




Annual report on drinking water quality in Victoria 2018–19

Responding to climate change



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Secretary's foreword

I am pleased to present the Department of Health and Human Services' *Annual report on drinking water quality in Victoria 2018–19*, which provides an annual statewide perspective of drinking water quality and water fluoridation activities.

The department plays a vital regulatory role as it aspires for all Victorians to be healthy, safe and able to lead a life they value. The *Safe Drinking Water Act 2003* and the *Safe Drinking Water Regulations 2015* provide the regulatory framework to ensure that drinking water supplied by water agencies is safe and aesthetically pleasant to drink. Safe drinking water is essential for maintaining public health and supporting the health and wellbeing of communities.

Drinking water quality performance continued to be maintained at a very high level during this reporting period. Water agencies remained vigilant in risk management and, in collaboration with the department, continued to promptly address issues and take corrective and preventive actions to minimise risk.

In accordance with the department's *Better regulatory practice framework*, the department is continuously improving its processes, effectiveness and engagement with stakeholders and the entities it regulates. In addition, it supports the outcomes of the *Water Unit regulator plan*, including the continued provision of safe drinking water to prevent the likelihood of illness.


The department recognises the increasing importance of safeguarding water sources for drinking. Water quality is under constant pressure, including the dual challenges of climate change and rising demand from an increasing population. Bushfires, drought, power outages and algal blooms are becoming more prevalent and affect drinking water supply and quality. Compounding risks have multiple impacts including reducing available raw water harvesting in catchments, inability of water treatment plants to safely treat the change in water quality, maintaining acceptable water quality within distribution systems and ensuring community confidence in drinking water.

The safety, security and sustainability of drinking water requires a dynamic risk management approach. Water agencies are required to constantly review and revise their risk management plans to incorporate potential hazards that arise from a changing landscape and new risks that may compromise drinking water quality and safety from catchment to tap.

As our climate changes, we will work together with water agencies and our government partners to ensure tap water remains the preferred choice of drink to stay healthy.



Kym Peake
Secretary
Department of Health and Human Services



Hamilton Water Treatment
Plant (courtesy of
Wannon Water)

Best tasting drinking water

In October 2018 Wannon Water's Hamilton drinking water supply was awarded the best tasting drinking water in Australia at the fourth annual Ixom Best Tap Water in Australia competition held in Toowoomba, Queensland. Samples were scored against a range of criteria including colour, clarity, odour and mouthfeel.

In February 2019 Wannon Water represented Australia at the annual International Water Tasting Competition held at Berkeley Springs in West Virginia, USA and was awarded the silver medal for having the second best tap water in the world.

Raw water for the Hamilton Water Treatment Plant is sourced from streams in the southern ranges of the Grampians National Park, about 50 kilometres to the north-east. Once treated, the award-winning water supplies 6,000 customers in Hamilton as well as the townships of Dunkeld and Tarrington.

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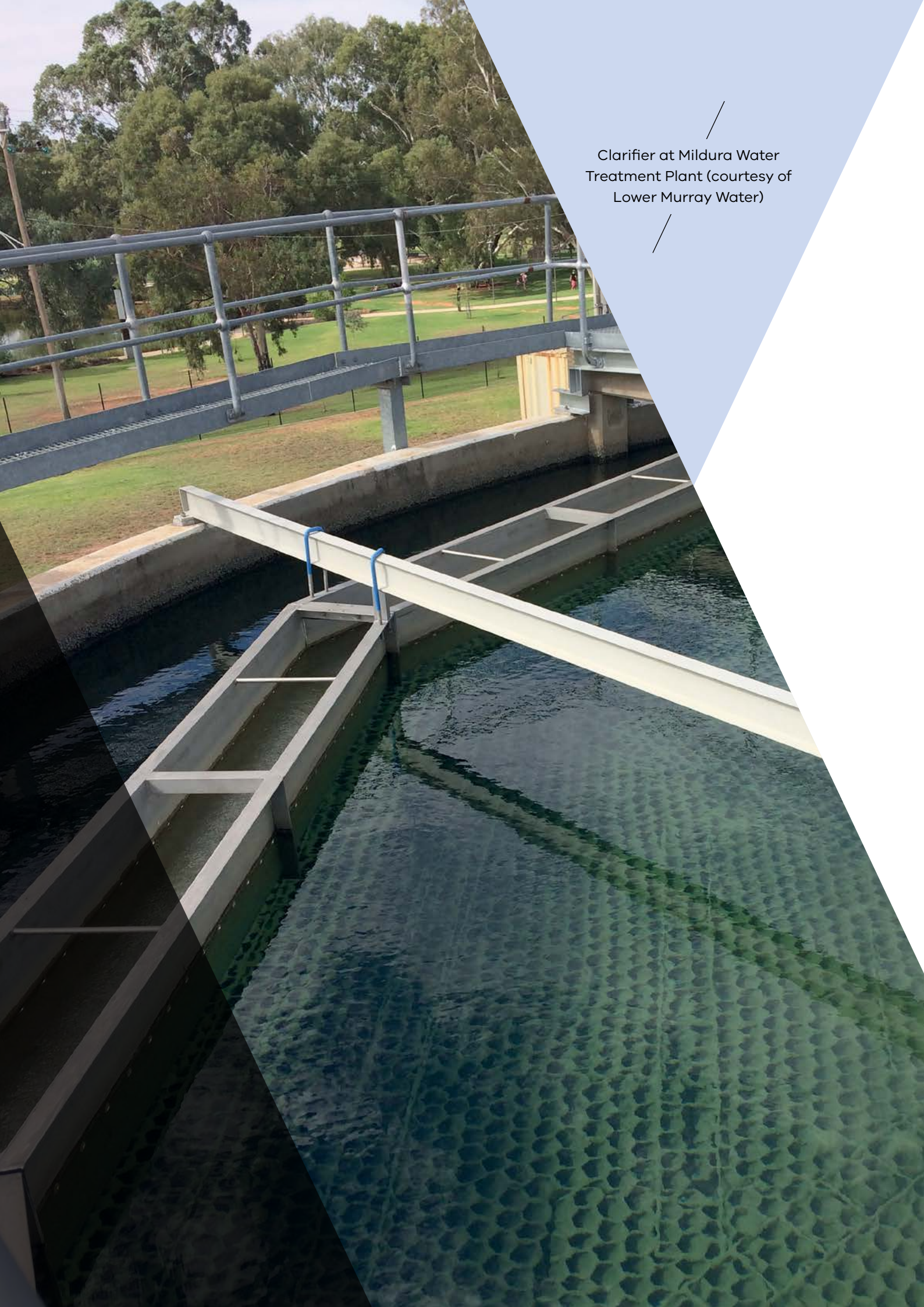
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Clarifier at Mildura Water Treatment Plant (courtesy of Lower Murray Water)



Introduction

The *Safe Drinking Water Act 2003* (the Act) and *Safe Drinking Water Regulations 2015* (the Regulations) provide Victorian water agencies and the Department of Health and Human Services (the department) with a framework to ensure safe drinking water is supplied for the health and wellbeing of Victorian communities.

Section 32 of the Act requires that the Secretary to the department provides the Minister for Health with an annual report that details a statewide perspective of drinking water quality, along with details of the Secretary's activities under the Act no later than 28 February each year.

Section 26 of the Act requires Victoria's 24 water agencies to prepare and submit annual reports on issues relating to the quality of drinking water and regulated water to the Secretary no later than 31 October each year. Water agencies' annual reports assist in providing a statewide perspective of drinking water quality.

The Regulations outline the information water agencies need to include in their annual reports. Where applicable, water agencies provide the following information in their respective annual reports:

- actions taken in respect of each emergency, incident or event that has affected water quality
- written undertakings that have been accepted by the Secretary
- the findings of the most recent risk management plan audit and any issues raised by the approved auditor
- a summary of disinfection or treatment processes
- information evidencing compliance or noncompliance with specific sections of the Regulations and actions taken
- analysis of water sample information, data and results
- a summary of variations in aesthetic standards and exemptions from a water quality standard
- a summary of complaints, responses and analysis and details of any regulated water supplied.

In-depth information on the performance of each water agency is provided on their respective websites (refer to Appendix 1 for water agency contact details).

This annual report summarises Victoria's drinking water quality performance and the department's activities during the 2018–19 reporting period. This annual report recognises the ongoing efforts made by water agencies and the department's strong commitment in delivering high-quality drinking water to Victorians.

In this reporting cycle, risk management plan audits were not carried out, however, water agencies reported in their annual reports any pending actions or opportunities for improvements that were undertaken during the 2018–19 reporting period.

Burnt catchment near
Nicholson River (courtesy of
East Gippsland Water)



Impacts of climate change on drinking water quality

In 2018–19 the department developed its first *Pilot health and human services climate change adaptation action plan, 2019–21*.

Climate change is threatening the quality of Victoria's water, resulting in increased risks to human health. Historically, the cool season (April to October) provides most of the runoff to Victoria's rivers. There has been a marked reduction in cool season rainfall over the past 30 years, interspersed with the occasional extremely wet year, such as 2010. The drying of Victoria's climate has become increasingly apparent since the mid-1990s, with only four of the past 20 years above the 1961 to 1990 average. The decline in cool season rainfall has consequences for water quality.

Droughts and rising water temperatures can alter the quality of drinking sources. Increased temperatures lead to an increased risk of harmful algae, expansion of the range of previously climatically restricted pathogens and vectors and emerging pathogens. Higher temperatures may accelerate the formation of biofilm and the prevalence of opportunistic pathogens (such as *Pseudomonas aeruginosa*) in the water supply network. Some species of harmful algae can produce chemical compounds that can challenge the effective operation of water treatment plants and affect drinking water quality, commonly imparting a musty odour and taste. More significantly, some species produce toxins that have serious health implications for humans, animals, birds and livestock if they are consumed, inhaled or come into contact with skin.

Higher temperatures may lead to more frequent bushfires and floods. Bushfires in drinking water catchments can compromise water quality in the short term and over many years. The degree of bushfire impact on water quality depends on the intensity of the fire, rainfall and the landscape characteristics. Ash, sediment, nutrients, human and animal waste and chemicals can be washed into receiving waterways and reservoirs following rainfall events. It can take many years before reservoirs return to their pre-fire state. In addition, bushfires increase the demand on water for firefighting purposes and can place pressure on water treatment plants to effectively treat water to a quality that is safe for drinking. Areas affected by power outages disrupt a water agency's ability to remotely monitor the operation and performance of water treatment plants. Without communications to the water treatment plant, a water agency needs to have a clear process for determining that the water it is supplying is safe to drink. It also should have contingencies on whether to inform the community to either 'boil water' or 'do not drink water' in the short term while balancing the needs for firefighting.

Deterioration of water quality has serious implications for human health. Exposure to contaminated water exposes Victorians to the risk of gastrointestinal illness and, in some cases death, as well as ear, nose and throat infections and dermatitis.

This annual report includes examples on how incidents such as bushfires and algal blooms affect drinking water supplies. Current climate predictions indicate that such events are likely to occur more frequently and with more intensity in the future.

Highlights and achievements of 2018–19

In 2018–19 the department continued to work with water agencies to maintain and improve the quality of drinking water supplied to Victorian communities. The performance of water sampling localities compliant with Schedule 2 parameters (*Escherichia coli* (*E. coli*), total trihalomethanes and turbidity) in the Regulations is 99 per cent, the highest recorded since the administration of the Act.

Ensuring compliance is paramount to maintaining community confidence in drinking water supplies and protecting the public from hazards in water. Through administration of the Act, the department regulates the Victorian water agencies and assists them with their legislative requirements.

In this reporting period, the department continued to implement its *Better regulatory practice framework*, which encompasses a risk-based approach, collaboration with stakeholders and water agencies and providing consistent regulatory oversight.

Key highlights relating to drinking water supplied in this reporting period are summarised below.

- Performance against the drinking water quality standards remained strong:
 - 468 localities (99.4 per cent) continuously met the Schedule 2 water quality standards in the Regulations.
 - Compliance with the *E. coli* standard increased (99.6 per cent) from 2017–18 (99.2 per cent).
 - Compliance with the trihalomethane standard increased (99.8 per cent) from 2017–18 (99.2 per cent).
 - Compliance with the turbidity water quality standard was 100.0 per cent, same as 2017–18.
 - 458 localities (97.2 per cent) continuously met all water quality standards in the Regulations.



