



# Annual report on drinking water quality in Victoria 2019–20

Preparedness and responsiveness  
from catchment to tap





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## Secretary's foreword

I am delighted to present the former Department of Health and Human Services' *Annual report on drinking water quality in Victoria 2019–20*, which provides an annual statewide perspective of drinking water quality and water fluoridation activities.


Safe drinking water is fundamental to the department's aspiration for all Victorians to be healthy, safe and able to lead a life they value.

That's why I'd like to give a huge thanks to our water agencies for ensuring the continued supply of safe drinking water to the Victorian community during the coronavirus (COVID-19) pandemic. Their role was fundamental in rapidly preparing and responding to prevent issues. Water agencies ensured the ongoing operation, maintenance and management of water treatment plants and distribution systems, undertook water quality monitoring, compliance reporting, investigations and associated rectification measures and responded to drinking water quality incidents; these were all important activities that had to continue as we waded through the pandemic.

Of course, it's not just the coronavirus (COVID-19) pandemic that has presented challenges in this space. The compounding risks of climate change with more frequent bushfires, floods, power outages and algal blooms will continue to challenge the quality and supply of our drinking water. The department administers the *Safe Drinking Water Act 2003* and the *Safe Drinking Water Regulations 2015* and we play a key regulatory role to ensure water agencies undertake their obligations under the Act and the Regulations.

These hazards have multiple impacts including reduced capacity for raw water harvesting in catchments; challenges for water treatment plants to safely treat the change in water quality; and maintaining acceptable water quality within distribution systems. Difficulties in meeting these challenges were evident in the increased number of drinking water advisories issued by water agencies to affected customers this past year. Indirectly, these hazards have also made visible a number of treatment plant and process failures that could have been prevented.

In response to the significant increase in drinking water advisories, the department implemented a regulatory improvement initiative. The aim is to assist water agencies and the department to protect public health by preparing and responding to incidents of possible contamination of drinking water. And to also ensure good-quality tap water remains the preferred drink to stay healthy. Our Water Unit began developing guidance and protocols for issuing and rescinding drinking water advisories and sought input from key stakeholders, including other regulators and partners nationally.



Our *Better regulatory practice framework* provides clarity and consistency across all the department's regulators and informs regulatory improvements. It supports the public need to have trust in regulators. We are also further developing our expertise and capability to improve clear communications to the community and the sector and, above all, striving to always be transparent and accountable. We hope that this, in turn, supports water agencies in their drive for continuous improvement in performance, accountability and transparency.

The department also undertook its biennial audit of water agencies' risk management plans. I am pleased that seven water agencies had their risk management plans audited by 30 June 2020 and the audit outcomes are presented in this report. The remaining 17 water agencies' risk management plan audits were conducted after this reporting period and the findings will be reported in next year's annual report.

Next steps? The department proposes to develop performance-based outcomes and associated indicators that better supports water agencies in their commitment to continuous improvement, providing greater assurance of high-quality drinking water to all customers and communities, especially in preparation for and response to future challenges. Challenges I feel we are confident to face together with water agencies.



Professor Euan M Wallace AM  
Secretary  
Department of Health

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## 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<sup>1</sup> (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 of 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 (21 water suppliers and four water storage managers; one being both a water supplier and water storage manager) 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 and the department's *Guidance: Water quality annual report* 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, including a list of all chemicals and other substances used to disinfect and treat the water
- 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
- 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 2019–20 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, seven of the 24 water agencies completed their risk management plan audits and their audit outcomes are reported. The remaining 17 water agencies' risk management plan audit findings will be reported in the 2020–21 annual report.

<sup>1</sup> As of 1 February 2021, the Department of Health and Human Services was separated into two new departments; the Department of Health and the Department of Families, Fairness and Housing.

## Preparedness and responsiveness – from catchment to tap


Water is essential for life, but it can and does transmit disease. Drinking water quality management continues to be a foundation for preventing and controlling waterborne diseases. We therefore must remain focused and committed to safeguarding our precious drinking water.

The risk profile for many water supply systems is changing. These threats include encroachment into water supply assets; activities such as recreation on water storages and within protected catchments; competition for natural resources; and land use intensification within water supply catchments. These activities increase the inherent risk to drinking water supplies by introducing contaminants, thereby increasing the potential for outbreaks of waterborne diseases.

