0	0	0	12	0.19
410	Mornington	20,916	3	0	0	0	0	4	0	1	0	0	2	0	2	0	12	0.06
420	Mount Martha	4,592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
430	Dromana	10,196	2	0	0	14	0	0	0	0	0	0	2	0	1	0	19	0.19
440	Rye	35,750	7	0	0	1	0	2	1	0	1	0	2	0	2	0	16	0.04
450	Lang Lang	1,165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
570	Bayswater	31,418	16	0	0	5	3	5	0	0	0	0	6	2	3	0	40	0.13
580	Ferntree Gully	10,040	7	0	0	0	0	3	0	0	1	0	2	1	1	0	15	0.15
581	Belgrave	6,773	10	0	0	3	1	3	0	0	0	0	0	1	1	0	19	0.28
590	Wantirna	11,372	16	0	0	1	0	3	0	0	0	0	2	0	0	0	22	0.19
610	Caulfield	84,182	51	1	0	0	2	1	0	1	2	0	6	0	10	0	74	0.09
620	South Melbourne	104,090	48	0	0	3	1	2	0	1	0	0	6	0	4	0	65	0.06
630	Hallam	31,757	28	2	1	1	1	5	1	0	2	1	3	1	3	0	49	0.15
640	Dandenong	57,703	34	1	1	0	4	7	1	0	4	0	5	2	5	0	64	0.11
650	Chelsea	23,285	8	0	0	1	0	0	0	0	0	0	0	0	0	0	9	0.04
660	Dandenong Nth	12,082	44	0	0	1	2	1	0	0	0	0	3	0	1	0	52	0.43
670	Brighton / Heatherton	103,127	85	2	1	4	6	14	4	0	1	0	10	3	4	0	134	0.13
680	Beaumaris	13,279	3	0	0	1	0	1	0	0	0	0	2	0	0	0	7	0.05
690	Mordialloc	15,136	10	1	0	0	0	5	0	1	0	0	0	0	0	0	17	0.11
700	Rowville	14,512	22	0	1	3	0	2	0	0	0	0	2	0	1	0	31	0.21
710	Moorooduc	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
720	Clyde North	13,256	1	1	0	0	0	2	1	0	0	0	4	0	1	0	10	0.08
<b>Business total</b>		<b>813,765</b>	<b>549</b>	<b>15</b>	<b>5</b>	<b>61</b>	<b>31</b>	<b>93</b>	<b>11</b>	<b>8</b>	<b>22</b>	<b>3</b>	<b>93</b>	<b>13</b>	<b>62</b>	<b>0</b>	<b>966</b>	<b>0.12</b>

## Discoloured water complaints

We enjoy the highest quality water from our catchments and it's carefully treated by us before we send it out into our network. Much of Melbourne's pipeline system is unfiltered, which means some harmless natural sedimentation can occur in the pipes.

We attribute most discoloured water complaints received during 2021-22 to increases in the flow of water through the main, or a reversal of the flow direction within the main. This can disturb the fine sediment material from the source water, which can settle in the main during periods of low flow. A change of the flow in the main can stir up sediment and cause discoloured water.

Most discoloured water complaints are a result of emergency works. We're committed to meeting the needs and expectations of our customers and engaging with our community. When we receive complaints relating to a burst or damaged water main, we respond by communicating why the water is discoloured and how we will resolve the problem. We respond by flushing the water main if the water is still discoloured, usually targeting dead-end streets where water does not move through the system as frequently.

## Taste and odour complaints

Taste and odour complaints are generally related to chlorine. These complaints can vary with seasonal water demands and the location of the customer's property.

The chlorination process can lead to noticeable, yet harmless, tastes and odours if the chlorine reacts with organic matter present in the pipe. Chlorine has been used effectively around the world for more than 100 years as part of the water treatment process and the amount of chlorine added is minimal.

While we regularly monitor the drinking water supply, it is not possible to accurately predict the occurrence of taste and odour problems. However, once reported by customers, or detected by our employees, we investigate the issue to devise a prompt resolution.

## Blue water

Blue water is caused by the release of copper into water passing through copper pipe, resulting in the water appearing blue. All blue water related complaints received in 2021-22 were associated with corrosion of the copper pipe within a customer's property or service pipe. We investigate these complaints, and we provide our customers with up-to-date information on this issue.

## Alleged illness complaints

Alleged illness complaints are received from customers who suspect their water supply may be associated with an illness they are experiencing. We investigate each complaint relating to alleged illness from our water quality with care and concern, inviting the Department of Health to assist where appropriate.

During 2021-22 there were no confirmed cases of illness arising from our water supply system.

## Other complaints

Other water quality complaints received were either from industrial customers concerned about water quality issues that could affect their processes (e.g., pH), or residential customers with concerns about water quality such as discolouration of kettles and issues with aquariums.

We produce a number of information sheets for our customers that cover numerous topics to help our customers understand water quality. This information, along with commonly-asked questions, is available for customers to access on our [website](#).



## Glossary/acronyms

ADWG	<b>Australian Drinking Water Guidelines 2011<sup>12</sup></b>
COLT	Continuous online testing
E. coli	Escherichia coli
HACCP	Hazard Analysis and Critical Control Point
HU	Hazen Units
mg/L	Milligrams per litre
mL	Millilitres
NTU	Nephelometric Turbidity Units
PRV	Pressure Reducing Valve
The Act	Safe Drinking Water Act 2003
The Regulations	Safe Drinking Water Regulations 2015
WTP	Water Treatment Plant

**Primary disinfection** refers to the initial disinfection treatment before water is supplied to customers, usually when water leaves an open storage such as Cardinia Reservoir.

**Secondary disinfection** refers to additional or booster disinfection treatment within the distribution system, usually a long time after primary disinfection. For example, secondary disinfection occurs towards the end of the distribution system where the residual from the primary disinfection has diminished.

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<sup>12</sup> The *Australian Drinking Water Guidelines 2011* is freely available on the National Health and Medical Research Council website: [www.nhmrc.gov.au/guidelines/publications/eh52](http://www.nhmrc.gov.au/guidelines/publications/eh52)

# Healthy Water. For Life.

## How to get in touch

**Email** [support@southeastwater.com.au](mailto:support@southeastwater.com.au)

**General account enquiries** 13 18 51

**South East Water Assist** 9552 3540

**Hearing and speech impaired services**

**TTY** 13 36 77 (ask for 13 18 51)

**Interpreter service (all languages)** 9209 0130

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