97.2%

of drinking water localities met all water quality standards



100%

of drinking water quality incidents were managed collaboratively to protect public health

- A total of 37 reports of known or suspected contamination were made under s. 22 of the Act, with all issues and incidents managed to minimise impacts to consumers.
- Contingency planning and emergency response by East Gippsland Water and Melbourne Water, along with support from the department, through the 2019 bushfires respectively had drinking water carted to the community in Buchan to maintain the safe supply of drinking water and enabled water quality from the Upper Yarra Reservoir to be protected from the impact of debris.
- Water agencies operating water fluoridation plants undertook a gap analysis of the design, operation and performance of these plants against the requirements of the *Code of practice for fluoridation of drinking water supplies, Second edition* published in 2018.
- The communities of Kallista, Macclesfield, Menzies Creek, Monbulk, The Patch, Avonsleigh, Clematis, Cockatoo, Emerald, Gembrook, Korrumburra, Loch, Poowong and Nyora received fluoridated drinking water for the first time.



14 Victorian towns received fluoridated drinking water for the first time



CLIMATE CHANGE

EXTREME EVENTS

Fire-affected catchments
Algal blooms
Boil water advisories

Victoria's safe drinking water regulatory framework

Victoria's drinking water is managed under a comprehensive regulatory framework that commenced on 1 July 2004. This framework aims to ensure a consistent, reliable supply of safe, good-quality drinking water for Victorians. This consists of the:

- *Safe Drinking Water Act 2003*
- Safe Drinking Water Regulations 2015.

The safe drinking water legislation requires:

- a proactive catchment-to-tap risk management approach by water agencies
- water agencies to meet drinking water quality standards
- water agencies to disclose information to the department and the public.

This framework is consistent with the risk management approach in the *Australian Drinking Water Guidelines* and supports the *Health (Fluoridation) Act 1973*.

Minister for Health

The Safe Drinking Water Act provides several functions and powers to the Minister for Health:

- declaring any water that is not drinking water to be regulated water
- approving an application by a water supplier to vary a drinking water aesthetic standard
- approving an application from a water supplier for an exemption from a drinking water quality standard
- imposing conditions in relation to drinking water variations or exemptions
- fixing a period for which an administration levy is payable by water agencies, apportioning the amount between the water agencies and ensuring payment is made into the Consolidated Fund
- ensuring that an annual report on drinking water quality is provided to each House of the Parliament on or before the sixth sitting day of the House after the report has been received.

Department of Health and Human Services

The Secretary to the department is the authority empowered to administer and enforce the Safe Drinking Water Act. The functions of the Secretary under the Act include:

- protecting public health in relation to the supply of drinking water
- monitoring and enforcing compliance with the Act and the Regulations
- reporting on the performance of water agencies in relation to the requirements under the Act
- investigating and reporting on any aspect of drinking water quality in Victoria
- making recommendations to the Minister for Health on any matter relating to drinking water or regulated water
- promoting industry and public awareness and understanding of drinking water quality issues.

The Secretary also has the following specific authority under the Act:

- do all things necessary, including requiring a water agency to give specified information, to carry out the Secretary's functions under the Act
- accept an undertaking by a water agency relating to a contravention of the Act
- issue an enforcement notice to a water agency if it is contravening specific sections of the Act or is in breach of an undertaking
- establish and maintain a register of variations, exemptions and undertakings
- direct a water agency to give specified information and take specified corrective action if there is a risk to public health
- appoint a person to be an authorised officer and authorise them to assess and address immediate risks to public health relating to drinking water
- require water agencies to have their risk management plans audited and approve the auditor.

The Secretary must give the Minister for Health an annual report on drinking water quality no later than 28 February each year.

Water Unit

The department's Water Unit administers Victoria's safe drinking water regulatory framework on behalf of the Secretary. The Water Unit has a regulatory role and activities include:

- reviewing and assessing the health significance of s. 18 notifications and s. 22 reports made by water agencies to the Secretary under the Act and ensuring that water agencies implement mitigation measures to minimise reoccurrences
- discussing current and future regulatory issues with water agencies and following up on compliance actions
- visiting and inspecting water treatment plants
- reviewing water agencies' drinking water quality annual reports
- reviewing and processing proposals by water agencies to vary water sampling localities and declarations concerning regulated water
- providing guidance and advice to water agencies on the safe drinking water regulatory framework and drinking water quality issues and working with them to achieve compliance with the Act and Regulations
- providing input into national drinking water guidelines and policy development
- raising awareness across government, industry and the community on public health protection and health promotion issues related to drinking water
- reviewing technical appraisals and audit reports for water fluoridation schemes and overseeing the operational efficacy of fluoride plants to ensure reliability in terms of safety and desired oral health benefits
- contributing to research about emerging drinking water quality issues
- leading the Victorian Government's emergency response during emergencies related to contaminated drinking water supplies.

Water agencies

The Safe Drinking Water Act requires water agencies to provide safe, good-quality drinking water. There are 24 water agencies regulated by the department, with the Act distinguishing between two types of water agency: water storage manager and water supplier. The Act applies to a range of water agencies involved with water storage, water treatment and distribution of drinking water and regulated water. Appendix 1 provides a list of water agencies.

Water agencies, depending on whether they are a water storage manager or a water supplier (one is both) have a range of obligations under the Act including:

- preparing, implementing and reviewing a plan to manage risks in relation to drinking water and having the risk management plan audited
- ensuring that the drinking water they supply meets quality standards specified by the Regulations
- notifying the Secretary if drinking water it is supplying does not comply with a water quality standard
- reporting to the Secretary any known or suspected contamination of drinking water
- providing an annual report related to the quality of drinking water and regulated water to the Secretary no later than 31 October each year.

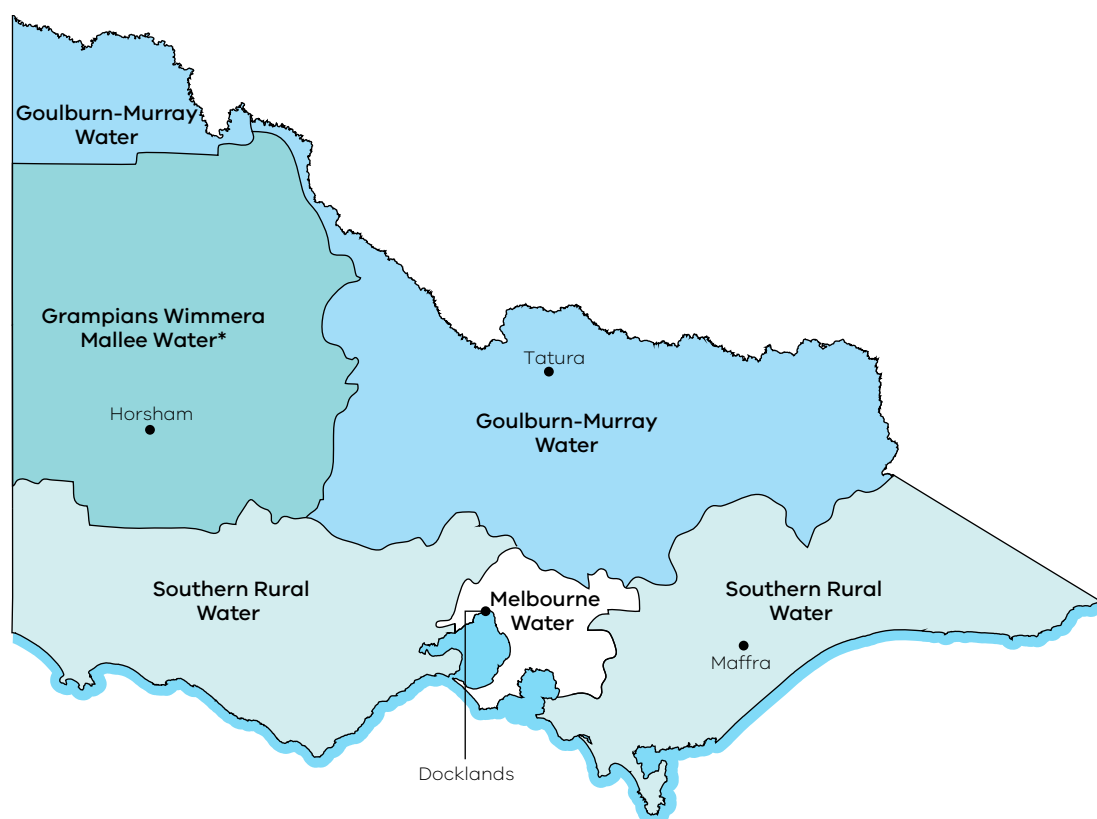
Water storage managers

Water storage managers store and supply water to water suppliers (Figure 1).

There are four water storage managers: Goulburn-Murray Water, Southern Rural Water and Grampians Wimmera Mallee Water supply untreated water to water suppliers, and Melbourne Water supplies treated drinking water.

Grampians Wimmera Mallee Water also operates as both a water storage manager and water supplier.

Figure 1: Water storage managers



- Water storage manager head office location

* Grampians Wimmera Mallee Water is both a water supplier and water storage manager

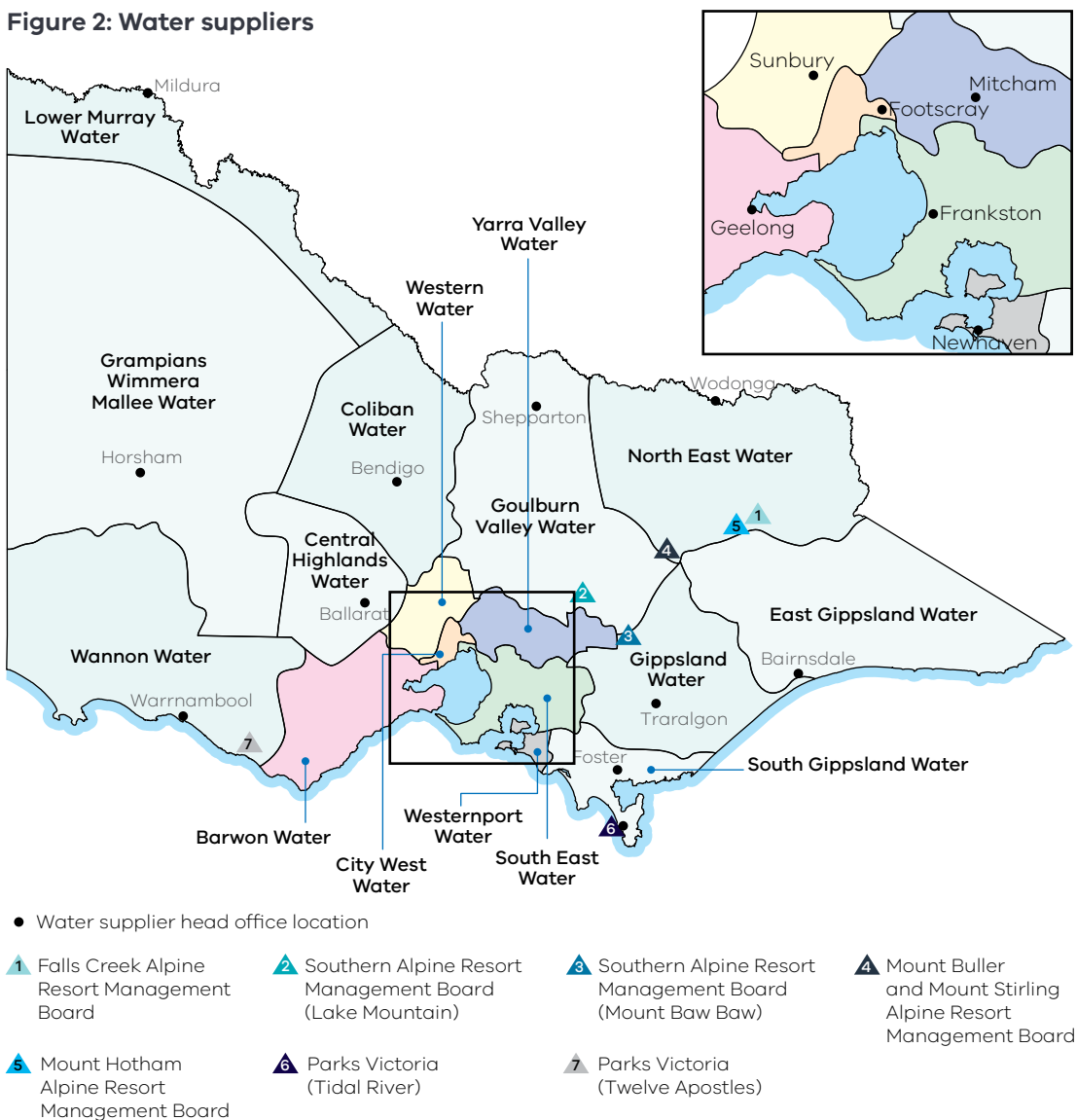
Water suppliers

Most Victorians receive reticulated drinking water supplied by a water supplier. Each water supplier covers a discrete geographic area where drinking water supply areas are defined as water sampling localities under the Regulations (Figure 2).

There are 21 water suppliers in Victoria, all responsible for ensuring water meets drinking water quality standards. Three water suppliers receive treated drinking water from a water storage manager and apply additional treatment. Eighteen suppliers apply primary and secondary treatment to untreated water to ensure all customers receive safe drinking water.