These threats not only increase the risk profile but exacerbate the impacts anticipated from climate change including biodiversity loss, increased potential for zoonotic diseases and the diversification, persistence and prevalence of harmful and nuisance algal blooms.

Water agencies need to continue to be prepared and responsive from catchment to tap to manage the changing risk profile and challenges into the future. Disaster risk reduction measures need to be reviewed and integrated into water agencies' planning to strengthen capability and reduce vulnerability to potential threats so a safe drinking water supply can be assured into the future. This includes water agencies' stewardship in watershed management and water storage management to not only reduce the risks to source waters but improve source water quality through catchment protection interventions and planning overlays.

Water agencies are already challenged by algal blooms compromising the effectiveness of water treatment operation and increasing taste and odour complaints from customers. Many water agencies are implementing response measures to strengthen the resilience of their systems and to improve preparations for more frequent and challenging algal blooms. Examples of enhancements to monitoring and early warning systems include pH monitoring of raw water offtake as an early indicator of developing algal blooms, the use of swarm buoys to monitor water quality parameters that may indicate suitable conditions for algal growth and active monitoring of sludge waste from clarifiers. Treatment interventions include customising mobile powder activated carbon (PAC) dosing units so they can be deployed at key raw water source offtake points; utilising coagulant to reduce algal growth and phosphorus in raw water storages; modifications to clarifiers; and increasing the capability of staff to measure biovolumes at each site.



In this reporting period, bushfires again challenged some water agencies' water supply systems. Multiple bushfires across large areas of Victoria placed pressure on water treatment plants to continue to effectively treat water to a quality that is safe for drinking during the event and following heavy rainfall in burnt catchment areas. These challenges were largely experienced by East Gippsland Water and North East Water during the 2019–20 bushfires in the north-eastern catchments of Victoria.

Measures to improve resilience from bushfires have included off-stream storage, fixed generators and operable water sprinklers at all sites, along with SCADA systems to remotely monitor plants and cameras to observe fire activity and the operability of sprinklers. Other measures to mitigate impacts from the fires included installation of pre-treatment clarifiers to manage high turbidity levels and installing turbidity monitors at river offtakes to assist with selective harvesting. Longer term improvements involved increasing water storage capability by installing new clear water storage tanks and converting existing storages to hold raw water to improve selective harvesting.

During the 2019–20 reporting period, eight water advisories were issued by water agencies to customers. While some of these related to climatic events, some were associated with system failures in the multiple barrier approach and could have been prevented.

Evidence has shown repeatedly that most of the impacts of incidents and emergencies could have been prevented by better decision making prior to the event. This requires a mindset that focuses on avoiding or reducing precursors and an ongoing commitment to continuous improvement to do as much as is practicable to reduce risk. The department is committed to strengthening its regulatory posture to support this mindset so government and water agencies are better prepared and responsive from catchment to tap. The outcome will be that Victorians, now and into the future, will continue to be assured safe drinking water.

## Overview of performance and achievements in 2019–20

Ensuring compliance is paramount to maintaining community confidence in drinking water supplies and protecting the public from hazards in water. Through administering the Act and the Regulations, the department regulates the Victorian water agencies and assists them with their regulatory obligations.

In 2019–20 the department continued to work with water agencies to maintain and improve the quality of drinking water supplied to Victorian communities. As part of this, the department continued to implement its Better regulatory practice framework, which encompasses a risk-based approach, collaboration with stakeholders and water agencies and provides consistent regulatory oversight.

Key performance outcomes and achievements relating to drinking water supplied in this reporting period are summarised below.

- Overall, performance against the drinking water quality standards remained strong:
  - A total of 467 localities (98.5 per cent) continuously met all three Schedule 2 water quality standards (regulation 12 (a)) in the Regulations compared with 468 localities (99.4 per cent) in the previous year.
    - 99.4 per cent of localities complied with the *Escherichia coli* (*E. coli*) standard compared with 99.6 per cent in 2018–19.
    - 99.2 per cent of localities complied with the total trihalomethanes standard compared with 99.8 per cent in 2018–19.
    - 100 per cent of localities complied with the turbidity water quality standard, the same as in 2018–19.
  - 459 localities (96.8 per cent) continuously met all water quality standards in the Regulations compared with 458 localities (97.2 per cent) in the previous year.
  - Seventeen notifications from four water suppliers were made under section 18 of the Act regarding water that did not meet a drinking water quality standard under regulation 12 of the Regulations, which is a 30.7 per cent increase compared with 2018–19 when 13 notifications were made by eight water suppliers.



