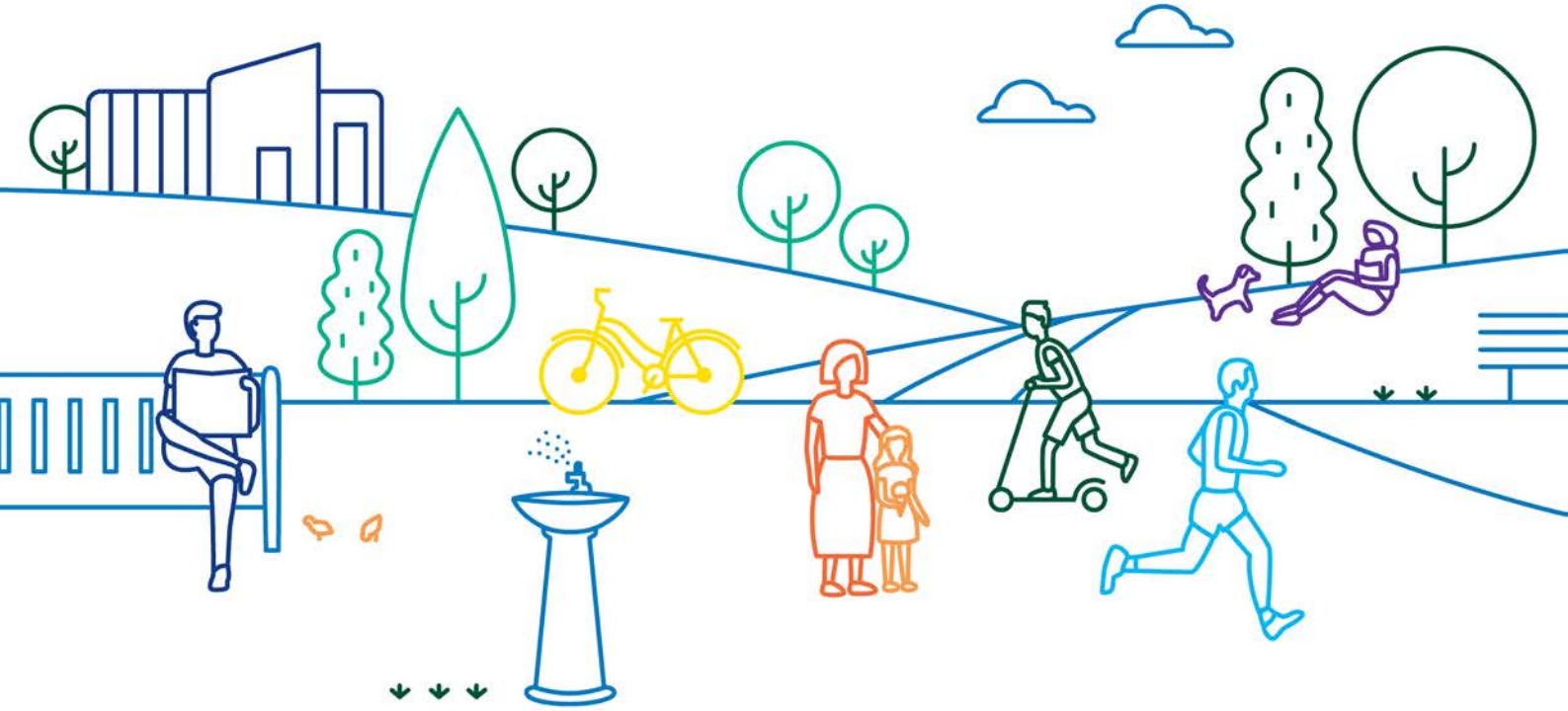
South East Water

Annual Drinking Water Quality Report 2018–19



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A message from our Managing Director

At South East Water, we're committed to delivering the highest quality water to support and enrich our communities and environment.

From green spaces for recreation, vibrant wetlands or urban gardens, we know that water delivers health and liveability and supports communities by creating spaces to work, live and play.

Our purpose, every day at every level of our organisation is to ensure the flow of healthy water to the people who rely on us for health, work, play and recreation. That means delivering the clean water they want, and safely treating the wastewater they don't – while finding new ways to use, and re-use, water so we don't waste a drop.

I'm proud to present South East Water's *Drinking Water Quality Report 2018–19,* which details how we performed against the S*afe Drinking Water Act 2003* (the Act), the *Safe Drinking Water Regulations 2015* (the Regulations) and the *Australian Drinking Water Guidelines 2011* in 2018–19.

Delivering healthy water every day

We take our responsibility to our customers seriously. Our hard-working team of water quality specialists monitor our drinking water 24-hours a day. We take more than 8,000 water samples every year, which helps us to make sure our drinking water is safe and healthy, 365 days a year.

This year, we upgraded key secondary chlorination sites with automated systems that remotely monitor and control water quality, which resulted in a significant decrease in complaints about the way our water tastes and smells (164 complaints compared to 199 last year).

We're always working to protect our water from contamination after it leaves our sites. Our upgraded backflow protection program requires all new properties connecting to our network to install a backflow prevention device to stop contaminants from entering our system, to keep our water safe and healthy.

Our integrated water management approach means that, more and more, we're working towards using the right type of water for the right purpose – and only using drinking water where it's really needed. We're doing this by connecting more customers to recycled water, and inventing new technology, like our rain-to-hot water system which is supplying customers at Aquarevo, our partnership development with Villawood properties in Lyndhurst, with treated rain water in the shower.

We're proud to report that we performed extremely well against all testing requirements. We met our drinking water quality standards including our testing for *Escherichia coli (E. coli)* resulting in no *E. coli* per 100 millilitres (mL) of drinking water. We also complied with the other standards listed in Schedule 2 of the Regulations, including turbidity and trihalomethanes (a by-product of chlorine disinfection). We also successfully completed our surveillance audit, securing our Hazard Analysis and Critical Control Points (HACCP) accreditation for the 20th consecutive year.

Delivering healthy water for communities

We supported our customers affected by the devastating Bunyip State Park bushfires in March 2019. Our crews were out in the community in the aftermath of the fires filling rainwater tanks (which had been contaminated by the fires) with clean drinking water.

We've also partnered with the Cambodia Water Authority in a two-year knowledge sharing program to help bring clean, healthy water to more than one million people. The program, called the Cambodia-Australia Water Utility Improvement Program, allows us to share our technology and management systems with the Cambodia Water Authority to help them develop their own management systems to improve the quality of water in Cambodia.

We know that our customers and community want safe and reliable services, now and always. At its essence, this means clean and quality drinking water, and the safe disposal of wastewater.

This report highlights the results from our Water Quality Monitoring Program and explains how we're working to deliver the best quality water possible, now and always. 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 to our customers.

Terri Benson

Managing Director

October 2019

Ever wondered where your 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 your taps? There's more to it than you might think.

Here's a snapshot of the journey in supplying our 1.83 million customers across Melbourne's south east – residential, commercial and industrial – with safe, high-quality drinking water.

It starts north in the Yarra Ranges

We purchase your 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 five 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.

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 and Human Services (DHHS) under the *Health (Fluoridation) Act 1973*). Adding lime adjusts pH to ensure water is at a level of 7 to 7.5.

The water's then transported to our supply system through a secure closed network to various covered storages, and delivered to your tap.

Our customers around our South Melbourne locality are supplied with water from the Winneke Water Treatment Plant (WTP), 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 treated at Winneke WTP, before undergoing 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 (WTP). The Tarago WTP is a state-of-the-art Dissolved Air Flotation and Filtration (DAFF) and ultraviolet (UV) disinfection water treatment plant. Water from the Tarago WTP is fed directly into our supply system via the Tarago–Westernport Pipeline. Much of what we do you'll never see, much like the plumbing in your home.

Our distribution system operates 24 hours a day so that drinking water is there when you need it.

All about desalinated water

As Melburnians, we're using the same amount of water as we did in 1980 – even though our population has doubled. This shows that Melbourne has done a great job continuing to be water wise beyond the millennium drought.

But our fast-growing population and drier weather conditions meant that in 2018–19 our water storages were the lowest they've been since 2011 – at just 50 per cent full.

We know we need to think ahead to ensure Melbourne's ongoing water resources as we adjust to the new normal of climate change and make sure we deliver healthy water to our customers. That's where the desalination plant comes in.

Depending on the volume of water stored in Melbourne's reservoirs, Cardinia Reservoir can receive desalinated water. Desalinated water is drinking water produced from sea water.Since 2016, 76 billion litres of desalinated water have boosted our supplies, including 15 billion litres in 2018–19.

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 (refer to table starting on page 12).

The Victorian Desalination Project is a Public-Private Partnership (PPP) between the Victorian Government and AquaSure. It's managed by the Department of Environment, Land, Water and Planning (DELWP) on behalf of the government.

Like all drinking water, desalination water from the plant meets the requirements of the *Australian Drinking Water Guidelines 2011*, *Safe Drinking Water Act 2003* and World Health Organisation guidelines, so it still looks and tastes great.

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

So the desalinated water can join our water supplies, the plant features an 84 kilometre underground two-way transfer pipeline to Berwick where it connects with our existing network and mixes with our supply at Cardinia Reservoir.

In March 2019, the Minister for Water announced an order of 125 billion litres of desalinated water for the 2019–20 financial year.

Our water system by numbers

- 1.83 million people serviced
- 9,575 kilometres of drinking water mains
- 778,018 customers
- 7,793 water quality samples
- 39 water sampling localities
- 81 pump stations
- 67 water storage facilities
- 23 secondary disinfection plants

Did you know?

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.

How we supply water to you

Water quality across our localities

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

You can see where our water is from, and which treatment is used, by looking at the locality map on page 8 or by visiting southeastwater.com.au/waterquality.

Please note that localities don't exactly align with suburbs.

Water quality localities and services

Our water system is divided into 39 water sampling localities and each one is numbered. Each locality is determined by where the water comes from, how it's delivered and how it's treated. This includes where the primary treatment is boosted through secondary disinfection. You can see a summary of the treatment processes on pages 12–17.

To maintain the aesthetic quality of your 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. Locations of these secondary disinfection plants are shown on the map of our water supply system on page 6.