Some water suppliers also manage regulated water supplies (water that could be mistaken for drinking water, for example, untreated reticulated water for irrigation, stock use or non-drinking domestic uses). Specific provisions for managing the risks associated with these water supplies is included in the Act and Regulations.

Figure 2: Water suppliers



Better regulation

The department is committed to modern regulatory practice and is actively involved in initiatives that aim to increase regulator efficiency and effectiveness, and to reduce the burden on regulated entities. These initiatives include participating in the Ministerial Statement of Expectations and the department's *Better regulatory practice framework*.

Ministerial Statement of Expectations

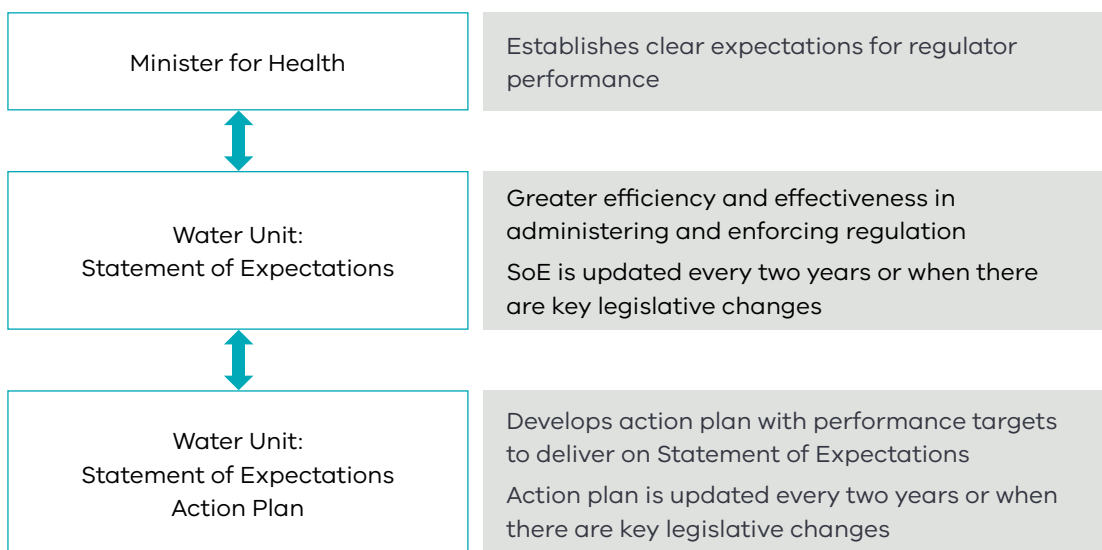
The Victorian Government developed the *Ministerial Statement of Expectations Framework for Regulators* (Figure 3). This whole-of-government initiative requires each minister to establish clear expectations for regulator performance and improvement within their respective portfolios. It aims to promote greater efficiency and increase the effectiveness of administration and enforcement of regulation.

The Minister for Health issued the Water Unit with the *Statement of Expectations 2017–19* that identified the following performance objectives and opportunities to drive continuous improvement in regulatory business processes and practices:

- compliance-related assistance and advice
- risk-based strategies
- stakeholder consultation and engagement
- timeliness
- transparency and accountability.

The Water Unit responded to the Minister's Statement of Expectations by committing to a *Statement of Expectations action plan* that clearly outlines actions and performance targets. View the *Statement of Expectations* and the *Statement of Expectations action plan* on the department's website <<https://dhhs.vic.gov.au/ministerial-statements-expectations-regulators>>.

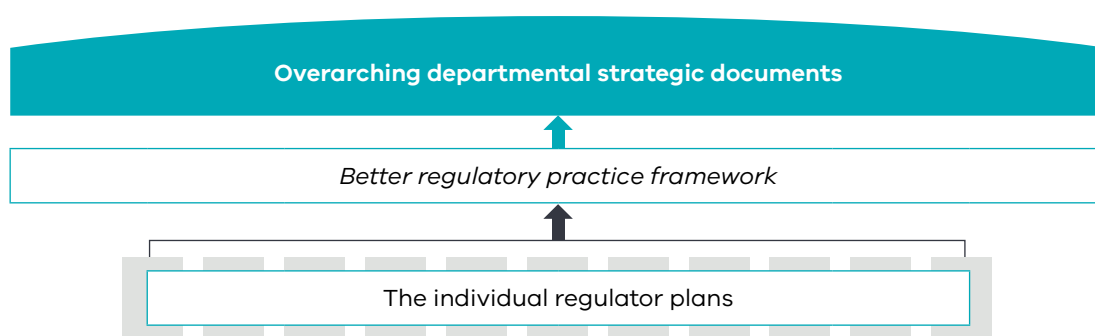
Figure 3: Statement of Expectations framework



Better regulatory practice framework

The department's *Better regulatory practice framework* provides clarity and consistency across the department's regulators (Figure 4). It provides a focus on regulatory outcomes, demonstrates a risk-based approach to regulation, and informs organisational improvements and stakeholder engagement activities.

Figure 4: Better regulatory practice framework



The *Better regulatory practice framework* ensures the Water Unit continuously improves its performance as a regulator. The framework has guided development of the *Water Unit regulator plan*, which outlines:

- the regulatory outcomes sought
- key regulatory risks to achieving the outcomes
- regulatory tools at the disposal of the Water Unit to influence compliance
- measurement of regulatory performance.

The Water Unit, in collaboration with water agencies, provides guidance and support to achieve regulatory outcomes to protect and improve the health of Victorian communities.

The *Better regulatory practice framework* and the *Water Unit regulator plan* for March 2018 to June 2019 can be viewed on the department's website <<https://www.dhhs.vic.gov.au/publications/better-regulatory-practice-framework>>.

Administrative law training

Water Unit staff undertook administrative law training in 2018–19 to be able to better interpret and administer the Act and Regulations for which they have legislative responsibility. The training focused on resolving or assisting to resolve issues that arise when exercising legislative discretion, on providing a greater understanding of powers and functions under an Act and on formulating responses to regulatory issues. Additionally, the course better equipped staff on how to approach decision making, the role of statutes and interpreting legislation.

Investigations training

Water Unit staff undertook investigations training to acquire the skills to better understand what is required to undertake appropriate investigations including steps in scoping and planning an investigation, managing key risks and issues of the investigation, the process of gathering evidence, the standard of proof required for further legal action and steps in concluding an investigation.

Water sector liaison

Open and ongoing discussions build trust and understanding which are fundamental in shaping stakeholder relationships and in effective regulation. Water Unit staff meet with water agencies to discuss present and future regulatory issues and compliance and legislative obligations in a constructive manner. This is achieved by considering past and present performance, various data, reports, reviews and debriefs after significant events or emergencies. When relevant and possible, Water Unit staff visit a range of water assets to better understand the issues facing water agencies.

Liaison activities are not limited to water agencies. Water Unit staff also actively meet and have discussions with other government agencies and regulators of water supply. These liaisons assist in cross-agency coordination and interaction of policies and procedures. They also provide the opportunity to share experiences, knowledge and learnings between different agencies and provide contact points for the water industry for the purposes of continuous improvement. Refer to Figure 5 for a whole-of-government approach to drinking water regulation.

Standard operating procedures

The Water Unit continues to improve its standard operating procedures to assist in the department's administration of the Act and achieving the objectives of the *Better regulatory practice framework*. These procedures are contributing to a standard and consistent regulatory approach and setting clear expectations both internally and with water agencies.

Water industry operator certification framework

The department and the Victorian Water Industry Association (VicWater) jointly adopted the drinking water component of the national *Water Industry Operator Certification Framework 2018: Drinking Water, Wastewater and Recycled Water* ('the national framework') for drinking water operator competency. This will be effective from 1 July 2019.

The national framework will supersede the *Victorian framework for water treatment operator competencies, Best practice guidelines 2010*. The national framework was informed by the Victorian framework, and the adoption was supported by a working group, chaired by the department with representatives from Barwon Water, Coliban Water, Gippsland Water, Wannon Water, VicWater and the Water Industry Operators Association of Australia.

The national framework provides benefits that are likely to increase certification uptake by water treatment operators and water agencies. The competency and capability requirements align with the tasks performed by operators and it encompasses all operators including contractors of drinking water treatment systems.

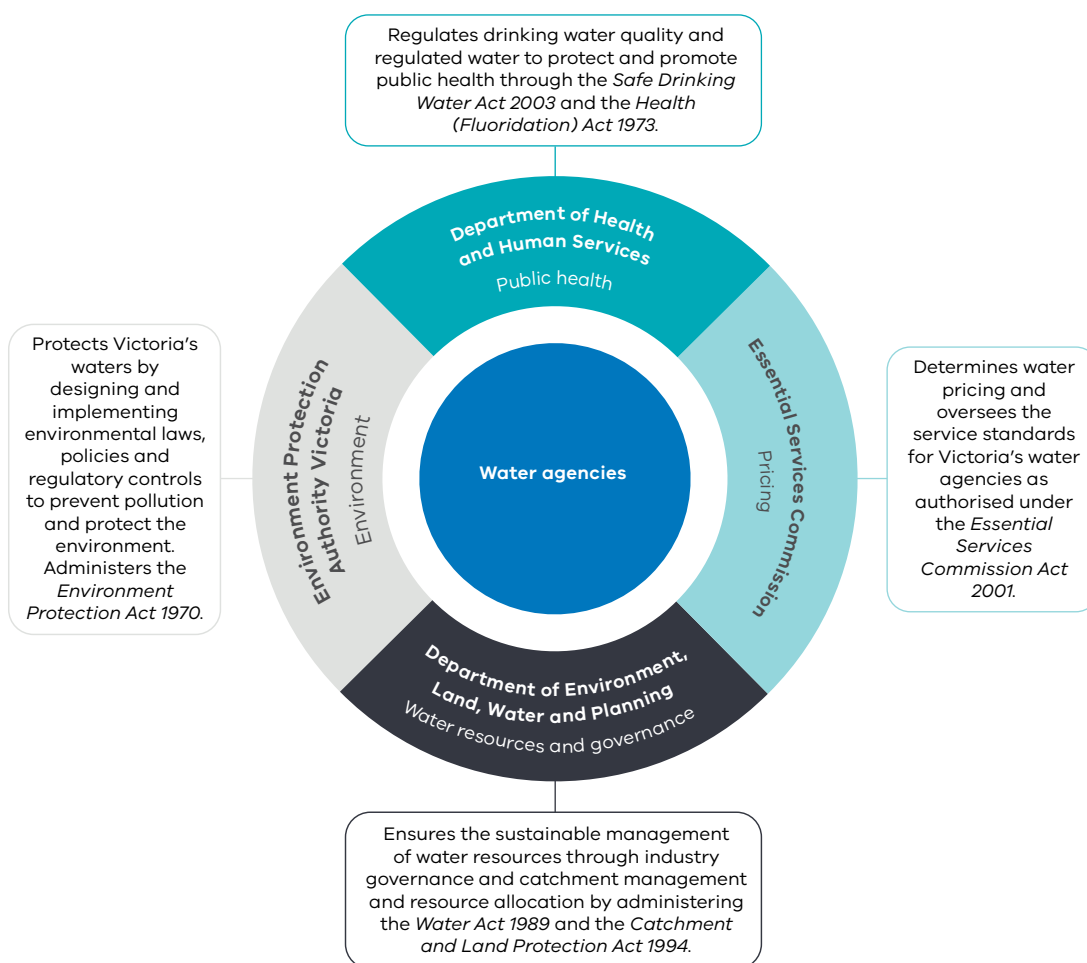
The implementation of the national framework by Victoria's water agencies will assist in demonstrating their capability of managing risks to drinking water systems under ss. 7 and 8 of the Act and r. 8 (1)(f) of the Regulations.

Whole-of-government approach to drinking water regulation

Four government agencies are involved in planning, managing and regulating Victoria’s water agencies. While each agency has a clearly defined regulatory role, there is significant interagency collaboration (Figure 5).

The department encourages a whole-of-government approach to safeguarding drinking water quantity and quality, including through source water protection. The health of the environment is paramount for providing safe drinking water and can be achieved through better catchment management strategies and maintaining controls to reduce and prevent contamination. This interagency collaboration ensures an integrated and collaborative approach in delivering safe drinking water for the health, safety and prosperity of Victorian communities.

Figure 5: Victoria’s drinking water regulatory system



Safe drinking water administration levy

In accordance with s. 51 of the Act, water agencies pay an administration levy to assist in defraying the costs of administering the Act. The meaning of costs of administering the Act is detailed in s. 52 of the Act. The proportion of levy that each water agency pays is based on a methodology that the Minister for Health considers fair and has been developed through consultation with stakeholders required under s. 53(d) of the Act.