**96.8%**

of drinking water localities met all water quality standards



**100%**

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

- Fifty-one reports of known or suspected contamination were made under section 22 of the Act, with all issues and incidents managed to minimise impacts to consumers, compared with 37 reports in 2018–19.
- Of the section 22 reports of known or suspected contamination, there were 27 reports of *E. coli* detections compared with 17 in the previous year, an increase of 58.8 per cent. Following investigations by the water agencies, 24 of the 27 *E. coli* detections were found to be false-positive samples (not representative of the drinking water being supplied).
- Six 'boil water' advisories and two 'do not drink' water advisories were issued by five water agencies due to an algal bloom event, disinfection failures, process control issues or the impact of bushfires or storms.
- Seven of the 24 water agencies completed their risk management plan audits, with the audits finding that six water agencies complied with the obligations imposed by section 7(1) of the Act during the audit period and one water agency did not comply.
- Grampians Wimmera Mallee Water completed its Mallee Towns Drinking Water Supply Project in August 2019, with the upgrade of three regulated supplies (Brim, Beulah and Woomelang) returning these supplies to reticulated drinking water.
- From the gap analysis against the requirements of the *Code of practice for fluoridation of drinking water supplies, Second edition* that began in the 2018–19 reporting period, most water agencies are progressing towards meeting compliance with the code of practice.

Increase the proportion of rural and regional Victorians accessing fluoridated drinking water to

**95%** (baseline 87%)

Source: Victorian action plan to prevent oral disease 2020–30



# 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 and reliable supply of safe, good-quality drinking water for Victorians. The framework 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.

The framework is consistent with the risk management approach in the *Australian Drinking Water Guidelines 2011 (ADWG)* 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

The Secretary of 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 specific authority under the Act to:

- 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 its activities include:

- reviewing and assessing the health significance of section 18 notifications and section 22 reports made by water agencies to the Secretary under the Act and ensuring that water agencies implement appropriate corrective actions and mitigation measures to minimise recurrences
- 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 comply with the Act and the 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 fluoridation 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 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 agencies: water storage manager and water supplier. The Act applies to all water agencies involved with water storage, water treatment and distribution of drinking water and regulated water. Appendix 1 provides a list of Victoria's 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, continuously reviewing and revising a plan to manage risks in relation to drinking water and having the risk management plan audited
- ensuring the drinking water they supply meets drinking water 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.