Private water services

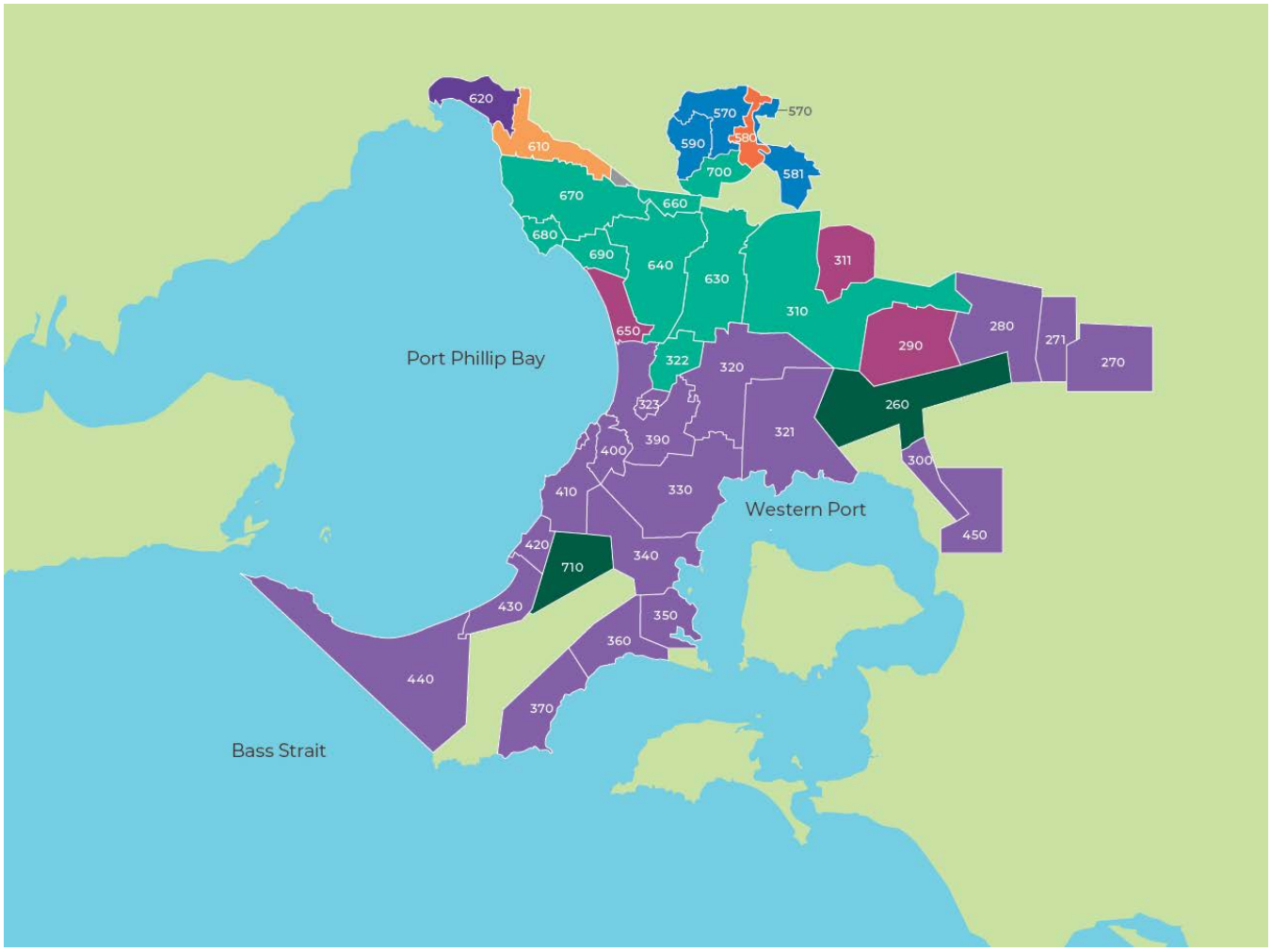
Private water services, which have a 'supply by agreement' with us, are included in relevant localities. This is because the water supplied through your private connection is still guaranteed to meet the requirements of the *Safe Drinking Water Regulations 2015*.

If your private connection is in Cora Lynn (locality no. 260) or Moorooduc (locality no. 710), you're supplied from large transfer pipelines (the Tarago–Westernport Pipeline for Cora Lynn and the Bittern–Dromana Pipeline for Moorooduc). 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.

If you're one of our customers who receive water from the Bunyip Main Race and Tarago Main Race, your water is supplied from an open channel system from the Bunyip and/or Tarago rivers. It's untreated and should only be used for stock and domestic purposes, as detailed in the individual supply agreement you have with us to provide you with water. 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 your water bill and on any Section 32 agreement for land transfer.

Are you a customer in Gembrook or on Old Menzies Creek Road in Selby? Your water is supplied directly from Yarra Valley Water mains and sources. We notify you individually when you move in.

Water localities map



Our water localities

Water sampling locality number		Water sampling locality name	Towns/suburbs supplied	Population*
	360	Balnarring	Balnarring, Bittern, Merricks, Merricks Beach, Somers	6,470
	570	Bayswater	Bayswater, Boronia, Ferntree Gully, Knoxfield, Upper Ferntree Gully, The Basin, Wantirna, Wantirna South	71,810
	680	Beaumaris	Beaumaris, Black Rock, Cheltenham	30,920
	581	Belgrave	Belgrave, Belgrave Heights, Belgrave South, Selby, Upper Ferntree Gully, Tecoma, Upwey	15,920
	310	Berwick	Beaconsfield, Berwick, Nar Nar Goon, Narre Warren, Narre Warren South, Narre Warren North, Officer, Pakenham	119,950
	350	Bittern	Bittern, Bittern West, Crib Point, HMAS Cerberus	6,050
	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	234,600
	270	Bunyip	Bunyip, Longwarry	4,400
	322	Carrum Downs	Carrum Downs, Skye, Sandhurst	30,850
	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	191,520
	650	Chelsea	Aspendale, Aspendale Gardens, Bonbeach, Carrum, Chelsea, Chelsea Heights, Edithvale, Patterson Lakes	53,520
	260	Cora Lynn	Bunyip, Koo Wee Rup, Nar Nar Goon, Tooradin	140
	320	Cranbourne	Cranbourne, Centreville, Cranbourne East, Cranbourne North, Cranbourne West,	93,880

			Cranbourne South, Langwarrin, Pearcedale	
	640	Dandenong	Bangholme, Dandenong, Dandenong South, Dingley Village, Doveton, Keysborough, Noble Park, Springvale South	131,390
	660	Dandenong North	Clayton, Dandenong North, Noble Park North, Springvale	27,580
	321	Devon Meadows	Clyde, Fiveways, Warneet, Cranbourne, Blind Bight, Cannons Creek, Tooradin, Warneet	10,160
	430	Dromana	Dromana, McCrae, Mt Martha, Safety Beach	22,950
	580	Ferntree Gully	Boronia, Ferntree Gully, The Basin, Upper Ferntree Gully	23,300
	390	Frankston	Baxter, Carrum Downs, Cranbourne, Frankston, Frankston North, Langwarrin, Seaford, Pearcedale	96,170
	400	Frankston South	Baxter, Frankston, Frankston South, Mt Eliza	14,430
	271	Garfield	Garfield, Garfield North	1,860
	630	Hallam	Dandenong South, Doveton, Endeavour Hills, Eumemmerring, Hallam, Hampton Park, Lynbrook, Lyndhurst, Narre Warren North	72,090
	340	Hastings	Bittern, Hastings	11,750
	323	Karingal	Frankston	11,510
	300	Koo Wee Rup	Koo Wee Rup	3,290
	450	Lang Lang	Lang Lang	2,050
	710	Moorooduc	Dromana, Moorooduc, Tuerong	130
	690	Mordialloc	Braeside, Dingley Village, Mentone, Mordialloc, Parkdale, Waterways	34,930
	410	Mornington	Mt Eliza, Mornington, Mt Martha, Osborne	48,600
	420	Mt Martha	Mt Martha	10,680
	290	Pakenham	Pakenham	45,060
	700	Rowville	Lysterfield, Rowville	33,800
	440	Rye	Blairgowrie, Cape Schanck, Fingal, McCrae, Portsea, Rosebud, Rosebud South, Rosebud West, Rye, Sorrento, St Andrews Beach, Tootgarook	82,470
	370	Shoreham	Flinders, Point Leo, Shoreham	3,710
	330	Somerville	Pearcedale, Somerville, Tyabb	17,250

	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	232,280
	280	Tynong	Nar Nar Goon, Nar Nar Goon North, Tynong	1,660
	311	Upper Beaconsfield	Beaconsfield, Guys Hill, Officer, Upper Beaconsfield	2,170
	590	Wantirna	Knoxfield, Scoresby, Wantirna, Wantirna South	26,100

*The population for each locality is derived by taking the number of property connections and averaging against the total population figure.