For 2018–19 there was no change to the levy methodology. Key steps in its calculation were:

1. The department estimated its annual cost of administering the Act.
2. The rural water storage managers, Parks Victoria and Alpine Resort Management Boards were levied a flat rate of 0.15 per cent of the department's annual cost estimate.
3. The balance of the department's annual cost estimate was apportioned to each of the state's water suppliers proportional to their number of customer connections previously approved by the minister.
4. The levy for the three metropolitan water suppliers was discounted by 25 per cent, and this proportion was allocated to Melbourne Water, which supplied their treated drinking water.

Department expenditure associated with administering the Act

The administration levy for the 2018–19 financial year was set at \$1,278,846. Receipts totalling this amount were paid into the government's Consolidated Fund; equivalent funds were then appropriated to the department.

Table 1 shows the department's expenditure associated with administering the Act in this reporting period, along with a comparison with the previous two financial years.

Table 1: Department expenditure to administer the Safe Drinking Water Act, 2016–17 to 2018–19

Expenditure type	2016–17	2017–18	2018–19	Variance 2018–19 and 2017–18
Salaries, allowances and salary-related on-costs	\$752,881	\$830,610	\$718,637	-\$111,973
Indirect costs	\$71,694	\$74,432	\$62,020	-\$12,412
Operating costs	\$218,081	\$76,990	\$129,323	\$52,333
Communication and education	\$32,937	\$23,829	\$10,773	-\$13,056
Research and development	\$33,025	\$146,733	\$109,129	-\$37,604
Information technology	\$3,617	\$6,825	\$2,913	-\$3,912
Total expenditure	\$1,112,235	\$1,159,419	\$1,032,795	-\$126,624

Salaries, allowances and salary-related on-costs and indirect costs

During the 2018–19 period, the department's salaries, related on-costs and indirect costs (office accommodation, depreciation and amortisation) were less than the previous period due to two FTE vacancies for approximately six months.

Operating costs

Operating costs include costs associated with engaging contractors for completing technical work related to external auditing of drinking water fluoridation plants. The operating costs were greater in this period due to investment in improving internal procedures and processes for better regulatory outcomes.

Communication and education costs

Section 27(f) of the Act gives the Secretary the function of promoting industry and public awareness and understanding of drinking water quality issues. This includes informing the community and the water sector about drinking water and public health. The communication and education costs were slightly lower than the previous period.

The following provides an overview of the information and guidance provided to our partners.

Water agency regulatory forums

The department held two regulatory forums with water agencies during the year to discuss drinking water regulatory matters. The forums provided an opportunity for the water agencies and the department to work collaboratively and share lessons learnt, with the aim of improving the understanding of regulatory outcomes. Water agencies contribute to the agenda to ensure forums focus on topics of interest and value.

Topics discussed at the November 2018 and May 2019 forums included:

- water sampling programs for water quality monitoring
- the Act and its obligations and expectations
- environmental *E. coli* blooms
- lead in drinking water from some plumbing products
- the *Code of Practice for fluoridation of drinking water supplies, Second edition*
- water agency annual reports and risk management plan audits
- operator competency including outcomes of the Water Research Australia project on the value of operator competency
- Tatura boil water advisory, management of harmful algal bloom and treatment challenges.

Upstream newsletter

The department's *Upstream* newsletter provides the water industry with news and upcoming event details, as well as guidance updates from the Water Unit. Two issues were published during the year.

Topics covered in the September 2018 and May 2019 newsletters included:

- lead in drinking water from some plumbing products
- the 2017–18 drinking water quality annual report
- responding to harmful algal blooms
- bushfires and drinking water quality
- protecting source waters
- Wannon Water's Hamilton Water Treatment Plant winning silver at the International Water Tasting Competition in the United States
- introducing water fluoridation to the Kallista water supply system.
- the 2017–18 drinking water compliance report
- surveillance for notifiable conditions in Victoria.

Water Industry Officer Association Victorian conference

Every year, the department participates in the Water Industry Officer Association Victorian conference. The conference provides an opportunity to discuss water-related matters with water operators. The department made several presentations including:

- 'The tooth is out there – Victoria's water fluoridation'
- 'Water treatment plant operator competencies – why are competent operators important to public health'
- 'Your chance to ask questions of the regulator'.

Research and development costs

The department is committed to improving the state of knowledge on managing risks to drinking water quality and ensuring evidence-based decision making to provide better outcomes for public health in Victoria.

The department endeavours to maintain a strong knowledge base through its membership with Water Research Australia (WaterRA). WaterRA coordinates and manages a structured program of collaborative research in water to ensure the knowledge generated is transferred to industry. As an industry member, the department ensures that public health priorities are considered in the development and delivery of its research agenda. The department is also an associate member with the Water Services Association of Australia, the peak body of the Australian water industry and the Australian Water Association.

The department provides financial and in-kind support for research and development opportunities that will enhance available information, improve knowledge and understanding of various topical issues and guide and inform regulatory decisions.

The department, through WaterRA, supported the following projects during this reporting period.

Significance of the environment as a reservoir of antimicrobial resistance from agricultural origin (Project no: 3040)

The department is partnering with multiple agencies to develop tools that will enable government, animal industries and the water agencies to appropriately manage antimicrobial resistance in the environment.

This project is investigating the relevance of agricultural inputs to the distribution of antimicrobial resistance organisms and genetic material in the environment. The expected outcomes include a greater appreciation of the relative importance of agriculture as a source of antimicrobial resistance compared with levels found in the natural environment.

The results will also enable the government, water agencies and animal industries to improve their knowledge about the types and methods that would be useful for antimicrobial monitoring programs.

Understanding impacts of recreational access to drinking water catchments and storages in Australia (Project no: 1124)

Source water protection underpins the safety and affordability of drinking water supplies whereby prevention of contamination provides greater surety than removing contaminants. As part of the multiple-barrier approach, the *Australian Drinking Water Guidelines* emphasises the protection of source waters to the maximum degree possible. Water agencies have been placed under increasing pressure to introduce or increase recreational access to drinking water catchments and water storages. There is also a lack of consensus around recreational access approaches across Australia.

In recent years there has been a considerable change both in the demand for recreational access in drinking water catchments and storages across Australia, and in our understanding of drinking water risks, and risks to recreators, within catchments that have recreational access.

This project seeks the best available scientific, economic and risk management knowledge to inform current and future decision-making processes to support communication with recreational bodies, state/territory governments, influencers, lobbyists, regulators and their drinking water customers. This includes:

- focusing on the current state of play of recreational access around Australia
- documenting case studies and evidence-based information on risks associated with recreational activities
- case studies on treatment efficacy
- cost-benefit impact analysis
- learnings to date.

A tiered communication package delivering key messages to the general public, policymakers and industry partners will also be developed.

Assessing the economic impact of harmful and nuisance algal blooms to the Australian water industry (Project no: 1125)

The prevalence and impact of harmful and nuisance algal blooms is a threat to the safety and security of drinking water supplies.

In 2000 the Land and Water Resources Research and Development Corporation published a report, *Cost of algal blooms* placing the cost to extractive users at approximately \$95 million a year. In addition to standard escalation for inflation, this figure is likely to be significantly higher in 2019 dollars because the previous estimates did not account for increased frequency and intensity of algal blooms as a consequence of climate change.

The project outcomes include completing a comprehensive assessment of the economic impact of harmful and nuisance algal blooms, including cyanobacteria, to the water industry. This assessment will provide an improved understanding on the economic risk posed by harmful and nuisance algal blooms, which in turn will provide economic justification for adopting control and/or treatment strategies.

Information technology costs

In this reporting period the information technology costs were lower than the previous period as this is directly related to staff FTE.

Drinking water quality performance and regulatory requirements in 2018–19

Water sampling localities

The Regulations require water suppliers to collect drinking water samples from specified water sampling localities. A water sampling locality is a discrete geographical area where water samples collected are representative of the drinking water that is supplied to that area.

All locations supplied with drinking water must be within a water sampling locality boundary. This allows water suppliers to determine any issues with drinking water sources, treatment processes or distribution, and to identify customers receiving drinking water in the water sampling locality.

New water sampling locality proposals are required for new discrete drinking water distribution systems, including when regulated water supplies are to be upgraded to drinking water supplies. Changes to existing water sampling localities may include redefining of boundaries, merging or dividing current water sampling localities, or changes to supply arrangements.

During the 2018–19 period, the department completed the review and gazettal of the water sampling locality submissions listed in Table 2.

Table 2: Water sampling locality gazettals, 2018–19

Water agency	Water sampling localities affected by notice	Victoria Government Gazette number	Date notice takes effect
Barwon Water	Bannockburn, Batesford, Clifton Springs, Leopold, Montpellier, Moorabool, Ocean Grove, Teesdale, Torquay and Ocean Acres	S221, Wednesday, 5 June 2019	1 July 2019
City West Water	Werribee, Deer Park, Caroline Springs and Taylors Lakes	S249 Friday, 21 June 2019	1 July 2019

The department provided support to several water agencies preparing proposals to amend water sampling localities. These will be assessed and gazetted as required in the future.

As of 30 June 2019, there were 471 water sampling localities across the state, which is the same number as last year.

Water quality standards

The Act requires that a water supplier must ensure that all drinking water supplied complies with quality standards. The drinking water quality standards are specified under r. 12 of the Regulations, which states that drinking water supplied within a water sampling locality must not:

- exceed the standard set out in Schedule 2 of the Regulations (r. 12(a))
- contain any algal toxin, pathogen, substance or chemical, whether alone or in combination with another toxin, pathogen, substance or chemical, in such amounts that may pose a risk to human health (r. 12(b)).

Schedule 2 of the Regulations prescribes three parameters for which drinking water samples must be analysed, along with the required frequency of analysis and meet the respective water quality standard (Table 3).

Table 3: Safe Drinking Water Regulations Schedule 2 drinking water quality standards

Parameter	Sampling frequency	Quality standard
<i>Escherichia coli</i>	Weekly	No <i>E. coli</i> per 100 mL with the exception of any false-positive sample
Total trihalomethanes	Monthly	≤ 0.25 mg/L
Turbidity	Weekly	The 95th percentile of results for samples in any 12 month period must be ≤ 5.0 Nephelometric Turbidity Units

For parameters not specified in Schedule 2 of the Regulations, the *Australian Drinking Water Guidelines* is the authoritative reference for health-based guideline values and is used to determine compliance.



Sample tap connection point at Bort (courtesy of Coliban Water)

Section 18 notifications

In the Act, s. 18 refers to a notification required if noncomplying water is supplied. The Act states that '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'. Notification under s. 18 ensures the department is aware of noncompliant drinking water and that the respective water agency implements corrective measures to mitigate any potential public health impacts and undertakes actions to prevent future recurrence.

In this reporting period, drinking water samples were collected from 471 water sampling localities around Victoria and tested for several water quality parameters to determine compliance with water quality standards.

In 2018–19 there were 13 notifications regarding water that did not meet a standard under either r. 12(a) (compliance with Schedule 2 drinking water quality standards) or r. 12(b) (compliance with any other drinking water quality standards); four were related to noncompliance under r. 12(a) and the remaining nine related to noncompliance under r. 12(b), which are outlined in the sections below. One locality failed to meet a water quality standard on more than one occasion. Each exceedance was of a short duration and involved corrective actions by the respective water agency to minimise a reoccurrence and ensure water supplied did not present a risk to public health. Appendix 2 lists all s. 18 notifications received during the year.

Regulation 12(a): Compliance with Schedule 2 drinking water quality standards

To demonstrate compliance with r. 12a, drinking water samples must be analysed for the parameters required under the Schedule 2 water quality standards of the Regulations (refer to Table 3).