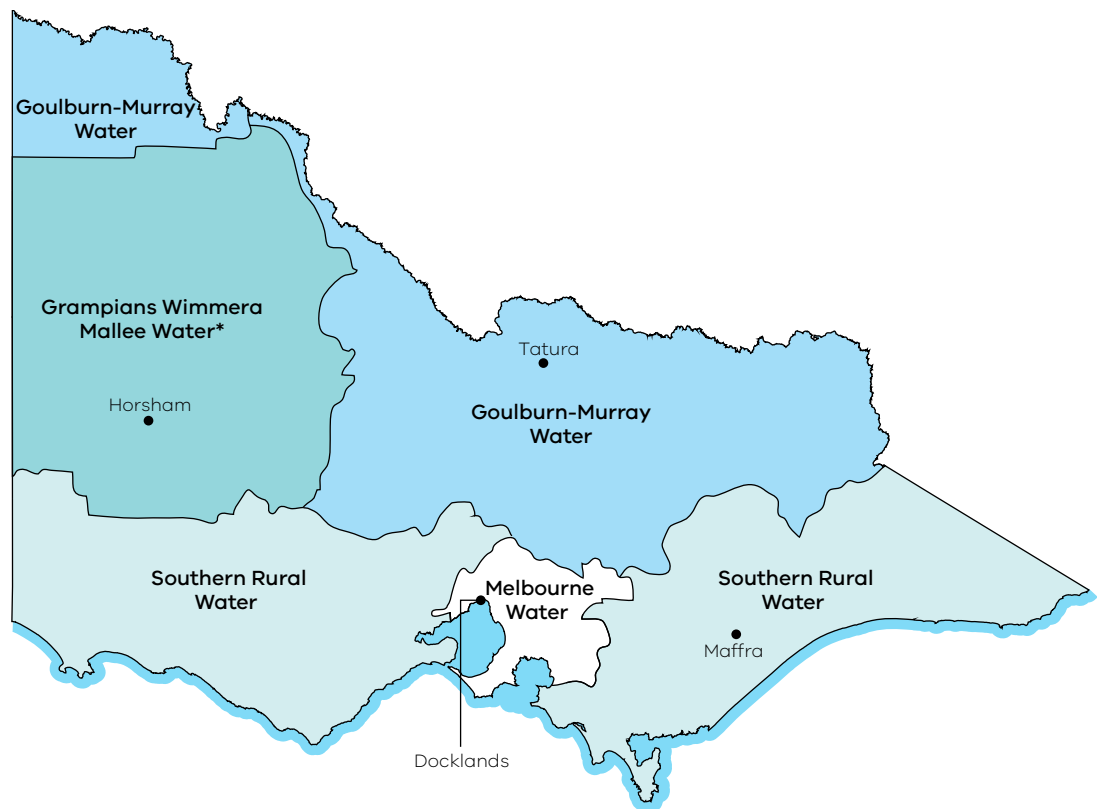
## Water storage managers

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 a 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