Treatment process across localities

Water sampling locality number		Source supply	Treatment process^	Added substances
	290, 311, 650	Cardinia Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
		Desalination plant supplying into Cardinia Reservoir	Coagulation	Ferric sulphate Sulfuric acid PolyDADMAC
			Filtration	
			Reverse osmosis	Antiscalant Caustic soda
			Remineralisation	Hydrated lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Sodium hypochlorite
			Sludge thickening	Ferric sulphate Polyacrylamide
			Membrane preservation	Sodium bisulfite
		Localised secondary disinfection	Secondary disinfection	Sodium hypochlorite
	310, 322, 630, 640, 660, 670, 680, 690, 700	Cardinia Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
		Desalination plant supplying into Cardinia Reservoir	Coagulation	Ferric sulphate Sulfuric acid PolyDADMAC
			Filtration	
			Reverse osmosis	Antiscalant Caustic soda
			Remineralisation	Hydrated lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Sodium hypochlorite
			Sludge thickening	Ferric sulphate Polyacrylamide
			Membrane preservation	Sodium bisulfite
	260#, 710*		Reservoir aeration	

		Tarago Reservoir and WTP	Organics removal	Powdered activated carbon
			Iron/manganese removal/algae control	Potassium permanganate
			Coagulation/flocculation	Lime Carbon dioxide Aluminium chlorohydrate PolyDADMAC
			Dissolved air flotation filtration (DAFF)	
			UV irradiation	
			pH correction	Lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Chlorine (gas)
			Sludge thickening/dewatering	Polyacrylamide
			Secondary disinfection	Sodium hypochlorite
		Cardinia Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
		Desalination plant supplying into Cardinia Reservoir	Coagulation	Ferric sulphate Sulfuric acid PolyDADMAC
			Filtration	
			Reverse osmosis	Antiscalant Caustic soda
			Remineralisation	Hydrated lime Carbon dioxide

			Fluoridation	Fluorosilicic acid
			Disinfection	Sodium hypochlorite
			Sludge thickening	Ferric sulphate Polyacrylamide
			Membrane preservation	Sodium bisulfite
	270, 271, 280, 300, 320, 321, 323, 330, 340, 350, 360, 370, 390, 400, 410, 420, 430, 440, 450	Tarago Reservoir and WTP	Reservoir aeration	
			Organics removal	Powdered activated carbon
			Iron/manganese removal/algae control	Potassium permanganate
			Coagulation/flocculation	Lime Carbon dioxide Aluminium chlorohydrate PolyDADMAC
			Dissolved air flotation filtration (DAFF)	
			UV irradiation	
			pH correction	Lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Chlorine (gas)
			Sludge thickening/dewatering	Polyacrylamide
			Secondary disinfection	Sodium hypochlorite
		Cardinia Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime

		Desalination plant supplying into Cardinia Reservoir	Coagulation	Ferric sulphate Sulfuric acid PolyDADMAC
			Filtration	
			Reverse osmosis	Antiscalant Caustic soda
			Remineralisation	Hydrated lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Sodium hypochlorite
			Sludge thickening	Ferric sulphate Polyacrylamide
			Membrane preservation	Sodium bisulfite
		Localised pH correction and secondary disinfection	pH correction	Carbon dioxide
			Secondary disinfection	Sodium hypochlorite
	580	Silvan Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
	620	Cardinia Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
		Desalination plant supplying into Cardinia Reservoir	Coagulation	Ferric sulphate Sulfuric acid PolyDADMAC
			Filtration	
			Reverse osmosis	Antiscalant Caustic soda
			Remineralisation	Hydrated lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Sodium hypochlorite
			Sludge thickening	Ferric sulphate Polyacrylamide
			Membrane preservation	Sodium bisulfite
		Silvan Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
			Reservoir aeration	

		Sugarloaf Reservoir and Winneke WTP	Coagulation/flocculation	Lime Aluminium sulphate Polyacrylamide
			Clarification/filtration	
			Disinfection	Chlorine (gas)
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
			Sludge thickening/dewatering	Polyacrylamide
			Secondary disinfection	Sodium hypochlorite
	570, 581, 590	Silvan Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
		Localised secondary disinfection	Secondary disinfection	Sodium hypochlorite
	610	Silvan Reservoir and WTP	Primary disinfection	Gaseous chlorine
			Fluoridation	Fluorosilicic acid
			pH correction	Lime
		Cardinia Reservoir and WTP	Primary disinfection	Primary disinfection
			Fluoridation	Fluorosilicic acid
			pH correction	pH correction
		Desalination plant supplying into Cardinia Reservoir	Coagulation	Ferric sulphate Sulfuric acid PolyDADMAC
			Filtration	
			Reverse osmosis	Antiscalant Caustic soda
			Remineralisation	Hydrated lime Carbon dioxide
			Fluoridation	Fluorosilicic acid
			Disinfection	Sodium hypochlorite
			Sludge thickening	Ferric sulphate Polyacrylamide
			Membrane preservation	Sodium bisulfite

Comments

#Locality 260 supplied directly from the Tarago–Westernport Pipeline without secondary disinfection. Customers supplied by private water services and supply-by-agreement conditions.

* Locality 710 supplied directly from the Bittern–Dromana Pipeline without secondary disinfection. Customers supplied by private water services and supply-by-agreement conditions.

There were no drinking water treatment process issues experienced during the reporting period for 2018-19.

^As South East Water is a water supplier, for a description of treatment processes refer to Melbourne Water's annual report.

It matters to you it matters to us

We're serious about making sure your water is safe to drink.

Our monitoring starts when water is transferred from Melbourne Water to us. From there, it's sampled every step of the way, right up to your home or businesses so that you can rely on us for clean and dependable water.

So when you turn on a tap, or press go on your dishwasher, you can be sure that everything's as it should be.

How we manage risk and protect your water

Risk Management Plan

This robust plan helps us to identify and manage risks to your 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 your water.

A key component of this framework is our HACCP Plan, which details the specific procedures and corrective measures we use to protect your water quality.

We work in collaboration with Melbourne Water to optimise and integrate our HACCP Plan with theirs. This makes sure that water quality risks are considered and managed along the whole water supply journey - from their catchments to your taps.

Proactive management of our water supply

We're always thinking ahead and managing our water supply in a proactive way. We have several supporting programs linked to our HACCP Plan; you can read about some in this report.

Metropolitan water industry response plan

In partnership with Melbourne Water, Yarra Valley Water and City West Water, we help to maintain 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. This plan is regularly tested for accuracy and effectiveness and has established a Melbourne-wide protocol for all four companies to follow when an unauthorised entry or security breach occurs at a water asset.

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.

Zero and Inadequate Disinfection Events document

The Zero and Inadequate Disinfection Events document supports us if there's a primary disinfection plant failure at each of Melbourne Water's primary disinfection plants. The protocol follows a scientific approach, based on quantitative microbial risk assessment. This statistical technique uses existing water quality data to confirm appropriate response times to chlorinator outages.

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 you 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 designed so that we can allocate and prioritise renewal or maintenance works. During the 2018-19 financial year we renewed more than 34 kilometres of water mains through this program.

Backflow prevention program

This program requires all new properties connecting to our water supply system to install an appropriate backflow prevention device, relevant to the level of risk, so that contaminants don't enter the system. We maintain a system to ensure all industrial and commercial properties have the appropriate device installed.

Hydrant permit system

We operate a HydroTrak® system where registered users can access our water supply system at designated points. A HydroTrak® device is installed on registered users' vehicles and tracks who is using water, 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 dirty water issues associated with unauthorised hydrant use. Registered hydrant users can also 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 three kilometres of each other. It also helps us identify and investigate when we receive three 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. (You can read more about this on page 62).

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, drones are used to inspect and assist in assessing the condition of tanks; reactively, they're used to inspect bird proofing and roof integrity.

Product quality notification

Our water quality team and other key areas of the business 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 *Australian Drinking Water Guidelines 2011*. This ensures we strive for excellence in water quality, rather than simply satisfying the *Australian Drinking Water Guidelines 2011* criteria.

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 Act, determined in consultation with DHHS.

The Bunyip Main Race and Tarago Main Race are open channels, owned and operated by Melbourne Water. The water is not disinfected or treated in any way and customers draw water into their properties for non-drinking uses (e.g. stock and domestic purposes). Its distinctive colour also makes it clear that this water isn't suitable for drinking. So we can 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.

We outline risk management procedures relating to non-drinking water from the Bunyip Main Race and Tarago Main Race in our HACCP Plan. This covers potential physical, chemical and biological hazards, as well as preventative measures in place to minimise these risks.

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 2018-19 we collected around 8,000 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. There were no significant changes to the monitoring program from previous years.

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 *Australian Drinking Water Guidelines 2011*. The samples were collected across the whole system, covering all areas within the 39 water sampling localities.

In 2018–19 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.

Section 22 of the Act requires us to notify DHHS in instances where we suspect contamination of our drinking water that may pose a possible health risk or cause widespread public complaint. There were no events that required Section 22 notifications to DHHS in 2018–19.

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 you and all of our customers at southeastwater.com.au/waterquality. 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 you can search for an address and access the most recent result from sample taps in your 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*.

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

Issues with potential to impact water supply

In early 2019 there were bushfires in the Thomson and Upper Yarra catchments. Melbourne Water managed two incidents relating to the fires including significant monitoring and modelling to ensure water quality. Melbourne Water are continuing to monitor but have seen no adverse impacts on water quality as a result of these fires.

Water quality results for 2018–19

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

Tables are provided for:

Drinking water quality standards specified in Schedule 2 of the Regulations	Including *Escherichia coli (E. coli)*, trihalomethanes and turbidity.	Pages 24–31
Other water quality standards	Including fluoride, copper, lead, manganese, inorganic compounds, organic compounds, polycyclic aromatic hydrocarbons and pesticides.	Pages 32–50
Aesthetic water quality	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. All samples of drinking water collected are found to contain no *Escherichia coli* per 100 millilitres of drinking water, with the exception of false positive samples.

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 Number	Locality Name					
360	Balnarring	Weekly	164	0	0	0
570	Bayswater	Daily	280	0	0	0
680	Beaumaris	Weekly	105	0	0	0
581	Belgrave	Weekly	273	0	0	0
310	Berwick	Daily	343	0	0	0
350	Bittern	Weekly	140	0	0	0
670	Brighton/ Heatherton	Daily	458	0	0	0
270	Bunyip*	Weekly	164	0	0	0
322	Carrum Downs	Weekly	104	0	0	0
610	Caulfield	Daily	399	0	0	0
650	Chelsea	Weekly	181	0	0	0
260	Cora Lynn*	Weekly	164	0	0	0
320	Cranbourne	Weekly	186	0	0	0
640	Dandenong	Daily	328	0	0	0
660	Dandenong North	Weekly	118	0	0	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 Number	Locality Name					
321	Devon Meadows	Weekly	105	0	0	0
430	Dromana	Daily	273	0	0	0
580	Ferntree Gully	Weekly	104	0	0	0
390	Frankston	Daily	275	0	0	0
400	Frankston South	Daily	319	0	0	0
271	Garfield*	Weekly	141	0	0	0
630	Hallam	Daily	315	0	0	0
340	Hastings	Weekly	116	0	0	0
323	Karingal	Weekly	134	0	0	0
300	Koo Wee Rup	Weekly	104	0	0	0
450	Lang Lang	Weekly	184	0	0	0
710	Moorooduc	Weekly	116	0	0	0
690	Mordialloc	Weekly	113	0	0	0
410	Mornington	Weekly	150	0	0	0
420	Mount Martha	Weekly	178	0	0	0
290	Pakenham	Weekly	188	0	0	0
700	Rowville	Weekly	137	0	0	0
440	Rye	Daily	301	0	0	0
370	Shoreham	Weekly	140	0	0	0
330	Somerville	Weekly	152	0	0	0
620	South Melbourne	Daily	445	0	0	0
280	Tynong*	Weekly	128	0	0	0
311	Upper Beaconsfield	Weekly	164	0	0	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 Number	Locality Name					
590	Wantirna	Weekly	104	0	0	0
	Business total		7793	0	0	0

Note: Sample numbers per locality are based on the population, with more samples required with greater population as per the *Australian Drinking Water Guidelines 2011* recommendations.