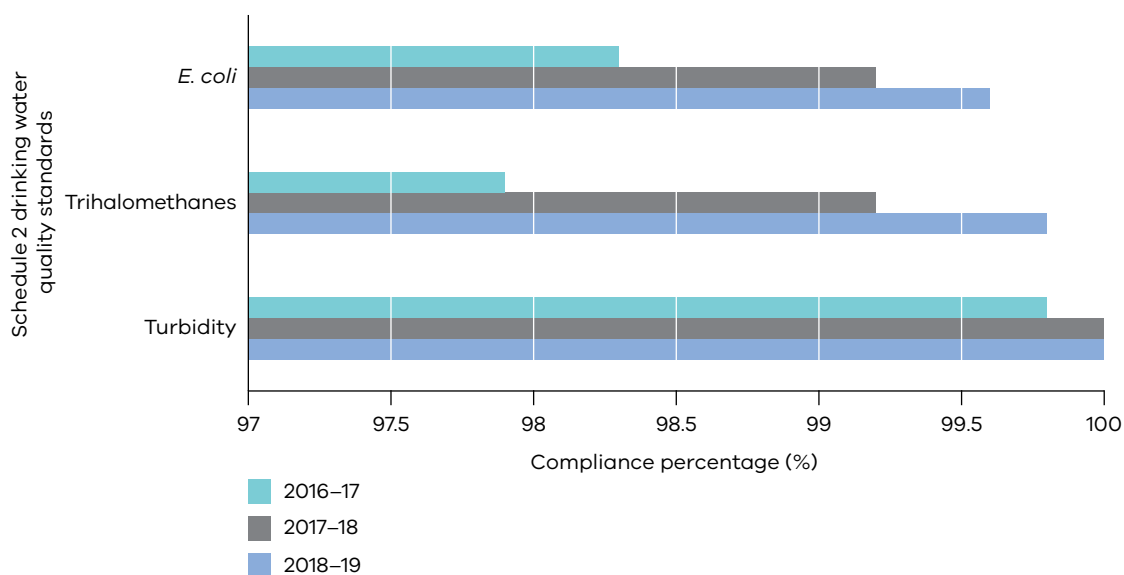
Table 4 and Figure 6 are interlinked and refer to compliance with Schedule 2 drinking water quality standards. Table 4 represents the actual number of **water samples** that did not meet the drinking water quality standards, and Figure 6 illustrates the percentage of water sampling **localities** that complied with the drinking water quality standards.

In this reporting period, there were four notifications representing three water sampling localities that did not meet the Schedule 2 drinking water quality standards; one of these localities failed to meet the trihalomethanes standard twice. Turbidity results were fully compliant, which is similar to last year. A consistently high level of compliance with *E. coli* and trihalomethanes standards was maintained, with the number of *E. coli* and trihalomethanes not meeting the standard reducing from the previous period.

Table 4: Water samples not meeting Schedule 2 drinking water quality standards, 2016–17 to 2018–19

Parameter	Water samples not meeting the quality standard		
	2016–17	2017–18	2018–19
<i>E. coli</i>	8	4	2
Trihalomethanes	23	7	2
Turbidity	1	0	0
Total	32	11	4

Figure 6: Percentage of water sampling localities compliant with Schedule 2 drinking water quality standards, 2016–17 to 2018–19



Escherichia coli

E. coli is a microbial indicator of drinking water quality. The Regulations require that all drinking water samples collected are found to contain no *E. coli* per 100 mL of drinking water, with the exception of any false-positive sample as defined in Schedule 2 of the Regulations. The detection of *E. coli* can signal microbial contamination; therefore, any detection is immediately reported under s. 22 of the Act. Refer to the discussion below on s. 22 *E. coli* detections.

When *E. coli* is detected in drinking water, an investigation is undertaken by the water agency in accordance with the guidance issued by the department to determine the cause, correct the issue and implement actions to prevent the issue from recurring. If the investigation concluded that the sample taken was representative of the drinking water supplied in the relevant water sampling locality, a notification is made under s. 18 of the Act.

Two notifications under s. 18 were received where water samples did not meet the *E. coli* standard. These two noncompliances were associated with:

- potential ingress of contaminants through a hole in a drinking water storage tank roof
- inadequate disinfection residual in the drinking water reticulation network.

Upon investigations the water agencies undertook the required corrective preventive actions to continuously improve compliance with the *E. coli* water quality standard.

Almost all (99.6 per cent) of all water sampling localities complied with the *E. coli* drinking water quality standard in 2018–19 (Figure 6).

Total trihalomethanes

Trihalomethanes are by-products of disinfection. They occur when chlorine comes into contact with organic matter in water. The Regulations require drinking water to be tested for trihalomethanes to ensure the result is compliant with the standard of less than or equal to 0.25 mg/L.

In 2018–19 the percentage of water sampling localities that were compliant with the trihalomethanes standard was 99.8 per cent, an increase from 99.2 per cent compliance in 2017–18 (Figure 6). There were two noncompliant results of the trihalomethane standard from one water sampling locality.

Corrective actions identified for reducing trihalomethanes in drinking water included the selective harvesting of source water and the addition of ultraviolet (UV) disinfection to minimise the formation of trihalomethanes. Other actions included reducing the age of water in drinking water reticulation systems.

Turbidity

Turbidity is a measure of the amount of suspended matter in drinking water. The Regulations require the 95th percentile of results in any 12 month period to be less than or equal to 5.0 Nephelometric Turbidity Units (NTU). In the 2018–19 reporting period, 100 per cent compliance with the turbidity water quality standard was achieved.

Figure 7: Percentage of water sampling localities continuously compliant with Schedule 2 drinking water quality standards, 2009–10 to 2018–19

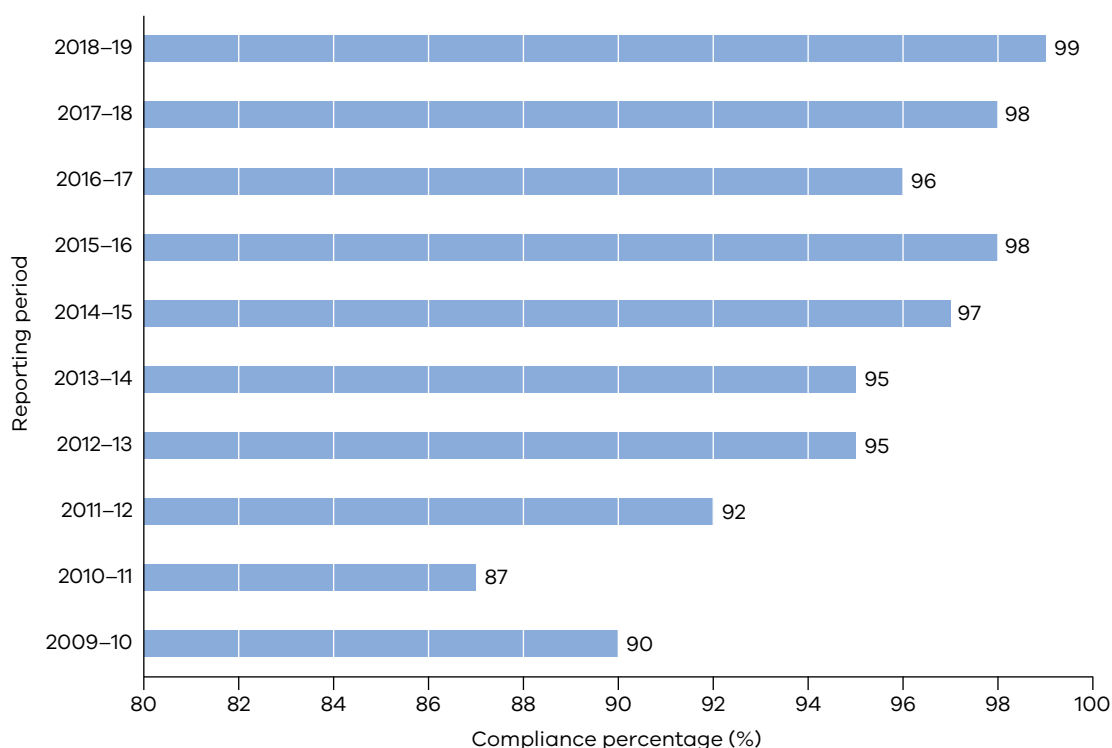


Figure 7 presents the past 10 years of performance of water sampling localities continuously compliant with Schedule 2 parameters. Of the 471 sampling localities, 468 continuously met water quality standards, achieving an overall compliance of 99.4 per cent. This is an improvement from 2017–18 and represents the highest compliance achieved.

Regulation 12(b): Compliance with other drinking water quality standards

To demonstrate compliance with r. 12(b), and as part of their water sampling program, water agencies use a risk-based approach to determine the water quality parameters, location and frequency of testing in their risk management plans. Water agencies and each water supply system face different risks, depending on factors such as the condition of the water supply catchment, treatment applied and supply system arrangements. Water agencies' water sampling programs are commensurate with this risk and tailored to each water sampling locality and supply system.

Table 5 summarises water samples not meeting other drinking water quality standards in 2018–19 and compares these results with the previous two reporting periods.

Table 5: Water samples not meeting other drinking water quality standards, 2016–17 to 2018–19

Parameter	Water samples not meeting the quality standards		
	2016–17	2017–18	2018–19
Chlorine	1	0	1
Bromate*	0	1	0
Chloral hydrate*	1	0	0
Dichloroacetic acid*	6	0	0
N-Nitrosodimethylamine*	2	0	0
Trichloroacetic acid*	19	5	1
Aluminium	1	0	1
Lead	0	1	5
Manganese	1	0	0
Nickel	3	5	1
Total	34	12	9

* Disinfection by-products

Disinfection by-products

Production of safe drinking water and maintaining safety throughout the supply and reticulation system typically requires the addition of a disinfectant. Reactions of chlorine disinfectants with natural organic compounds in source waters can produce disinfection by-products (DBP). While long-term, high concentrations of DBPs may increase risks to human health, short-term, low-level exceedances of the health guideline values do not present a risk to health. The *Australian Drinking Water Guidelines* recommend not compromising disinfection by trying to avoid DBP formation.

While trihalomethanes are addressed in the Schedule 2 standards, water agencies also sample for other DBPs where relevant. In 2018–19 one drinking water sample from one locality did not meet the standard for trichloroacetic acid but this did not pose a risk to human health.

Metals

Metals may be present in drinking water due to several reasons including:

- those naturally present in source waters and insufficient removal via treatment
- leaching from metal pipework and fittings
- their use in treatment processes (such as alum coagulant).

In 2018–19 there were seven drinking water samples that exceeded drinking water quality standards for metals compared with six the previous year.

Exemption from a water quality standard

Section 20 of the Act allows the Minister for Health to exempt a water supplier from the obligation to comply with a drinking water quality standard for a specified period, provided that adequate measures are proposed to eliminate or minimise any risks to public health.

During the year, there were no applications from water suppliers to be exempted from meeting a drinking water quality standard under the Regulations. There are no exemptions from meeting a water quality standard.

Section 22 reports of known or suspected contamination

Under s. 22 of the Act, water agency and council officers are required to immediately report to the department if they believe, or suspect on reasonable grounds, that water supplied, or to be supplied, for drinking purposes:

- may be the cause of an illness; or
- may be the means by which an illness is being, has been or will be, transmitted; or
- 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
- may cause widespread public complaint.

This reporting requirement ensures the department is informed of potential drinking water quality issues in a timely manner, resulting in a response to issues proportionate with the potential public health risk.

The department, in conjunction with water agencies, ensures all relevant corrective actions are taken to reduce risks to acceptable levels and that preventive actions are implemented to minimise recurrence of the issue.

The requirement to report relevant issues often leads to investigation findings that human health was not compromised. Most reports relate to isolated issues that water agencies manage without significant departmental support. However, where the reported issue is more complex, the water agency may require departmental support, advice or additional direction.

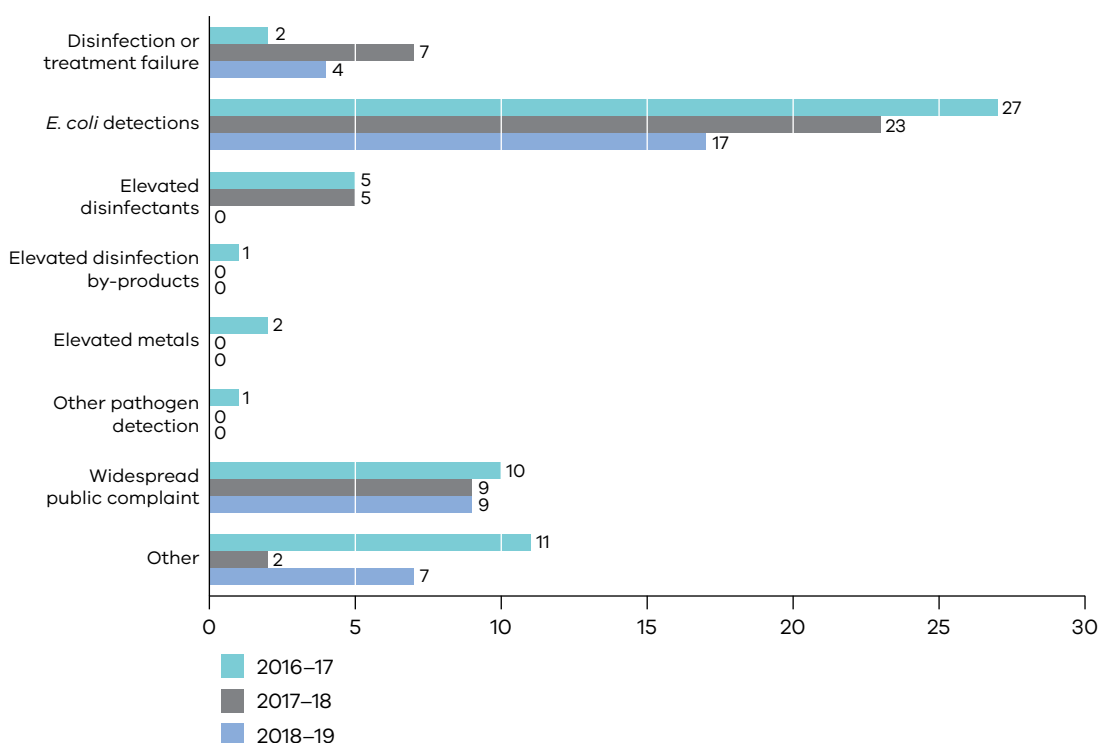
Section 22 reports have generally been declining in number since the safe drinking water regulatory framework was introduced in 2004. This can be attributed to water agencies' investment in infrastructure, the maturity of water agency risk management practices, and the strong focus on the audit process and continuous improvement.