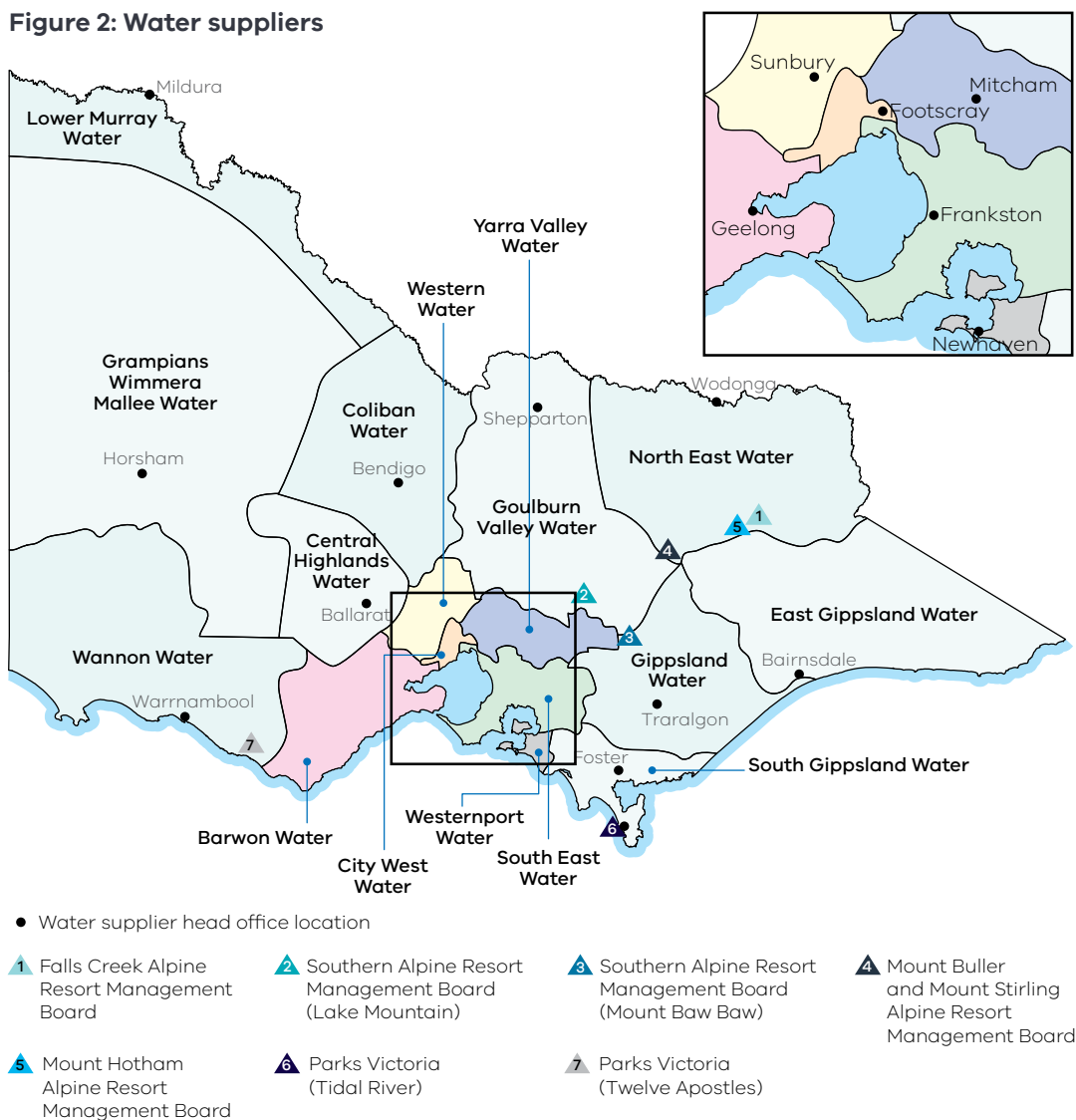
## Water suppliers

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. The three metropolitan water suppliers receive treated drinking water from Melbourne Water (water storage manager) and apply additional treatment (secondary chlorination). Eighteen water suppliers apply primary and secondary treatment to untreated water to ensure all customers receive safe drinking water.

Seven 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 are 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 responding to the Ministerial Statement of Expectations and the department's *Better regulatory practice framework*.

### Ministerial Statement of Expectations

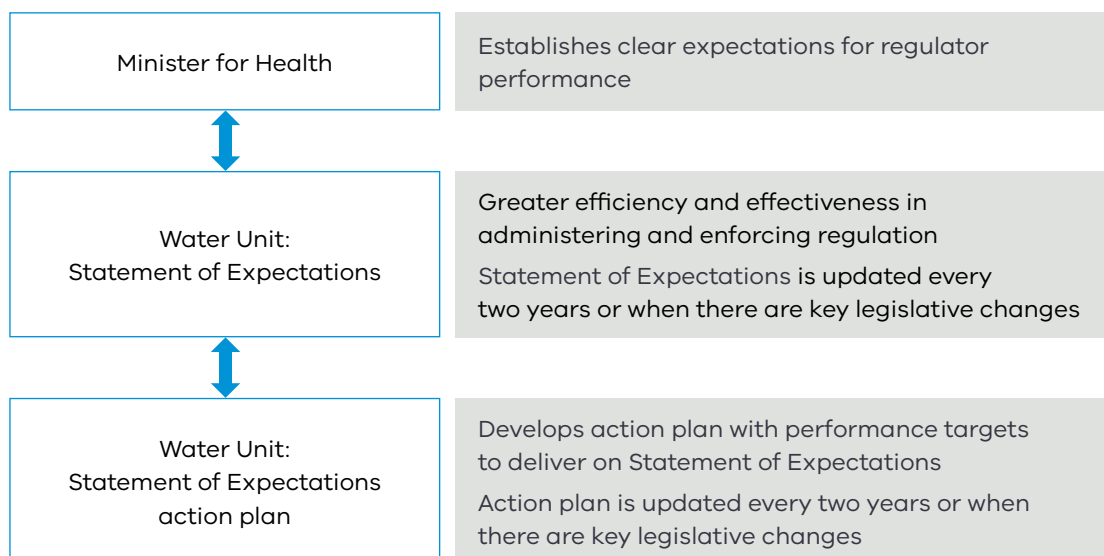
The Victorian Government developed the *Ministerial Statement of Expectations framework for regulators* (Figure 3). This whole-of-government initiative requires each minister to establish clear expectations for regulator performance and improvement within their respective portfolios. It aims to promote 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 2019–2021*, which 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 Ministerial Statement of Expectations by committing to a *Statement of Expectations action plan* that clearly outlines actions and performance targets. The Ministerial Statement of Expectations and the *Statement of Expectations action plan* can be viewed on the department's website <<https://dhhs.vic.gov.au/ministerial-statements-expectations-regulators>>.

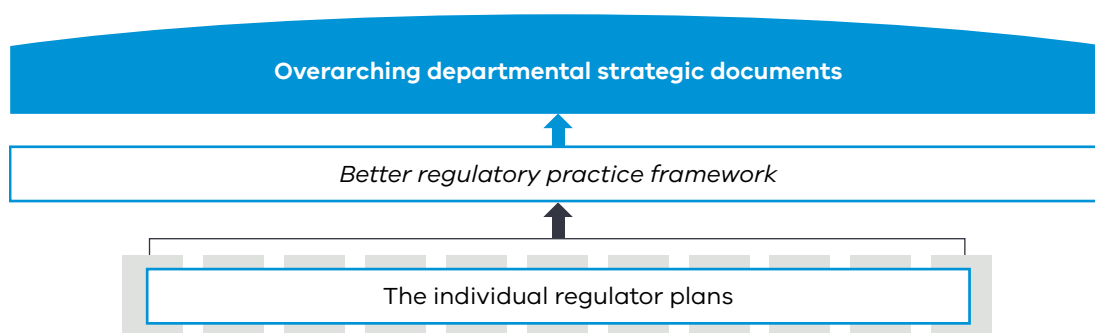
**Figure 3: Statement of Expectations framework**



## 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 legislative and regulatory outcomes to protect and improve the health of Victorian communities.