*See page 60.

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 0.100mg/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	0.059	0.074	0
570	Bayswater	Monthly	12	0.074	0.100	0
680	Beaumaris	Monthly	12	0.037	0.045	0
581	Belgrave	Monthly	12	0.077	0.100	0
310	Berwick	Monthly	12	0.032	0.042	0
350	Bittern	Monthly	12	0.063	0.078	0
670	Brighton/ Heatherton	Monthly	12	0.048	0.074	0
270	Bunyip	Monthly	12	0.057	0.081	0
322	Carrum Downs	Monthly	12	0.031	0.038	0
610	Caulfield	Monthly	12	0.058	0.069	0
650	Chelsea	Monthly	12	0.039	0.046	0
260	Cora Lynn	Monthly	12	0.051	0.073	0
320	Cranbourne	Monthly	12	0.032	0.047	0
640	Dandenong	Monthly	12	0.046	0.081	0
660	Dandenong North	Monthly	12	0.067	0.078	0
321	Devon Meadows	Monthly	12	0.036	0.042	0
430	Dromana	Monthly	12	0.068	0.080	0
580	Ferntree Gully	Monthly	12	0.064	0.088	0
390	Frankston	Monthly	12	0.039	0.057	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					
400	Frankston South	Monthly	12	0.049	0.074	0
271	Garfield	Monthly	12	0.054	0.080	0
630	Hallam	Monthly	12	0.032	0.038	0
340	Hastings	Monthly	12	0.066	0.092	0
323	Karingal	Monthly	12	0.042	0.049	0
300	Koo Wee Rup	Monthly	12	0.067	0.085	0
450	Lang Lang	Monthly	12	0.083	0.096	0
710	Moorooduc	Monthly	12	0.062	0.074	0
690	Mordialloc	Monthly	12	0.039	0.048	0
410	Mornington	Monthly	12	0.070	0.092	0
420	Mount Martha	Monthly	12	0.070	0.085	0
290	Pakenham	Monthly	12	0.036	0.060	0
700	Rowville	Monthly	12	0.053	0.100	0
440	Rye	Monthly	12	0.075	0.099	0
370	Shoreham	Monthly	12	0.050	0.061	0
330	Somerville	Monthly	12	0.038	0.049	0
620	South Melbourne	Monthly	12	0.060	0.085	0
280	Tynong	Monthly	12	0.060	0.081	0
311	Upper Beaconsfield	Monthly	12	0.042	0.045	0
590	Wantirna	Monthly	12	0.071	0.096	0
	Business total		468	0.054	0.100	0

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	95th percentile	Number of 95th percentile of results in any 12 months above standard (s.18)
Locality Number	Locality Name					
360	Balnarring	Weekly	52	0.7	0.65	0
570	Bayswater	Weekly	52	1.3	1.25	0
680	Beaumaris	Weekly	52	1.6	0.85	0
581	Belgrave	Weekly	53	1.3	1.10	0
310	Berwick	Weekly	52	0.8	0.80	0
350	Bittern	Weekly	52	0.7	0.60	0
670	Brighton/ Heatherton	Weekly	52	1.2	1.05	0
270	Bunyip*	Weekly	64	0.2	0.10	0
322	Carrum Downs	Weekly	52	1.0	0.80	0
610	Caulfield	Weekly	52	1.2	1.15	0
650	Chelsea	Weekly	52	0.9	0.80	0
260	Cora Lynn*	Weekly	64	1.9	0.10	0
320	Cranbourne	Weekly	76	1.2	0.90	0
640	Dandenong	Weekly	52	1.1	0.95	0
660	Dandenong North	Weekly	64	2.3	1.30	0
321	Devon Meadows	Weekly	52	2.4	0.90	0
430	Dromana	Weekly	52	0.8	0.50	0
580	Ferntree Gully	Weekly	52	1.3	1.10	0
390	Frankston	Weekly	53	1.3	0.80	0

Water Sampling Locality		Frequency of sampling	Number of samples	Maximum NTU	95th percentile	Number of 95th percentile of results in any 12 months above standard (s.18)
Locality Number	Locality Name					
400	Frankston South	Weekly	52	1.3	0.80	0
271	Garfield*	Weekly	52	0.1	0.10	0
630	Hallam	Weekly	52	0.9	0.85	0
340	Hastings	Weekly	52	0.7	0.50	0
323	Karingal	Weekly	52	0.9	0.85	0
300	Koo Wee Rup	Weekly	52	0.3	0.10	0
450	Lang Lang	Weekly	52	0.4	0.15	0
710	Moorooduc	Weekly	52	0.7	0.50	0
690	Mordialloc	Weekly	52	0.9	0.80	0
410	Mornington	Weekly	52	0.6	0.50	0
420	Mount Martha	Weekly	52	0.6	0.45	0
290	Pakenham	Weekly	52	0.9	0.90	0
700	Rowville	Weekly	52	1.2	1.00	0
440	Rye	Weekly	52	0.7	0.50	0
370	Shoreham	Weekly	52	5.5	0.60	0
330	Somerville	Weekly	52	1.7	0.80	0
620	South Melbourne	Weekly	52	1.5	1.20	0
280	Tynong*	Weekly	52	0.5	0.10	0
311	Upper Beaconsfield	Weekly	52	1.2	0.80	0
590	Wantirna	Weekly	52	1.2	1.20	0
	Business total		2090	5.5	1.20	0

*See page 60.

Compliance summary for drinking water quality standards

For this reporting year, and the two 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		
	2018-19	2017-18	2016–17	2018-19	2017-18	2016-17
Escherichia coli	100%	100%	100%	100%	100%	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 2018-19.

All data in the following tables has been compared to the previous two 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 three-year period. Results for 2016-17 and 2017-18 are available in our respective annual water quality reports.

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.

Fluoride is added 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 South East Water's service area. Localities supplied from each fluoridation plant are listed in the table on pages 12–17.

Water Sampling Locality		Number of samples tested	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	3	0.69	0.75	0.83	0
570	Bayswater	13	0.63	0.77	0.86	0
680	Beaumaris	6	0.41	0.71	0.85	0
581	Belgrave	13	0.43	0.73	0.89	0
310	Berwick	5	0.77	0.80	0.85	0
350	Bittern	3	0.59	0.71	0.79	0
670	Brighton/ Heatherton	26	0.46	0.76	0.87	0
270	Bunyip	4	0.84	0.86	0.87	0
322	Carrum Downs	6	0.19	0.69	0.82	0
610	Caulfield	26	0.06	0.74	0.85	0
650	Chelsea	5	0.43	0.67	0.81	0
260	Cora Lynn	4	0.08	0.66	0.87	0
320	Cranbourne	9	0.29	0.69	0.90	0
640	Dandenong	5	0.67	0.76	0.85	0
660	Dandenong North	26	0.35	0.78	0.87	0
321	Devon Meadows	8	0.21	0.64	0.88	0
430	Dromana	3	0.76	0.80	0.84	0
580	Ferntree Gully	13	<0.05	0.76	0.92	0
390	Frankston	9	0.55	0.74	0.82	0

Water Sampling Locality		Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality Number	Locality Name					
400	Frankston South	8	0.45	0.73	0.84	0
271	Garfield	4	0.79	0.83	0.85	0
630	Hallam	5	0.64	0.73	0.87	0
340	Hastings	3	0.80	0.83	0.85	0
323	Karingal	9	0.53	0.74	0.84	0
300	Koo Wee Rup	3	0.85	0.87	0.89	0
450	Lang Lang	4	0.35	0.73	0.88	0
710	Moorooduc	4	0.43	0.70	0.81	0
690	Mordialloc	5	0.60	0.77	0.85	0
410	Mornington	3	0.78	0.80	0.81	0
420	Mount Martha	3	0.77	0.81	0.87	0
290	Pakenham	5	0.67	0.76	0.82	0
700	Rowville	5	0.56	0.78	0.86	0
440	Rye	4	0.76	0.79	0.80	0
370	Shoreham	4	0.61	0.77	0.84	0
330	Somerville	9	0.24	0.73	0.83	0
620	South Melbourne	26	0.58	0.75	0.86	0
280	Tynong	4	0.84	0.85	0.86	0
311	Upper Beaconsfield	5	0.72	0.80	0.85	0
590	Wantirna	13	0.57	0.77	0.90	0
	Business total	313	<0.05	0.75	0.92	0