In 2018–19 there were 37 reports made under s. 22 of the Act, a decrease from the previous year (Table 6). These reported issues are broadly grouped into various categories shown in Figure 8, which shows that fewer reports related to disinfection or treatment failure and *E. coli* detections. The number of widespread public complaints remain consistent with the previous year.

Table 6: Number of reports made under section 22 of the Act, 2016–17 to 2018–19

Reporting period	Number of s. 22s
2018–19	37
2017–18	45
2016–17	59

Figure 8: Categories of reports made under section 22 of the Act, 2016–17 to 2018–19



Disinfection or treatment failure

There were four reports to the department related to disinfection/treatment failure during the 2018–19 reporting period. This is a decrease from the previous year. One of these incidents related to an algal bloom impacting on the effectiveness of the filtration system to reliably remove pathogenic microorganisms. This resulted in a precautionary boil water advisory. A case study from Goulburn Valley Water, who issued the boil water advisory for the Tongala township, is included in this annual report. The other incident related to fluoride flowmeter failure resulting in a short period of overdosing that was of low health risk. The other two recorded reports were failure of standby generators to function at a scheduled test period, which led to loss of chlorination for a short period, again, this had no adverse impacts on public health.

Escherichia coli detections

During this reporting period there were 17 reports of *E. coli* detections compared with 23 in the previous year. Following investigations by the water agencies, 15 of the 17 *E. coli* detections resulted in a false positive. This meant that the *E. coli* detection was not representative of the drinking water being supplied and therefore the water sampling locality met the drinking water quality standard. Investigations into these detections revealed causes such as storage tank being offline, power outages, rain events and errors in sampling procedures.

Two notifications made under s. 18 were confirmed to have not met the standard and have been discussed in the 'Regulation 12(a): Compliance with Schedule 2 drinking water quality standards' section.

Widespread public complaint

A range of factors can result in drinking water tasting, smelling and appearing unpleasant. Where an issue results in widespread public complaints, the water agency must inform the department in accordance with s. 22 of the Act.

There were nine reports of widespread public complaints in this reporting period, which was the same as last year.

The reasons identified for these notifications in the 2018–19 reporting period included manganese and iron causing taste and discolouration of water, burst water mains causing sediment and air in water, and algae in reservoirs causing unpleasant taste and odours.

Although these reports identified undesirable aesthetic water quality issues, they did not represent a direct public health risk. Taste and odour issues may, however, result in the consumption of less healthy drinks, such as sugar-sweetened beverages.

The department worked with all water agencies to ensure these issues were resolved in a timely manner.

Other incidents

The 'Other' category of incidents include recycled water cross-connections, chemical/biological incidents, drinking water supply incidents and harmful algal blooms incidents. These incidents have been placed in 'Other' category to allow comparison with the last two reporting periods (see Appendix 3 for all s. 22 reports received by the department). This indicates that, while there are common categories for s. 22 reports, there can always be other events that need to be managed and controlled in a timely manner.

Risk management plan audits

The primary purpose of audits is to determine compliance with legislative risk management plan requirements. Section 11 of the Act empowers the Secretary to the department to request that water suppliers and water storage managers have their risk management plan audited by a specified date. The audits are carried out approximately every two years, a timeframe that allows water agencies to drive continuous improvement and best practices, reinforcing and promoting the risk management principles of Victoria's water industry. In 2018–19 no audits were undertaken, however, water agencies reported on any pending actions and opportunities for improvements from their previous audit.

Regulated water declarations

Some rural water agencies supply untreated water directly to communities through a piped distribution system. This water is not intended for human consumption; rather, it is used for purposes such as watering gardens, flushing toilets and other non-drinking domestic uses. If it is considered that this water could be mistaken for drinking water, the Minister for Health may, under s. 6 of the Act, declare the water to be regulated water.

Regulated water declarations are a mechanism for managing these non-drinking water supplies within the safe drinking water regulatory framework. A water agency supplying regulated water must have a risk management plan for that water supply. It must take all reasonable steps to ensure the community is made aware of the nature of the water, and it must provide information about the health risks associated with drinking the water.

The process for considering whether a particular supply is declared as regulated water involves consultation between the water supplier and the affected community.

Regulated water declarations can also be made if a water supply intended for drinking water deteriorates to the point where drinking water quality standards cannot be met. This has occurred in the past when extreme weather events significantly changed the characteristics of source water quality.

No changes were made to regulated water declarations during this reporting period. Appendix 4 lists regulated water supplies for this reporting period.

Undertakings

Under s. 30 of the Act, the Secretary may accept undertakings to address water quality issues and deliver permanent water quality improvements. A water agency may enter into an undertaking with the Secretary when the department or the water agency identifies a contravention under the safe drinking water regulatory framework. The undertaking describes what the water agency will do to resolve the issue and how any public health risks are managed while the agency resolves the contravention within a specified timeframe. In this reporting period, no undertaking was in place.

Annual reports

Under s. 26 of the Act, all water agencies must provide an annual report on the quality of drinking water and regulated water for every financial year. Water agencies must give the report to the Secretary no later than 31 October of each year. Reports must be made available to the public on the respective water agency website by the next business day. Part 5 of the Regulations outlines the details to be included in the annual reports, and water agencies receive additional guidance to assist with explaining the regulatory requirements.

As part of the *Better regulatory practice framework*, the department has enhanced its internal review of water agencies' annual reports to ensure a consistent approach while ensuring water agencies have met the requirements of the Act, Regulations and guidance note. The department provides feedback to individual water agencies at the time of reviewing their annual reports, with a statewide analysis presented at future water forums.

All water agencies submitted draft and final annual reports to the department within the required timeframe for this reporting period. Water agencies' specific water quality annual reports can be viewed on their websites. Appendix 1 lists the contact details for each water agency.

Emergency preparedness and incident management

The department and its stakeholders work together to respond to and manage emergencies affecting the safety and quality of reticulated drinking water supplies. The department works under the requirements of the *Emergency management manual Victoria*, which identifies agencies' roles and responsibilities for response. The department is the control agency for drinking water contamination.

The *State health emergency response plan* (SHERP) describes the department's roles and responsibilities during emergencies. A subplan of the SHERP is the operational response plan for a drinking water contamination event. This describes the emergency management arrangements that the department follows in response to a drinking water contamination event.

The department and water agencies are quick to enact their respective emergency management plans and arrangements when events may affect water quality and public health. Response measures include protecting key infrastructure, increasing treatment, providing alternative drinking water supplies and providing advice to affected communities.

The water industry maintains a state of emergency preparedness through cross-agency collaboration exercises that examine different scenarios affecting drinking water supplies. Water agencies regularly conduct these exercises, often inviting the department to attend. Local business, local government, Victoria Police, fire agencies and relevant government departments including the Department of Environment, Land, Water and Planning and EPA Victoria may also attend these drills.

In October 2018 the department was present as an observer for a combined emergency management exercise involving five Melbourne metropolitan water agencies. The aim of the exercise was to test the joint emergency management arrangements of these water agencies and the implementation of the *Melbourne metropolitan water industry response plan* as part of the water agencies' obligations under Part 7A of the *Emergency Management Act 2013*.

In January 2019 the department actively participated in a water quality emergency exercise for Falls Creek Alpine Resort Management Board that focused on risks to human health, public communications, immediate response and corrective actions to address the risk.

Debriefs of actual emergency events is a critical part of preparing for future possibilities. In 2018–19 the department participated in emergency event debriefs with water agencies. The learnings from debriefs drive continuous improvements in water agency and departmental responses.

Debriefs and presentations attended included:

- Goulburn Valley Water's boil water advisory in Tatura
- Melbourne Water's response to bushfires in the Thomson and Upper Yarra Reservoirs
- End of season Blue Green Algae Regional Coordination.

During the 2018–19 period, two significant fires affected drinking water catchments. A summary of the risks and impacts of these is summarised in the next section.

East Gippsland Water Buchan Bushfire 2019

East Gippsland Water provides drinking water to the Buchan township. Drinking water is sourced from the Buchan River and treated at the Buchan Water Treatment Plant. During January and February 2019, approximately 20 per cent of the forested drinking water catchment area that supplies the Buchan River was affected by fire.

The river water quality deteriorated significantly after rainfall and impacts of fire debris. While the water treatment plant at Buchan is designed to treat river water of varying quality, the poor river water quality restricted the treatment plant operation. The Buchan Water Treatment Plant was temporarily turned off because it was unable to treat the poor river water quality. East Gippsland Water carted drinking water from several other water systems to maintain the drinking water supply in Buchan.

Through contingency planning, emergency response and continuous safe access to the Buchan Water Treatment Plant, East Gippsland Water was able to maintain safe drinking water supply throughout the fire event. Efforts in managing water will continue into the future as rain continues to transport fire debris into the Buchan River.


The department maintained communications with East Gippsland Water throughout the fire event to support any decisions regarding drinking water quality and risks to the community.

2019 fires in the catchments of the Upper Yarra and Thomson reservoirs

Melbourne's water supply is predominantly sourced from the catchments of the Upper Yarra and Thomson reservoirs, amounting to approximately 70 per cent of Melbourne's total storage capacity. In late January 2019, a lightning strike started a bushfire in the Thomson catchment that burnt more than 13 per cent of the total catchment area. The adjacent Upper Yarra catchment also experienced a bushfire due to lightning strikes, with approximately 5 per cent of the catchment being burnt. Due to the importance of these two reservoirs for Melbourne's water supply, both fires caused significant concern for the Victorian Government, Melbourne Water, other drinking water suppliers and the wider community.

Given the criticality of these water supply catchments to Melbourne, significant fire-fighting efforts were employed using the combined resources of fire agencies, forest fire crews and Melbourne Water to minimise the fire impact to the catchment area. Melbourne Water's water quality contingency planning and emergency responses enabled water quality from the Upper Yarra reservoir to be protected from the impact of debris. This involved significant land stabilisation and erosion control within the catchment area, transferring large quantities of reservoir water away from affected catchments and rapid modelling of water quality forecasts based on the fire behaviour.

The department maintained regular contact with Melbourne Water to understand the current and forecasted impacts to water quality in the reservoirs and likely impact to the drinking water for Melbourne. Involvement in State Emergency Control Centre meetings and briefings continued through the fire threat period to provide a state public health perspective.

An aerial photograph of a wide river with a weir structure. The water is a murky, greenish-brown color. In the foreground, there are patches of green lily pads. The middle ground shows a dense line of trees along the riverbank, with some buildings and structures visible. The background consists of a flat, open landscape with scattered trees and fields under a clear sky. The image is framed by a large, light blue triangular graphic on the right side.

Goulburn Weir – Kirwans
Bridge Offtake (courtesy of
Goulburn Valley Water)

Algal bloom within the Goulburn system and Tongala boil water advisory 2019

Water agencies in Victoria have expertise with treating algae-affected water, however, because algae is a living organism its behaviour can change in different environments. In early 2019 algae bloomed in areas that have historically been unaffected by algae. The algae had a rapid early growth stage, which meant Goulburn Valley Water experienced water treatment challenges at the Tatura, Kyabram, Rushworth and Tongala water treatment plants that sourced water from the Goulburn Weir and Waranga basin. In addition to the challenges to treat the algae, the ability to operate the water treatment plant at Tongala was significantly affected. The treatment process was removing the algae, however, due to the unusual behaviour of the algae the filters were unable to operate effectively. The removal of other microorganisms could not be assured and Goulburn Valley Water issued a boil water advisory to the Tongala township (population 1,926). The boil water advisory was in place for almost 48 hours.

Other impacts included water carting from other storages to major (food production) customers and alternative water supplies to critical customers (such as nursing homes). Significant financial spending (close to \$1 million) was made on asset response improvements and investment in water treatment plant improvements in the Goulburn system.

Investigation work was also carried out to correctly speciate and confirm the toxicity of the algae. The molecular data indicates that the algae is a new species to the area. Climate change and warmer temperatures are likely to result in more harmful algal blooms, creating challenges for managing drinking water supplies.