Chlorine

We met the *Australian Drinking Water Guidelines 2011 (ADWG)* criteria for chlorine, which suggests a health limit of 5 mg/L. Less than 1 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 tested	Minimum (mg/L)	Average(mg/L)	Maximum(mg/L)	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
360	Balnarring	Weekly	164	<0.05	0.32	0.80	Yes
570	Bayswater	Daily	280	<0.05	0.16	0.64	Yes
680	Beaumaris	Weekly	105	0.07	0.35	0.85	Yes
581	Belgrave	Daily	273	<0.05	0.12	0.76	Yes
310	Berwick	Daily	343	<0.05	0.48	0.97	Yes
350	Bittern	Weekly	140	<0.05	0.35	0.73	Yes
670	Brighton/ Heatherton	Daily	458	<0.05	0.34	0.76	Yes
270	Bunyip	Weekly	164	<0.05	0.32	0.75	Yes
322	Carrum Downs	Weekly	128	<0.05	0.45	0.88	Yes
610	Caulfield	Daily	399	<0.05	0.25	0.67	Yes
650	Chelsea	Weekly	181	0.09	0.33	0.65	Yes
260	Cora Lynn	Weekly	164	<0.05	0.31	0.93	Yes
320	Cranbourne	Weekly	186	<0.05	0.51	0.94	Yes
640	Dandenong	Daily	328	<0.05	0.32	0.83	Yes
660	Dandenong North	Weekly	118	<0.05	0.28	1.00	Yes
321	Devon Meadows	Weekly	105	<0.05	0.33	0.73	Yes
430	Dromana	Daily	273	<0.05	0.27	0.96	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						
580	Ferntree Gully	Weekly	104	<0.05	0.27	0.88	Yes
390	Frankston	Daily	275	<0.05	0.45	0.88	Yes
400	Frankston South	Daily	319	<0.05	0.35	1.80	Yes
271	Garfield	Weekly	141	0.09	0.55	0.87	Yes
630	Hallam	Daily	315	<0.05	0.56	0.99	Yes
340	Hastings	Weekly	116	<0.05	0.56	0.80	Yes
323	Karingal	Weekly	134	0.06	0.28	0.49	Yes
300	Koo Wee Rup	Weekly	104	<0.05	0.54	0.82	Yes
450	Lang Lang	Weekly	184	<0.05	0.30	0.77	Yes
710	Moorooduc	Weekly	116	<0.05	0.64	0.93	Yes
690	Mordialloc	Weekly	113	<0.05	0.12	0.46	Yes
410	Mornington	Weekly	150	<0.05	0.41	1.10	Yes
420	Mount Martha	Weekly	178	<0.05	0.29	0.72	Yes
290	Pakenham	Weekly	188	<0.05	0.55	0.88	Yes
700	Rowville	Weekly	137	<0.05	0.38	1.00	Yes
440	Rye	Daily	312	<0.05	0.42	0.74	Yes
370	Shoreham	Weekly	140	<0.05	0.41	0.81	Yes
330	Somerville	Weekly	152	<0.05	0.25	0.61	Yes
620	South Melbourne	Daily	445	<0.05	0.26	0.62	Yes
280	Tynong	Weekly	128	0.06	0.40	1.10	Yes
311	Upper Beaconsfield	Weekly	164	<0.05	0.19	0.67	Yes
590	Wantirna	Weekly	104	<0.05	0.20	0.80	Yes
	Business total		7828	<0.05	0.35	1.80	Yes

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 tested	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying Yes/No
Locality Number	Locality Name						
581	Belgrave	1	0	<0.001	<0.001	<0.001	Yes
610	Caulfield	1	0	<0.001	<0.001	<0.001	Yes
660	Dandenong North	1	0	<0.001	<0.001	<0.001	Yes
390	Frankston	1	0	<0.001	<0.001	<0.001	Yes
450	Lang Lang	1	0	<0.001	<0.001	<0.001	Yes
290	Pakenham	1	0	<0.001	<0.001	<0.001	Yes
	Business total	6	0	<0.001	<0.001	<0.001	Yes

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 tested	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	1	0	0.011	0.011	0.011	0
581	Belgrave	1	0	0.006	0.006	0.006	0
322	Carrum Downs	1	0	0.012	0.012	0.012	0
610	Caulfield	2	0	0.005	0.011	0.017	0
620	South Melbourne	2	0	0.008	0.016	0.023	0
690	Mordialloc	1	0	0.010	0.010	0.010	0
710	Moorooduc	1	0	0.015	0.015	0.015	0
321	Devon Meadows	1	0	0.005	0.005	0.005	0
580	Ferntree Gully	1	0	0.037	0.037	0.037	0
390	Frankston	1	0	0.005	0.005	0.005	0
271	Garfield	1	0	0.009	0.009	0.009	0
670	Brighton/ Heatherton	2	0	0.008	0.013	0.018	0
340	Hastings	1	0	0.011	0.011	0.011	0
323	Karingal	1	0	0.005	0.005	0.005	0
440	Rye	1	0	0.010	0.010	0.010	0
330	Somerville	1	0	0.015	0.015	0.015	0
630	Hallam	1	0	0.006	0.006	0.006	0
660	Dandenong North	2	0	0.004	0.009	0.014	0
311	Upper Beaconsfield	1	0	0.001	0.001	0.001	0

Water Sampling Locality		Number of samples tested	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						
590	Wantirna	1	0	0.004	0.004	0.004	0
	Business total	24	0	0.001	0.011	0.037	0

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 Yes/No
Locality Number	Locality Name						
570	Bayswater	1	0	<0.001	<0.001	<0.001	Yes
581	Belgrave	1	0	<0.001	<0.001	<0.001	Yes
670	Brighton/ Heatherton	2	0	<0.001	<0.001	<0.001	Yes
322	Carrum Downs	1	0	<0.001	<0.001	<0.001	Yes
610	Caulfield	2	0	<0.001	<0.001	<0.001	Yes
660	Dandenong North	2	0	<0.001	<0.001	<0.001	Yes
321	Devon Meadows	1	0	<0.001	<0.001	<0.001	Yes
580	Ferntree Gully	1	0	<0.001	<0.001	<0.001	Yes
390	Frankston	1	0	<0.001	<0.001	<0.001	Yes
271	Garfield	1	0	<0.001	<0.001	<0.001	Yes
630	Hallam	1	0	<0.001	<0.001	<0.001	Yes
340	Hastings	1	0	<0.001	<0.001	<0.001	Yes
323	Karingal	1	0	<0.001	<0.001	<0.001	Yes
710	Moorooduc	1	0	<0.001	<0.001	<0.001	Yes
690	Mordialloc	1	0	<0.001	<0.001	<0.001	Yes
440	Rye	1	0	<0.001	<0.001	<0.001	Yes
330	Somerville	1	0	<0.001	<0.001	<0.001	Yes
620	South Melbourne	2	0	<0.001	<0.001	<0.001	Yes
311	Upper Beaconsfield	1	0	<0.001	<0.001	<0.001	Yes

Water Sampling Locality		Number of samples tested	Number of non-complying results	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Complying Yes/No
Locality Number	Locality Name						
590	Wantirna	1	0	<0.001	<0.001	<0.001	Yes
	Business total	24	0	<0.001	<0.001	<0.001	Yes

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.

Sampling locations are random and change each year.

Water Sampling Locality		Number of samples tested	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						
360	Balnarring	1	0	0.004	0.004	0.004	0
570	Bayswater	4	0	0.002	0.004	0.005	0
680	Beaumaris	1	0	0.007	0.007	0.007	0
581	Belgrave	3	0	0.004	0.004	0.004	0
310	Berwick	1	0	0.006	0.006	0.006	0
350	Bittern	1	0	0.002	0.002	0.002	0
670	Brighton/ Heatherton	7	0	<0.001	0.004	0.008	0
270	Bunyip	1	0	<0.001	<0.001	<0.001	0
322	Carrum Downs	2	0	<0.001	0.002	0.003	0
610	Caulfield	7	0	0.003	0.005	0.014	0
650	Chelsea	1	0	0.007	0.007	0.007	0
260	Cora Lynn	1	0	<0.001	<0.001	<0.001	0
320	Cranbourne	2	0	0.002	0.004	0.005	0
640	Dandenong	1	0	0.004	0.004	0.004	0
660	Dandenong North	7	0	0.003	0.005	0.011	0
321	Devon Meadows	3	0	0.001	0.003	0.004	0
430	Dromana	1	0	0.002	0.002	0.002	0
580	Ferntree Gully	3	0	0.004	0.005	0.005	0
390	Frankston	2	0	0.002	0.003	0.003	0

Water Sampling Locality		Number of samples tested	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 Number						
400	Frankston South	1	0	0.005	0.005	0.005	0
271	Garfield	1	0	<0.001	<0.001	<0.001	0
630	Hallam	1	0	0.001	0.001	0.001	0
340	Hastings	2	0	0.001	0.002	0.002	0
323	Karingal	2	0	0.001	0.003	0.004	0
450	Lang Lang	1	0	<0.001	<0.001	<0.001	0
710	Moorooduc	1	0	<0.001	<0.001	<0.001	0
690	Mordialloc	2	0	<0.001	0.002	0.002	0
410	Mornington	1	0	0.002	0.002	0.002	0
290	Pakenham	1	0	0.006	0.006	0.006	0
700	Rowville	1	0	0.004	0.004	0.004	0
440	Rye	2	0	<0.001	0.001	0.001	0
370	Shoreham	1	0	0.001	0.001	0.001	0
330	Somerville	3	0	0.001	0.004	0.007	0
620	South Melbourne	7	0	0.003	0.005	0.007	0
311	Upper Beaconsfield	2	0	0.003	0.004	0.004	0
590	Wantirna	3	0	0.004	0.004	0.005	0
	Business total	81	0	<0.001	0.004	0.014	0

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.

Sampling locations are random and change each year.

Water Sampling Locality		Number of samples tested	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	1	0.04	0.04	0.04	0
570	Bayswater	4	<0.02	<0.02	<0.02	0
680	Beaumaris	1	0.05	0.05	0.05	0
581	Belgrave	3	<0.02	<0.02	<0.02	0
310	Berwick	1	0.04	0.04	0.04	0
350	Bittern	1	0.04	0.04	0.04	0
670	Brighton/ Heatherton	7	<0.02	0.05	0.06	0
270	Bunyip	1	<0.02	<0.02	<0.02	0
322	Carrum Downs	2	0.05	0.05	0.05	0
610	Caulfield	7	<0.02	<0.02	<0.02	0
650	Chelsea	1	0.04	0.04	0.04	0
260	Cora Lynn	1	<0.02	<0.02	<0.02	0
320	Cranbourne	2	0.05	0.06	0.06	0
640	Dandenong	1	0.05	0.05	0.05	0
660	Dandenong North	7	<0.02	<0.02	<0.02	0
321	Devon Meadows	3	0.05	0.05	0.06	0
430	Dromana	1	0.03	0.03	0.03	0
580	Ferntree Gully	3	<0.02	<0.02	<0.02	0
390	Frankston	2	0.05	0.05	0.05	0

Water Sampling Locality		Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of samples where standard was not met (s.18)
Locality Number	Locality Name					
400	Frankston South	1	0.05	0.05	0.05	0
271	Garfield	1	<0.02	<0.02	<0.02	0
630	Hallam	1	0.06	0.06	0.06	0
340	Hastings	2	0.03	0.03	0.03	0
323	Karingal	2	0.05	0.05	0.05	0
450	Lang Lang	1	<0.02	<0.02	<0.02	0
710	Moorooduc	1	0.03	0.03	0.03	0
690	Mordialloc	2	<0.02	0.04	0.05	0
410	Mornington	1	0.03	0.03	0.03	0
290	Pakenham	1	0.05	0.05	0.05	0
700	Rowville	1	<0.02	<0.02	<0.02	0
440	Rye	2	<0.02	<0.02	<0.02	0
370	Shoreham	1	0.04	0.04	0.04	0
330	Somerville	3	0.05	0.05	0.06	0
620	South Melbourne	7	<0.02	<0.02	<0.02	0
311	Upper Beaconsfield	2	0.05	0.05	0.05	0
590	Wantirna	3	<0.02	<0.02	<0.02	0
	Business total	81	<0.02	0.03	0.06	0

Inorganic parameters

The following tables summarise the results of all the other 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 tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	ADWG value	Number of samples where standard was not met (s.18)
Aluminium	24	<0.01	0.05	0.10	0.2	0
Antinomy	6	<0.001	<0.001	<0.001	0.003	0
Barium	6	0.011	0.014	0.018	2	0
Beryllium	6	<0.001	<0.001	<0.001	0.06	0
Cadmium	6	<0.0002	<0.0002	<0.0002	0.002	0
Chromium	6	<0.001	<0.001	<0.001	0.05	0
Cyanide	6	<0.005	<0.005	<0.005	0.08	0
Mercury	6	<0.0001	<0.0001	<0.0001	0.001	0
Molybdenum	6	<0.001	<0.001	<0.001	0.05	0
Nickel	6	<0.001	<0.001	<0.001	0.02	0
Nitrate	24	0.04	0.14	0.28	50	0
Nitrite	24	<0.002	<0.002	<0.002	3	0
Selenium	6	<0.001	<0.001	<0.001	0.01	0
Sulphate	6	1.0	1.7	2.6	500	0

Organic parameters

Parameter	Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	ADWG value	Number of samples where standard was not met (s.18)
Trihalomethanes						
Dibromochloromethane	468	<0.001	0.004	0.015	N/A	N/A
Bromoform	468	<0.001	0.001	0.002	N/A	N/A
Dichlorobromomethane	468	<0.005	0.013	0.033	N/A	N/A
Chloroform	468	0.017	0.037	0.095	N/A	N/A
Chlorophenols						
2-chlorophenol	24	<0.001	<0.001	<0.001	0.3	0
2,4-dichlorophenol	24	<0.001	<0.001	<0.001	0.2	0
2,4,6-trichlorophenol	24	<0.001	<0.001	<0.001	0.02	0
Pentachlorophenol	24	<0.001	<0.001	<0.001	0.01	0
Polycyclic aromatic hydrocarbons						
Benzo(a)pyrene	11	<0.000002	<0.000002	<0.00001	0.00001	0
Volatile organic compounds						
Benzene	24	<0.001	<0.001	<0.001	0.001	0
Carbontetrachloride	24	<0.001	<0.001	<0.001	0.003	0
Chlorobenzene	24	<0.001	<0.001	<0.001	0.3	0
1,2-dichlorobenzene	24	<0.001	<0.001	<0.001	1.5	0
1,3-dichlorobenzene	24	<0.001	<0.001	<0.001	0.02	0
1,4-dichlorobenzene	24	<0.001	<0.001	<0.001	0.04	0
1,1-dichloroethane	24	<0.001	<0.001	<0.001	N/A	N/A
1,2-dichloroethane	24	<0.001	<0.001	<0.001	0.003	0
1,1-dichloroethene	24	<0.001	<0.001	<0.001	0.03	0
cis-1,2-dichloroethene	24	<0.001	<0.001	<0.001	0.06	0
trans-1,2-dichloroethene	24	<0.001	<0.001	<0.001	0.06	0

Parameter	Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	ADWG value	Number of samples where standard was not met (s.18)
cis-1,3-dichloropropene	24	<0.001	<0.001	<0.001	0.1	0
trans-1,3-dichloropropene	24	<0.001	<0.001	<0.001	0.1	0
Ethylbenzene	24	<0.001	<0.001	<0.001	0.3	0
Styrene	24	<0.001	<0.001	<0.001	0.03	0
Tetrachloroethene	24	<0.001	<0.001	<0.001	0.05	0
Toluene	24	<0.001	<0.001	<0.001	0.8	0
1,2,3-trichlorobenzene	24	<0.001	<0.001	<0.001	0.03	0
1,2,4-trichlorobenzene	24	<0.001	<0.001	<0.001	0.03	0
o-Xylene	24	<0.001	<0.001	<0.001	0.6	0
m&p-Xylene	24	<0.002	<0.002	<0.002	0.6	0
Pesticides						
2,4,5-T	6	<0.00001	<0.00001	<0.00001	0.1 mg/L	0
2,4,6-T	6	<0.00001	<0.00001	<0.00001	N/A	N/A
2,4-D	6	<0.00001	<0.00001	<0.00001	0.03 mg/L	0
2,4-DB	6	<0.00001	<0.00001	<0.00001	N/A	N/A
2,6-D	6	<0.00001	<0.00001	<0.00002	N/A	N/A
4-CPA	6	<0.00001	<0.00002	<0.00006	N/A	N/A
Aldrin	6	< 0.00001	< 0.00001	< 0.00001	0.0003 mg/L	0
Ametryn	6	< 0.002	< 0.002	< 0.002	0.07 mg/L	0
Atrazine	6	< 0.002	< 0.002	< 0.002	0.02 mg/L	0
Bentazon	6	<0.00001	<0.00001	<0.00001	0.4 mg/L	0
BHC (Alpha Isomer)	6	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
BHC (Beta Isomer)	6	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
BHC (Delta Isomer)	6	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
Bromoxynil	6	<0.00001	<0.00001	<0.00002	0.01 mg/L	0

Parameter	Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	ADWG value	Number of samples where standard was not met (s.18)
Chlordane	6	< 0.00001	< 0.00001	< 0.00001	0.002 mg/L	0
cis-Chlordane	6	< 0.00001	< 0.00001	< 0.00001	0.002 mg/L	0
Clopyralid	6	<0.00005	<0.00005	<0.00005	2 mg/L	0
DDD	6	< 0.00006	< 0.00006	< 0.00006	N/A	N/A
DDE	6	< 0.00006	< 0.00006	< 0.00006	N/A	N/A
DDT	6	< 0.00006	< 0.00006	< 0.00006	0.009 mg/L	0
Dicamba	6	<0.00001	<0.00001	<0.00001	0.1 mg/L	0
Dichlorprop	6	<0.00001	<0.00001	<0.00001	0.1 mg/L	0
Dieldrin	6	< 0.00001	< 0.00001	< 0.00001	0.0003 mg/L	0
Dinoseb	6	<0.00001	<0.00001	<0.00001	N/A	N/A
Endosulphan I	6	< 0.00005	< 0.00005	< 0.00005	0.02 mg/L	0
Endosulphan II	6	< 0.00005	< 0.00005	< 0.00005	0.02 mg/L	0
Endosulphan Sulphate	6	<0.00005	<0.00005	<0.00005	2 mg/L	0
Endrin	6	< 0.0001	< 0.0001	< 0.0001	N/A	N/A
Endrin Ketone	6	< 0.00005	< 0.00005	< 0.00005	N/A	N/A
Endrin Aldehyde	6	< 0.0001	< 0.0001	< 0.0001	N/A	N/A
Fluroxypyr	6	<0.00001	<0.00001	<0.00001	N/A	N/A
Glyphosate	6	< 0.03	< 0.03	< 0.03	1 mg/L	0
Heptachlor	6	< 0.00005	< 0.00005	< 0.00005	0.0003 mg/L	0
Heptachlor Epoxide	6	< 0.00005	< 0.00005	< 0.00005	0.0003 mg/L	0
Hexachlorobenzene	6	< 0.000002	< 0.000002	< 0.000002	N/A	N/A
Lindane	6	< 0.00005	< 0.00005	< 0.00005	0.01 mg/L	0
MCPA	6	<0.00001	<0.00001	<0.00001	0.04 mg/L	0
MCPB	6	<0.00001	<0.00001	<0.00001	N/A	N/A
Mecoprop	6	<0.00001	<0.00001	<0.00001	N/A	N/A

Parameter	Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	ADWG value	Number of samples where standard was not met (s.18)
Methoxychlor	6	< 0.0002	< 0.0002	< 0.0002	0.3 mg/L	0
Oxy-Chlordane	6	< 0.00001	< 0.00001	< 0.00001	0.002 mg/L	0
Picloram	6	<0.0001	<0.0001	<0.0001	0.3 mg/L	0
Prometon	6	< 0.002	< 0.002	< 0.002	N/A	N/A
Prometryn	6	< 0.002	< 0.002	< 0.002	N/A	N/A
Propazine	6	< 0.002	< 0.002	< 0.002	0.05 mg/L	0
Silvex	6	<0.00001	<0.00001	<0.00001	N/A	N/A
Simazine	6	< 0.002	< 0.002	< 0.002	0.02 mg/L	0
Simetryn	6	< 0.002	< 0.002	< 0.002	N/A	N/A
Terbuthylazine	6	< 0.002	< 0.002	< 0.002	0.01 mg/L	0
Terbutryn	6	< 0.002	< 0.002	< 0.002	0.4 mg/L	0
trans-Chlordane	6	< 0.00001	< 0.00001	< 0.00001	0.002 mg/L	0
Triclopyr	6	<0.00001	<0.00001	<0.00001	0.02 mg/L	0

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

Aesthetic water quality results

Colour, pH, iron, alkalinity and inorganic parameters

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.

These standards are measured against the *Australian Drinking Water Guidelines 2011* 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.

All data in the following tables has been compared to the previous two 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 three-year period. Results for 2016–17 and 2017–18 are available in the respective Annual Water Quality Reports.

Colour (apparent) results

We met the *Australian Drinking Water Guidelines 2011* (ADWG) criteria for colour, which suggests a 'true' colour of 15 Hazen Units (HU), with an upper limit of 25 HU permissible so long as effective disinfection can be maintained.