This case study highlights the significant impact of algal blooms on the water supply system, the ongoing need for research and surveillance to keep abreast of emerging species, and the need to better understand the causal factors including catchment management practices to minimise the prevalence of algal blooms.

Fluoridated water reaching more Victorians

The National Health and Medical Research Council (NHMRC) released its *Public Statement 2017: Water Fluoridation and Human Health in Australia* in November 2017. The NHMRC strongly recommends community water fluoridation as a safe, effective and ethical way to help reduce tooth decay across the population. This statement updates and replaces the 2007 public statement to reflect recent evidence. The NHMRC also released several supporting publications in 2017, including *Water Fluoridation and Human Health in Australia: Questions and Answers* and *Information Paper – Water fluoridation: dental and other human health outcomes*.

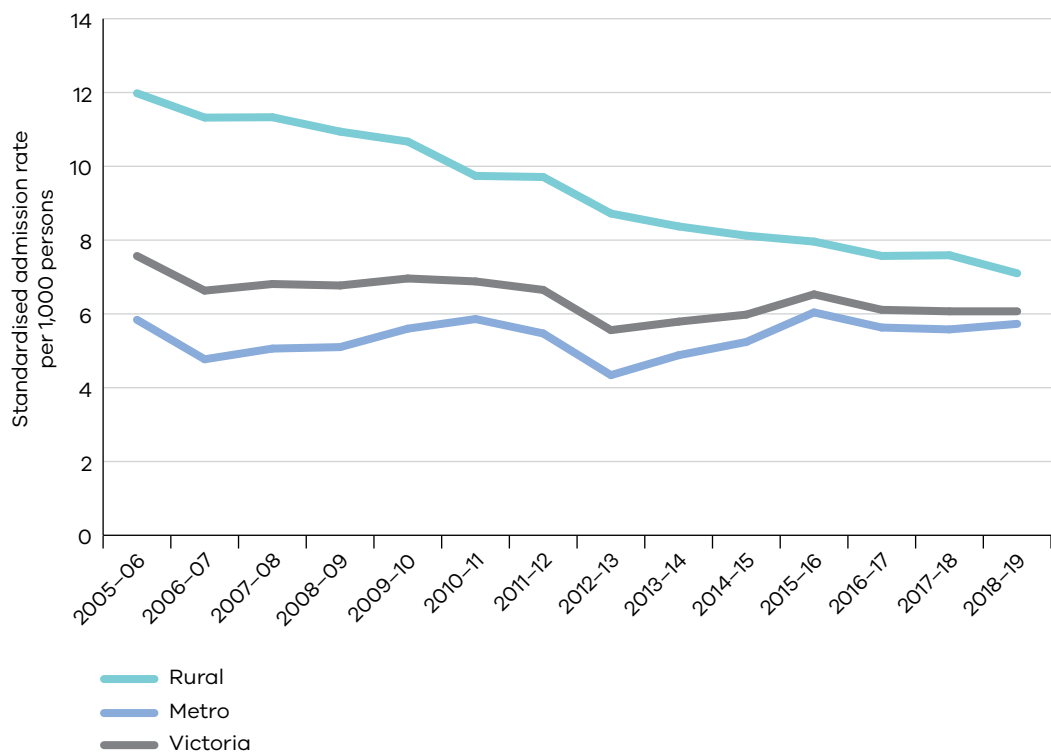
Benefits of drinking water fluoridation

Community water fluoridation is the most effective population-wide intervention to prevent tooth decay. Most Victorians have access to fluoridated drinking water.

However, there are many communities in rural and regional Victoria receiving non-fluoridated reticulated drinking water. There is a gap in oral health outcomes between people living in fluoridated areas (metropolitan) and people living in non-fluoridated areas (rural and regional). Tooth decay remains a considerable public health issue, with children in non-fluoridated rural and regional areas experiencing higher rates of hospital admissions for tooth decay.

Dental conditions remain the highest cause of all potentially preventable hospitalisations in children aged up to nine years, predominantly because of tooth decay. Over the period 2005–06 to 2018–19, dental hospitalisation rates in children aged up to nine years have decreased, particularly in rural areas (Figure 9). This is likely to be due to an increase in the number of children accessing dental care and a decrease in tooth decay prevalence. The decrease in tooth decay rates appears to be greater in rural than in metropolitan areas, most likely because of the extension of community water fluoridation in rural areas from 2006. While admission rates are still higher in rural areas than metropolitan areas, the gap has narrowed since 2005–06. The remaining gap may be because not all rural children have access to optimally fluoridated water and the relatively lower socioeconomic status of rural families.

Figure 9: Standardised hospital admission rates (per 1,000 people) for dental conditions for children aged 0–9 years, Victoria, 2005–06 to 2018–19



Activities under the Health (Fluoridation) Act

Under the Health (Fluoridation) Act, the department oversees the extension of water fluoridation in Victoria and the ongoing compliance of fluoridation plants in operation. Before adding fluoride to any water supply, a water agency must submit plans and specifications to the department for consideration. The department then conducts a technical appraisal of the fluoridation plant in accordance with Victoria's *Code of practice for fluoridation of drinking water supplies, Second edition* to ensure the fluoridation plant can operate safely and reliably. When the technical appraisal is complete and following the water agency satisfactorily addressing any issues relevant to the outcomes of the technical appraisal, the department issues a letter approving the plant's commencement. Fluoridation plant audits are arranged within 12 months of operation to verify the recommendations of the technical appraisal and any other requirements at the time the approval was provided.

In 2018–19 the following activities occurred:

- August 2018: South Gippsland Water completed the Lance Creek Water Connection project, ensuring water security and a fluoridated drinking water supply for residents of Korumburra, Poowong, Loch and Nyora.
- March 2019: Following a technical appraisal, the department approved the addition of fluoride to the Kallista drinking water supply. The Kallista drinking water supply is managed by Melbourne Water and Yarra Valley Water and services approximately 16,000 people in Kallista, Macclesfield, Menzies Creek, Monbulk, The Patch, Avonsleigh, Clematis, Cockatoo, Emerald and Gembrook.
- June 2019: Water fluoridation plant audits for Cardinia Water Treatment Plant (Melbourne Water), Maryborough Water Treatment Plant (Central Highlands Water) and Maffra Water Treatment Plant (Gippsland Water) were conducted.
- Water agencies operating water fluoridation plants undertook a gap analysis of the design, operation and performance of the plants against the requirements in the *Code of practice for fluoridation of drinking water supplies, Second edition*.

On the horizon

The department is committed to working with its partners and stakeholders to meet future challenges to the continued supply of safe drinking water. The following outlines the topics that the Water Unit is currently monitoring.

Understanding impacts of recreational access to drinking water catchments

Surface water catchments are the first barrier in many drinking water supply systems. Protecting drinking water sources underpins the safety, reputation and affordability of drinking water supplies. The *Australian Drinking Water Guidelines* emphasises that protecting water sources is of paramount importance and must never be compromised. Protecting drinking water catchments reduces the risk of introducing contamination to drinking water supplies, as well as protecting the valuable ecosystem services that provide natural purification of runoff.

In addition to the purpose of drinking water supply, some catchments also provide the community with a place to engage in nature-based recreational activities, which can be beneficial for physical and mental health. However, recreational access has the potential for negative impacts on quality, safety and security of drinking water sources if not appropriately managed. In addition to the direct risks of recreational access such as increased pathogen loads, there are indirect impacts that can include increased fire risks, degradation of vegetation and the spread of invasive species, accelerated erosion, rubbish and other contaminants (fuels) and increased nutrient loads. These threats are likely to be exacerbated by the effects of climate change and extreme weather events. Indirect impacts can be long-lasting and, where degradation is experienced, often additional water treatment is required to maintain safe drinking water at significant cost. Nevertheless, treatment barriers can and do fail, increasing the inherent risk to the public.

The increasing demand for recreational access to drinking water catchments in combination with the potential threats from climate change means an understanding of the evidence of health risks and benefits is essential for making appropriate whole-of-government decisions to ensure the ongoing protection and provision of safe drinking water. As the evidence base continues to develop and evolve from industry learning and scientific investigation, the approach to recreation management and source protection needs to evolve to ensure the risks to drinking water are adequately addressed.

The department has contributed through its continued active involvement and provision of funds to a national level multiagency research project being managed by Water Research Australia: 'Understanding impacts of recreational access to drinking water catchments and storages in Australia'. The outcomes of the research will help to guide the department's engagement with recreational groups, influencers, lobbyists and water agencies. In addition to formal research, the department continually monitors good practice from other jurisdictions in Australia and internationally through its industry networks. The intent of this work is to ensure the best available knowledge on good practice for drinking water source protection is considered in the department's policy and ongoing advice and regulation of water agencies.

Better regulation of public drinking water

The department has an ongoing commitment to modern regulatory practice and initiatives to improve regulator effectiveness and efficiency and to reduce undue burden on regulated entities as it administers the Safe Drinking Water Act and the corresponding Regulations. For the ongoing protection of public health, the department remains committed to improving regulatory practice in collaboration with stakeholders and water agencies.

A key aspect of better regulation includes building further capacity to support water agencies in responding to the impacts of a changing climate on public drinking water supplies. The foremost goals of better regulation of public drinking water include setting clear expectations for water agencies, risk-based approaches to decision making, and aligning with recognised industry best practice. While it is not always easy to portray a cause-and-effect relationship between climate change and health and drinking water quality, Victoria is not immune to increased intensity and frequency of extreme weather events. This in turn has the potential to increase the spread of diseases, threaten food and drinking water supplies, and adversely impact community health and wellbeing. The department is increasingly responding to the impacts of climate change, with bushfires and algal blooms becoming more prevalent and affecting drinking water supply systems.

Setting clear expectations

Setting clear expectations for water agencies means that the requirements of the safe drinking water regulatory framework for Victoria are applied transparently and consistently, and that any foreseen changes are incorporated and adopted in a timely manner. The department is constantly working to improve and update guidance to water agencies on their obligations as drinking water storage managers and suppliers. As part of better regulation, the process for updating guidance will include greater engagement with water agencies and other government agencies. Timely engagement ensures there is opportunity to discuss changes and seek feedback before implementing new guidance, processes or policies.

Risk-based approach

The highly variable and often unpredictable nature of extreme weather events such as flash flooding, drought and bushfires makes planning for every scenario impractical. Consistent with Victoria's safe drinking water regulatory framework, the department is focusing on risk-based decision making for ensuring that threats to drinking water safety are appropriately planned for and addressed. The decision-making process is based on objectively evaluating information about the possible threats to drinking water safety, assessing the risk to public health, using evidence-based information when making decisions, and responding proportionally to the level of risk.

Best practice

The ongoing effects of climate change is something that is affecting many drinking water agencies across Australia and internationally. As a result, the water industry is continually evolving to respond, adapt and develop better practices for managing the ongoing safety of drinking water supplies. Through the work on better regulation, the department is committed to applying industry best practice in administering the safe drinking water regulatory framework for Victoria.

The department's commitment to better regulation underpins the Water Unit's work program. It supports the need to be agile in responding to current and future challenges faced by water agencies such as climate change and associated extreme weather events.