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 with 25 HU as the limit.

Water Sampling Locality		Frequency of sampling	Number of samples	Minimum HU	Average HU	Maximum HU	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
360	Balnarring	Fortnightly	26	<2	3.2	6	Yes
570	Bayswater	Fortnightly	26	2	6.2	10	Yes
680	Beaumaris	Fortnightly	26	<2	3.7	6	Yes
581	Belgrave	Fortnightly	26	4	6.8	10	Yes
310	Berwick	Fortnightly	26	2	3.6	6	Yes
350	Bittern	Fortnightly	26	<2	3.3	6	Yes
670	Brighton/Heatherton	Fortnightly	26	2	4.8	8	Yes
270	Bunyip	Fortnightly	38	<2	2.4	6	Yes
322	Carrum Downs	Fortnightly	26	<2	3.7	6	Yes
610	Caulfield	Fortnightly	26	2	6.0	8	Yes
650	Chelsea	Fortnightly	26	<2	3.9	8	Yes
260	Cora Lynn	Fortnightly	39	<2	2.6	4	Yes
320	Cranbourne	Fortnightly	50	<2	3.6	8	Yes
640	Dandenong	Fortnightly	26	2	4.7	10	Yes
660	Dandenong North	Fortnightly	38	2	5.6	12	Yes
321	Devon Meadows	Fortnightly	26	2	4.1	6	Yes
430	Dromana	Fortnightly	26	<2	2.8	6	Yes
580	Ferntree Gully	Fortnightly	26	4	7.1	10	Yes

Water Sampling Locality		Frequency of sampling	Number of samples	Minimum HU	Average HU	Maximum HU	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
390	Frankston	Fortnightly	26	<2	3.8	6	Yes
400	Frankston South	Fortnightly	26	<2	3.3	6	Yes
271	Garfield	Fortnightly	26	<2	2.4	4	Yes
630	Hallam	Fortnightly	26	2	3.8	6	Yes
340	Hastings	Fortnightly	26	<2	2.8	6	Yes
323	Karingal	Fortnightly	26	<2	3.7	6	Yes
300	Koo Wee Rup	Fortnightly	26	<2	3.0	9	Yes
450	Lang Lang	Fortnightly	26	<2	2.8	4	Yes
710	Moorooduc	Fortnightly	26	2	2.7	4	Yes
690	Mordialloc	Fortnightly	26	2	3.7	6	Yes
410	Mornington	Fortnightly	26	<2	3.2	8	Yes
420	Mount Martha	Fortnightly	26	<2	2.8	4	Yes
290	Pakenham	Fortnightly	26	2	4.0	6	Yes
700	Rowville	Fortnightly	26	2	4.5	8	Yes
440	Rye	Fortnightly	26	<2	2.7	4	Yes
370	Shoreham	Fortnightly	26	<2	3.8	24	Yes
330	Somerville	Fortnightly	26	<2	3.8	8	Yes
620	South Melbourne	Fortnightly	26	4	5.8	10	Yes
280	Tynong	Fortnightly	26	<2	2.6	6	Yes
311	Upper Beaconsfield	Fortnightly	26	2	3.9	6	Yes
590	Wantirna	Fortnightly	26	4	6.7	10	Yes
	Business total		1075	<2	3.9	24	Yes

**Compliance with the Australian Drinking Water Guidelines 2011means the upper bound of the 95 per cent confidence interval of the mean is less than the guideline value*

pH results

We met the *Australian Drinking Water Guidelines 2011* (ADWG) criteria for pH*, 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.

*pH is a measure of the acidic or alkaline nature of the water.

Water Sampling Locality		Frequency of sampling	Number of samples	Minimum (units)	Average (units)	Maximum (units)	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
360	Balnarring	Fortnightly	26	7.0	7.4	8.0	Yes
570	Bayswater	Fortnightly	26	6.8	7.2	7.6	Yes
680	Beaumaris	Fortnightly	26	6.8	7.2	7.7	Yes
581	Belgrave	Fortnightly	26	6.8	7.4	8.2	Yes
310	Berwick	Fortnightly	26	7.0	7.3	7.8	Yes
350	Bittern	Fortnightly	26	7.1	7.4	7.8	Yes
670	Brighton/ Heatherton	Fortnightly	26	6.7	7.2	8.4	Yes
270	Bunyip	Fortnightly	38	6.7	7.1	7.4	Yes
322	Carrum Downs	Fortnightly	26	6.8	7.3	7.5	Yes
610	Caulfield	Fortnightly	26	6.7	7.1	7.5	Yes
650	Chelsea	Fortnightly	26	6.8	7.2	7.6	Yes
260	Cora Lynn	Fortnightly	39	6.8	7.1	7.4	Yes
320	Cranbourne	Fortnightly	50	6.8	7.2	7.6	Yes
640	Dandenong	Fortnightly	26	6.8	7.2	7.7	Yes
660	Dandenong North	Fortnightly	38	6.6	7.1	7.7	Yes
321	Devon Meadows	Fortnightly	26	6.9	7.4	7.8	Yes
430	Dromana	Fortnightly	26	6.8	7.4	7.7	Yes
580	Ferntree Gully	Fortnightly	26	6.8	7.2	7.6	Yes
390	Frankston	Fortnightly	26	6.8	7.3	7.7	Yes
400	Frankston South	Fortnightly	26	7.0	7.4	7.6	Yes

Water Sampling Locality		Frequency of sampling	Number of samples	Minimum (units)	Average (units)	Maximum (units)	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
271	Garfield	Fortnightly	26	7.0	7.2	7.6	Yes
630	Hallam	Fortnightly	26	6.8	7.2	7.6	Yes
340	Hastings	Fortnightly	26	7.0	7.3	7.6	Yes
323	Karingal	Fortnightly	26	6.9	7.3	7.6	Yes
300	Koo Wee Rup	Fortnightly	26	7.0	7.3	7.5	Yes
450	Lang Lang	Fortnightly	26	7.0	7.3	7.9	Yes
710	Moorooduc	Fortnightly	26	7.0	7.3	7.5	Yes
690	Mordialloc	Fortnightly	26	6.7	7.3	7.6	Yes
410	Mornington	Fortnightly	26	7.0	7.4	7.6	Yes
420	Mount Martha	Fortnightly	26	7.0	7.4	7.8	Yes
290	Pakenham	Fortnightly	26	6.9	7.2	7.6	Yes
700	Rowville	Fortnightly	26	6.9	7.3	8.2	Yes
440	Rye	Fortnightly	26	7.2	7.5	8.4	Yes
370	Shoreham	Fortnightly	26	7.1	7.9	9.0	Yes
330	Somerville	Fortnightly	26	6.8	7.3	7.8	Yes
620	South Melbourne	Fortnightly	26	6.7	7.1	7.5	Yes
280	Tynong	Fortnightly	26	7.0	7.2	7.4	Yes
311	Upper Beaconsfield	Fortnightly	26	6.9	7.4	7.9	Yes
590	Wantirna	Fortnightly	26	6.8	7.2	7.8	Yes
	Business total		1075	6.6	7.3	9.0	Yes

Iron results

We met the *Australian Drinking Water Guidelines 2011* (ADWG) criteria for iron, which suggests an aesthetic limit of 0.3mg/L.

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	Minimum (units)	Average (units)	Maximum (units)	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
360	Balnarring	Fortnightly	26	0.02	0.03	0.05	Yes
570	Bayswater	Fortnightly	26	0.04	0.07	0.11	Yes
680	Beaumaris	Fortnightly	26	0.02	0.04	0.07	Yes
581	Belgrave	Fortnightly	26	0.04	0.07	0.09	Yes
310	Berwick	Fortnightly	26	0.02	0.04	0.07	Yes
350	Bittern	Fortnightly	26	0.02	0.03	0.06	Yes
670	Brighton/Heatherton	Fortnightly	26	0.02	0.05	0.10	Yes
270	Bunyip	Fortnightly	26	<0.01	0.01	0.02	Yes
322	Carrum Downs	Fortnightly	26	0.02	0.04	0.08	Yes
610	Caulfield	Fortnightly	26	0.05	0.07	0.09	Yes
650	Chelsea	Fortnightly	26	0.02	0.05	0.08	Yes
260	Cora Lynn	Fortnightly	27	<0.01	0.01	0.02	Yes
320	Cranbourne	Fortnightly	26	0.02	0.04	0.08	Yes
640	Dandenong	Fortnightly	26	0.02	0.05	0.09	Yes
660	Dandenong North	Fortnightly	26	0.04	0.06	0.10	Yes
321	Devon Meadows	Fortnightly	26	0.02	0.04	0.08	Yes
430	Dromana	Fortnightly	26	0.01	0.02	0.05	Yes
580	Ferntree Gully	Fortnightly	26	0.04	0.07	0.09	Yes
390	Frankston	Fortnightly	26	0.02	0.05	0.09	Yes
400	Frankston South	Fortnightly	26	0.03	0.04	0.07	Yes

Water Sampling Locality		Frequency of sampling	Number of samples	Minimum (units)	Average (units)	Maximum (units)	Complying with ADWG (Yes/No)
Locality Number	Locality Name						
271	Garfield	Fortnightly	26	<0.01	0.01	0.02	Yes
630	Hallam	Fortnightly	26	0.02	0.04	0.08	Yes
340	Hastings	Fortnightly	26	0.01	0.02	0.05	Yes
323	Karingal	Fortnightly	26	0.02	0.04	0.08	Yes
300	Koo Wee Rup	Fortnightly	26	<0.01	0.01	0.04	Yes
450	Lang Lang	Fortnightly	26	<0.01	0.02	0.04	Yes
710	Moorooduc	Fortnightly	26	<0.01	0.02	0.06	Yes
690	Mordialloc	Fortnightly	26	0.03	0.04	0.07	Yes
410	Mornington	Fortnightly	26	0.01	0.02	0.09	Yes
420	Mount Martha	Fortnightly	26	0.01	0.03	0.04	Yes
290	Pakenham	Fortnightly	26	0.02	0.05	0.08	Yes
700	Rowville	Fortnightly	26	0.02	0.05	0.08	Yes
440	Rye	Fortnightly	26	0.01	0.02	0.04	Yes
370	Shoreham	Fortnightly	26	0.02	0.04	0.22	Yes
330	Somerville	Fortnightly	26	0.02	0.04	0.07	Yes
620	South Melbourne	Fortnightly	26	<0.01	0.06	0.09	Yes
280	Tynong	Fortnightly	26	<0.01	0.01	0.08	Yes
311	Upper Beaconsfield	Fortnightly	26	0.02	0.05	0.07	Yes
590	Wantirna	Fortnightly	26	0.04	0.07	0.12	Yes
	Business total		1015	<0.01	0.04	0.22	Yes

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. Alkalinity is measured as mg/L of calcium carbonate equivalent.