Water tower at
Numurkah (courtesy
of Goulburn Valley
Water)



Appendices

Appendix 1: Water agency contact details

Water agency	Telephone	Website
Barwon Water	1300 656 007	www.barwonwater.vic.gov.au
Central Highlands Water	1800 061 514	www.chw.net.au
City West Water	131 691	www.citywestwater.com.au
Coliban Water	1300 363 200	www.coliban.com.au
East Gippsland Water	1800 671 841	www.egwater.vic.gov.au
Falls Creek Alpine Resort Management Board	03 5758 1200	www.falls creek.com.au
Gippsland Water	1800 050 500	www.gippswater.com.au
Goulburn-Murray Water	1800 013 357	www.g-mwater.com.au
Goulburn Valley Water	03 5832 4800	www.gvwater.vic.gov.au
Grampians Wimmera Mallee Water	1300 659 961	www.gwmwater.org.au
Lower Murray Water	03 5051 3400	www.lmw.vic.gov.au
Melbourne Water	131 722	www.melbournewater.com.au
Mount Buller and Mount Stirling Alpine Resort Management Board	03 5777 6077	www.mtbuller.com.au
Mount Hotham Alpine Resort Management Board	03 5759 3550	www.mthotham.com.au
North East Water	1300 361 622	www.newater.com.au
Parks Victoria	131 963	www.parks.vic.gov.au
South East Water	131 694	www.southeastwater.com.au
South Gippsland Water	1300 851 636	www.sgwater.com.au
Southern Alpine Resort Management Board	03 5957 7222	www.southernalpine.vic.gov.au
Southern Rural Water	1300 139 510	www.srw.com.au
Wannon Water	1300 926 666	www.wannonwater.com.au
Western Water	1300 650 422	www.westernwater.com.au
Westernport Water	1300 720 711	www.westernportwater.com.au
Yarra Valley Water	1300 853 811	www.yvw.com.au

Appendix 2: Section 18 notifications for drinking water quality standards, 2018–19

Water agency	Water sampling locality	Water quality standard
Barwon Water	Moorabool	Lead
Coliban Water	Echuca	Aluminium
Coliban Water	Boort	Nickel
Coliban Water	Strathfieldsaye	Lead
Grampians Wimmera Mallee Water	Murtoa	Lead
Grampians Wimmera Mallee Water	Ararat	Lead
Mount Buller and Mount Stirling Alpine Resort Management Board	Mount Stirling	Trichloroacetic acid
Mount Buller and Mount Stirling Alpine Resort Management Board	Mount Buller	Elevated chlorine
North East Water	Benalla	Lead
South Gippsland Water	Poowong	<i>E. coli</i>
Wannon Water	Cavendish	Trihalomethanes
Wannon Water	Cavendish	Trihalomethanes
Western Water	Gisborne	<i>E. coli</i>

Appendix 3: Section 22 reports of known or suspected contamination, 2018–19

Water agency	Water sampling locality	Reason
Barwon Water	Montpellier	Widespread public complaint
City West Water	Werribee South	<i>E. coli</i> detection
City West Water	Werribee	Other (recycled water cross-connection at customer property)
Coliban Water	Bridgewater-Inglewood	Other (chemical incident)
Coliban Water	Echuca	Widespread public complaint
Coliban Water	Strathfieldsaye	Other (raw water cross-connection at customer property)
Coliban Water	Boort	Widespread public complaint
East Gippsland Water	Lindenow	Disinfection or treatment failure
East Gippsland Water	Lindenow	Disinfection or treatment failure
Goulburn Valley Water	Kyabram	Other (blue-green algae incident)
Goulburn Valley Water	Numurkah	Other (storage integrity issue)
Goulburn Valley Water	Picola	Widespread public complaint
Goulburn Valley Water	Dookie	Widespread public complaint
Goulburn Valley Water	Tongala	Disinfection or treatment failure
Goulburn Valley Water	Avenel	Widespread public complaint
North East Water	Chiltern	<i>E. coli</i> detection
North East Water	Goorambat	<i>E. coli</i> detection
North East Water	Benalla	<i>E. coli</i> detection
Melbourne Water	Silvan Waverley	Disinfection or treatment failure
Melbourne Water	Greenvale	<i>E. coli</i> detection
Melbourne Water	Yuroke	Widespread public complaint

Water agency	Water sampling locality	Reason
South Gippsland Water	Leongatha	Widespread public complaint
South Gippsland Water	Poowong	<i>E. coli</i> detection
Wannon Water	Parks Victoria Twelve Apostles	<i>E. coli</i> detection
Wannon Water	Port Campbell	<i>E. coli</i> detection
Wannon Water	Port Campbell	<i>E. coli</i> detection
Wannon Water	Port Fairy	<i>E. coli</i> detection
Wannon Water	Purnim	<i>E. coli</i> detection
Wannon Water	Casterton	<i>E. coli</i> detection
Western Water	Melton South	<i>E. coli</i> detection
Western Water	Gisborne	<i>E. coli</i> detection
Yarra Valley Water	Warburton	<i>E. coli</i> detection
Yarra Valley Water	Mernda/ Hurstbridge	<i>E. coli</i> detection
Yarra Valley Water	Ivanhoe	<i>E. coli</i> detection
Yarra Valley Water	Wallan	Other (recycled water cross-connection at customer property)
Yarra Valley Water	Lower Plenty	Widespread public complaint
Yarra Valley Water	Warranwood	Other (biological incident)

Appendix 4: Regulated water supplies at 30 June 2019

Water agency	Water supply area
Central Highlands Water	Amphitheatre, Raglan, Redbank
Coliban Water	Borong, Dingee, Jarklin, Macorna, Mitiamo, Mysia, Wychitella
Goulburn Valley Water	Corop, Goulburn Weir, Kirwans Bridge, Molesworth, Strathbogie, Woods Point
Grampians Wimmera Mallee Water	Antwerp, Apsley, Berriwillock, Beulah, Brim, Buangor, Chillingollah, Chinkapook, Cowangie, Culgoa, Dooen, Elmhurst, Glenorchy, Goroke, Harrow, Jung, Kaniva, Kiata, Lalbert, Lascelles, Lillimur, Marnoo, Miram, Moyston, Murrayville, Nandaly, Nullawil, Patchewollock, Pimpinio, Serviceton, Speed, Streatham, Tarranyurk, Temy, Ultima, Waitchie, Walpeup, Watchem, Westmere, Wickliffe, Woomelang, Yaapeet Pipelines: Ararat-Lake Fyans pipeline, Mount Cole pipeline, Mount Zero pipeline, Moyston pipeline, Northern Mallee pipeline, St Arnaud pipeline, Stawell supply main, Wickliffe pipeline, Willaura pipeline, Willaura-Lake Bolac pipeline
Southern Alpine Resort Management Board	Lake Mountain Alpine Resort
Lower Murray Water	Millewa water supply system (Cullulleraine, Meringur, Werrimull), Mystic Park
Wannon Water	Darlington, North Otway pipeline

Glossary

Blue-green algae	Blue-green algae, or cyanobacteria, are a type of microscopic, algae-like bacteria that inhabit freshwater, coastal waters and marine waters. Blue-green algae in water bodies can potentially affect human health. Refer also to 'Harmful algal bloom'.
Boil water advisory	Advice issued by a water supplier that requires consumers to boil their drinking water supply before consumption (or for purposes connected to human consumption such as food preparation, tooth brushing or ice making) due to a deterioration in the quality of drinking water supplied to a level that has been assessed as posing an unacceptable risk to public health.
Catchment	An area of land that collects rainfall and contributes to surface water (streams, rivers, wetlands) or to groundwater.
Catchment-to-tap	A risk management approach based on the principle that multiple treatment barriers minimise or mitigate identified hazards in raw water and produce water that meets drinking water quality standards.
Chloral hydrate	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
Corrective actions	Actions put in place following an incident or issue to alleviate immediate concerns.
Dichloroacetic acid	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
Disinfectant	An oxidising agent (for example, chlorine, chlorine dioxide, chloramines or ozone) added to water in any part of the treatment process or distribution system to reduce microorganisms to acceptable levels.
Disinfection	The process designed to destroy or inactivate microorganisms in water, including essentially all pathogenic (disease-causing) bacteria. There are numerous disinfection processes including chlorination, chloramination, chlorine dioxide disinfection, ozonation and ultraviolet disinfection.
Disinfection by-products	Products formed from the reaction between disinfectants, particularly chlorine, and naturally occurring organic materials in water.
Distribution system	A network of pipes leading from a water treatment plant to customers' plumbing systems.
Drinking water	Water that is intended for human consumption or for purposes connected with human consumption, such as preparing food and making ice (excludes pre-packaged bottled water).
Drinking water quality standards	Drinking water quality standards specified in r. 12 of the Safe Drinking Water Regulations 2015 for the purposes of s. 17 of the <i>Safe Drinking Water Act 2003</i> .

<i>Escherichia coli</i>	<i>Escherichia coli</i> (also known as <i>E. coli</i>) is a type of faecal coliform bacteria. The presence of <i>E. coli</i> is an indicator of the presence of contamination from human or animal waste. Its presence most likely indicates a breach of a water quality treatment barrier or contamination during the distribution of the water. It is used as an indicator for the presence of microbial pathogens.
False-positive	An investigation concluded that the detection of <i>E. coli</i> in a sample is not representative of the drinking water in the relevant water sampling locality. Refer to the meaning of 'false positive' in Schedule 2 of the Safe Drinking Water Regulations 2015.
Groundwater	Water contained in rocks or subsoil.
Harmful algal bloom	Naturally occurring algae that sometimes produce toxins that affect either aquatic life, such as fish, or human health. This includes blue-green algae and many other algae.
Hazard	A biological, chemical, physical or radiological agent that has the potential to cause harm. Physical and chemical hazards include heavy metals, trace organic compounds, total suspended solids and turbidity. Microbiological hazards include bacteria, viruses and protozoan parasites.
N-Nitrosodimethylamine	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
Nephelometric turbidity units	A measure of clarity determined by a nephelometer that emits a light beam through water.
Non-potable water	Any source of water that is unsuitable for drinking.
Notification	Verbal and written communication received by the department from water suppliers under s. 18 of the <i>Safe Drinking Water Act 2003</i> when drinking water supplied to the public does not (or is not likely to) comply with drinking water quality standards.
Parameters	Parameters for drinking water quality fall under four categories: physical, chemical, microbiological and radiological. Physical parameters include colour and turbidity. Chemical parameters include metals and organic compounds. Microbiological parameters include viruses, protozoa and bacteria. Radiological parameters include beta- and gamma-emitting radionuclides.
Pathogen	Disease-causing microorganisms including types of virus, protozoa and bacteria.
Preventive actions	Actions put in place following immediate corrective actions to minimise the risk of a recurrence of an incident or issue.
Raw water	Water found in the environment – such as rainwater, groundwater, reservoir water and river water – that has not been treated.

Regulated water	Water that is not intended for drinking but that could reasonably be mistaken for drinking water.
Report	Verbal and written communication received by the department from water suppliers, water storage managers or council officers under s. 22 of the <i>Safe Drinking Water Act 2003</i> regarding known or suspected contamination of water.
Reticulated drinking water supply	The piped drinking water network.
Risk	The likelihood and consequence of a hazard causing harm in exposed populations in a specified timeframe.
Risk management	The systematic evaluation of the water supply system, the identification of present and potential hazards and hazardous events, the assessment of risks and the development and implementation of preventive strategies to manage those risks.
Risk management plan	A plan prepared by water agencies under the <i>Safe Drinking Water Act 2003</i> that details how risk is managed in relation to the storage or supply of drinking water and regulated water to the public.
Safe drinking water regulatory framework	The legislation used to regulate the supply of Victoria's drinking water is referred to as the safe drinking water regulatory framework. The framework consists of the <i>Safe Drinking Water Act 2003</i> and the <i>Safe Drinking Water Regulations 2015</i> . The safe drinking water regulatory framework supports the <i>Health (Fluoridation) Act 1973</i> and is consistent with the risk management approach in the <i>Australian Drinking Water Guidelines</i> .
Section 18	Refers to a notification required if noncomplying water is supplied. The Act states that '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'.
Section 22	Refers to an officer to report known or suspected contamination. The Act states that it 'applies if an officer of a water supplier, water storage manager or council believes, or suspects, on reasonable grounds, that water supplied, or to be supplied, for drinking purposes: <ul style="list-style-type: none"> • may be the cause of an illness; or • may be the means by which an illness is being, has been or will be, transmitted; or • 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 • may cause widespread public complaint'. A s. 22 must be reported immediately to the Secretary.

Surface water	Water naturally open to the atmosphere, such as that in rivers, streams, lakes and reservoirs.
The Act	<i>Safe Drinking Water Act 2003</i>
The Regulations	Safe Drinking Water Regulations 2015
Trichloroacetic acid	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
Trihalomethanes	Organic compounds formed when chlorine reacts with naturally occurring organic matter in water supplies.
Turbidity	The cloudiness of water caused by the presence of fine, suspended matter.
Ultraviolet (UV) disinfection	A method of water disinfection in which light in the 100–400 nanometer wavelength range is applied to kill microbial pathogens.
Water agency	Water storage managers and water suppliers are referred to collectively as water agencies.
Water fluoridation	The adjustment of the level of fluoride in drinking water to around 1 mg/L (also known as 1 part per million), a level that helps to protect teeth against decay.
Water sampling locality	A geographic area defined by the following criteria: an area supplied with drinking water; a discrete area of similar water quality, inclusive of all customers supplied with drinking water of similar water quality; and able to be described by its boundaries. Water samples are required to be taken and analysed from water sampling localities.
Water storage manager	The Melbourne Water Corporation constituted under the <i>Water Act 1989</i> or a water corporation within the meaning of the Water Act (other than Melbourne Water Corporation constituted under the Water Act) that supplies water to a water supplier; or any other person or body declared by the Regulations to be a storage manager for the purposes of the <i>Safe Drinking Water Act 2003</i> .
Water supplier	A supplier of drinking water or regulated water to the public; the holder of a water licence issued in Part 2 Division 1 of the <i>Water Industry Act 1994</i> ; an authority within the meaning of the <i>Water Act 1989</i> ; Parks Victoria established under the <i>Parks Victoria Act 1998</i> ; an alpine resort management board established under the <i>Alpine Resorts (Management) Act 1997</i> ; or any other person or body declared by the Regulations to be a water supplier for the purposes of the <i>Safe Drinking Water Act 2003</i> .