Water Sampling Locality		Number of samples tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)
Locality Number	Locality Name				
570	Bayswater	1	13	13	13
581	Belgrave	1	13	13	13
670	Brighton/Heatherton	2	16	17	17
322	Carrum Downs	1	19	19	19
610	Caulfield	2	10	12	14
660	Dandenong North	2	8	11	14
321	Devon Meadows	1	15	15	15
580	Ferntree Gully	1	13	13	13
390	Frankston	1	19	19	19
271	Garfield	1	26	26	26
630	Hallam	1	17	17	17
340	Hastings	1	23	23	23
323	Karingal	1	18	18	18
710	Moorooduc	1	22	22	22
690	Mordialloc	1	18	18	18
440	Rye	1	27	27	27
330	Somerville	1	16	16	16
620	South Melbourne	2	13	14	14
311	Upper Beaconsfield	1	19	19	19
590	Wantirna	1	11	11	11
	Business total	24	8	16	27

Inorganic parameters

These inorganic parameters are measured against the *Australian Drinking Water Guidelines 2011* (ADWG) criteria, aesthetic 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 tested	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	ADWG value	Number of samples where ADWG not met
Ammonia	24	<0.002	0.003	0.006	0.5	0
Calcium	30	2.9	5.3	10.0	N/A	N/A
Chloride	6	7.0	10.8	28.0	250	0
Dissolved oxygen	24	8.4	9.5	10.9	N/A	N/A
Electrical conductivity (uS/cm)	1015	46	88	170	N/A	N/A
Hardness	30	12	19	36	200	0
Magnesium	30	0.6	1.3	2.6	N/A	N/A
Potassium	6	0.6	0.9	2.1	N/A	N/A
Silica	6	4.9	6.3	7.3	80	0
Sodium	6	3.5	5.6	13	180	0
Suspended solids	24	<2	<2	3	N/A	N/A
Total dissolved solids	24	18	44	100	600	0
Total organic carbon	6	1.3	2.2	4.7	N/A	N/A
Total phosphorus	24	<0.005	0.006	0.011	N/A	N/A
Zinc	24	0.001	0.004	0.012	3	0

Regulatory Notifications to the Department of Health and Human Services

Section 22 of the Act requires us to notify the Department of Health and Human Services in instances where we suspect contamination of our drinking water that may pose possible health risks. This includes non-compliant laboratory test results related to any Department of Health and Human Services standards or reporting requirements, or events where there are widespread customer complaints about water quality.

This financial year we had no Section 22 or Section 18 notifications to the Department of Health and Human Services.

Victorian bushfires

Due to bushfires and restrictions to access in the Bunyip, Cora Lynn, Garfield and Tynong localities during the 4-8 March, 2019, drinking water samples could not be collected. As a result of not sampling, *E.*coli samples were not collected from zones 270, 271 and 280 for that week. Turbidity was also not sampled from all four zones for the week.

We used data from online monitoring sites to access information regarding chlorine residual and pH as well as confirming results of free chlorine, coliforms, *E.coli* and turbidity from upstream and downstream samples to verify the water quality supplied to the four affected localities during the missed sample period. Water quality sampling resumed in the four affected localities on the 11th of March 2019.

The Department of Health and Human Services was notified 7 March 2019 in accordance with procedure, as a result South East Water failed to meet regulation 13(1) of the *Safe Drinking Water Act 2015* for this period.

Responding to our customers

Our water quality complaints remained below our target (0.18 per 100 properties), with a yearly result of 0.11 per 100 properties.

The biggest reductions in complaints compared to previous years were taste and odour. These complaints are generally related to chlorine. A reduction in these complaints demonstrates an improvement in operational control of our secondary chlorine dosing units, as well as continued teamwork and communication with Melbourne Water, which is responsible for providing primary chlorine disinfection.

The table below compares complaints for the previous years.

Type of complaint	Number of complaints		
	2018-19	2017-18	2016–17
Discoloured water	557	475	809
Taste and odour	164	199	190
Blue water	6	5	10
Air in water	44	48	38
Alleged illness	7	13	5
Other	38	38	29
Total	**816**	**778**	**1,081**

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 a number of 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. As such, all customer complaints about water quality are handled by dedicated and highly trained call centre employees. 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.

A summary of all water quality complaints by water sampling locality is shown in the following table.

Responding to our customers *continued*

Locality number	Locality name	Customer count^	Brown	Blue	Black	White #	Yellow	Chlorine	Earthy	Musty	Petrochemical	Stale	Other (taste/odour)	Alleged illness	Other	Reporting total	Complaints (per 100 customers)
260	Cora Lynn	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
270	Bunyip	1,872	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.05
271	Garfield	792	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
280	Tynong	705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
290	Pakenham	19,174	22	0	0	0	1	4	0	0	1	1	4	0	2	35	0.19
300	Koo Wee Rup	1,398	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.07
310	Berwick	51,041	114	0	0	4	2	7	0	0	0	1	4	0	4	136	0.27
311	Upper Beaconsfield	924	10	0	0	0	0	0	0	0	0	0	0	0	0	10	1.08
320	Cranbourne	39,947	22	0	0	2	3	9	0	0	0	0	9	1	2	48	0.12
321	Devon Meadows	4,325	1	0	0	0	0	3	0	0	0	0	0	0	1	5	0.12
322	Carrum Downs	13,129	6	0	0	1	2	2	0	0	0	0	0	0	1	12	0.09
323	Karingal	4,899	4	0	0	0	0	1	0	0	0	0	1	0	0	6	0.12
330	Somerville	7,342	7	1	0	1	1	0	0	1	0	0	1	0	0	12	0.16
340	Hastings	5,002	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0.04
350	Bittern	2,575	1	0	0	2	0	0	1	0	0	0	0	0	0	4	0.16
360	Balnarring	2,754	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
370	Shoreham	1,577	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.06
390	Frankston	40,925	35	0	1	4	2	4	1	1	0	0	5	3	1	57	0.14
400	Frankston South	6,141	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.02
410	Mornington	20,680	8	0	0	0	0	2	0	0	0	0	5	0	0	15	0.07

Locality number	Locality name	Customer count	Brown	Blue	Black	White	Yellow	Chlorine	Earthy	Musty	Petrochemical	Stale	Other (taste/odour)	Alleged illness	Other	Reporting total	Complaints (per 100 customers)
420	Mount Martha	4,545	31	0	0	0	0	1	0	1	0	0	1	0	0	34	0.75
430	Dromana	9,769	0	0	0	0	0	0	0	0	1	0	2	0	0	3	0.03
440	Rye	35,095	17	0	0	1	0	1	1	2	0	0	1	0	1	24	0.07
450	Lang Lang	873	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.12
570	Bayswater	30,563	14	0	0	1	5	3	0	0	0	0	1	0	0	24	0.08
580	Ferntree Gully	9,914	6	1	0	0	0	3	0	0	0	0	0	0	1	11	0.11
581	Belgrave	6,773	1	0	0	1	0	1	0	0	0	0	3	0	0	6	0.09
590	Wantirna	11,108	13	0	0	2	0	0	0	0	0	0	0	0	0	15	0.14
610	Caulfield	81,502	17	0	0	3	2	6	0	0	0	0	4	0	6	38	0.05
620	South Melbourne	98,842	6	1	0	3	2	3	0	0	1	0	2	0	5	23	0.02
630	Hallam	30,676	35	0	0	3	1	8	1	0	2	0	3	0	0	53	0.17
640	Dandenong	55,912	30	1	0	7	6	5	1	1	2	1	4	1	2	61	0.11
650	Chelsea	22,773	10	0	0	0	0	3	0	0	0	0	2	1	0	16	0.07
660	Dandenong North	11,738	5	0	0	0	1	0	0	0	0	0	0	0	2	8	0.07
670	Brighton Heatherton	99,842	69	2	0	7	4	4	1	1	1	0	9	0	4	102	0.10
680	Beaumaris	13,156	1	0	0	0	1	0	0	0	0	0	2	0	3	7	0.05
690	Mordialloc	14,869	4	0	0	1	0	0	0	0	0	0	0	0	2	7	0.05
700	Rowville	14,385	26	0	0	1	1	2	0	0	1	0	3	0	1	35	0.24
710	Moorooduc	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
SEW Total		778,018	521*	6	1	44	35	72	6	7	9	3	67	7	38	816	0.11

*2 complaints for brown water were received from customers supplied by South East Water however exist within Yarra Valley Water localities. As such they were not captured within a locality however contributed to total figure.

^ Customer count refers to property connections.

White water is caused by trapped air in pressurised mains.

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. Melbourne's pipeline system is unfiltered, which means some harmless natural sedimentation can occur in the pipes.

We attribute the majority of discoloured water complaints received during 2018–19 to an increase 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 or 'dirty' water.

The majority of 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 dirty 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 2018–19 were associated with corrosion of the copper pipe within a customer's property. We investigate these complaints where necessary 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 and Human Services to assist where appropriate.

During 2018–19 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 blackening 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 at southeastwater.com.au/waterquality.

Glossary/acronyms

ADWG	*Australian Drinking Water Guidelines 2011**
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
SDWA	*Safe Drinking Water Act 2003* (the Act)
SDWR	*Safe Drinking Water Regulations 2015* (the Regulations)
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.

*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

How to get in touch

Email support@southeastwater.com.au
General account enquiries 13 18 51
South East Water Assist 9552 3540
Hearing and speech impaired services
TTY 133 677 (ask for 13 18 51)
Interpreter service 9209 0130 (all languages)

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