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

## Continuous improvement

### Performance reporting

An effective performance monitoring and reporting system is a key aspect of a well governed water agency. Good governance requires that a water agency has a structured and regular system of performance monitoring and reporting that is appropriate for both internal and external reporting requirements such as the drinking water quality annual report. Furthermore, reporting on drinking water quality performance to regulators, governing boards and the community is an important part of a performance management framework for public sector accountability.

Ideally, a water agency that is performing effectively in providing high-quality drinking water should demonstrate achievements that exceed targets (if they are cost-effective), thereby delivering improved water quality for all customers and communities.

Effective performance monitoring and reporting on drinking water quality is equally important for internal accountability. This enables a water agency's management and board to evaluate its performance against its drinking water policy commitments and provides the feedback loop to take appropriate and timely action to achieve drinking water policy objectives and outcomes.

### Key performance indicators

To provide greater assurance of high-quality drinking water to all customers and communities, especially in preparedness for and response to future challenges; the department's Water Unit proposes to develop performance-based outcomes and associated indicators that incentivise water agencies to demonstrate their commitment to continuous improvement.

For performance reporting, a clear and accurate specification of a well-chosen suite of key performance indicators are necessary. The suite of key performance indicators should be comprehensive and consistent and, together with complementary information, present a balanced and coherent snapshot of an agency's achievements in providing quality drinking water within a strategic context.

## Guidance and protocols for issuing and rescinding drinking water advisories

The compounding risks of climate change with more frequent bushfires, floods, power outages and algal blooms challenged the quality and supply of drinking water. These events have multiple impacts such as reduced capacity for raw water harvesting in catchments; challenges for water treatment plants to safely treat the change in water quality; and maintaining acceptable water quality within distribution systems. This was reflected in the significant increase in the number of drinking water advisories issued by water agencies to affected customers since December 2019. Indirectly, these events have also identified treatment plant and process failures that could have been prevented.

The department reviewed the incidents to understand lessons learned from events that led to such advisories. The review identified that a variety of situations can lead to making difficult decisions on both an urgent and defensible basis. It is therefore important that water agencies are better prepared in responding to possible incidents of contamination of drinking water to protect public health. The aim is to ensure good-quality tap water remains the preferred choice of drink to stay healthy.

In June 2020 the department engaged Water Futures Limited to help develop practical guidance and protocols relating to 'boil water', 'do not drink' or 'do not use' advisories for:

- assessing public health risk to inform decisions on drinking water advisories
- cleansing, sanitising and restoring drinking water supply networks
- making decisions on rescinding drinking water advisories.

The guidance and protocols are intended to:

- ensure the department and water agencies adopt reasonably consistent and defensible approaches to issuing and rescinding drinking water advisories
- help the department and water agencies understand expectations regarding what may trigger advisories and the action, data/evidence and information required before rescinding them.

At the end of the reporting period, the department was preparing to seek input from key stakeholders including water agencies, other regulators and partners such as the National Health and Medical Research Council.



## Water sector liaison

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. This is achieved, in part, through designated liaison officers assigned to each water agency.

This year saw several challenges to business-as-usual arrangements, influenced by both internal and external changes. In August and September 2019, two new staff members joined the Water Unit to fill two previously vacated roles. Liaison officers are each responsible for overseeing a number of water agencies and being the first point of contact for those agencies. These two appointments triggered a reassignment of water agencies among team members.

On 16 March 2020 a state of emergency in Victoria was declared in response to the coronavirus (COVID-19) pandemic. On 27 March 2020 the Deputy Chief Health Officer (Environment) wrote to all water agencies about the essential service they provide to the Victorian community and the importance of their role in supporting the coronavirus (COVID-19) response by ensuring the continuity of supply of safe drinking water. Providing safe drinking water from catchment to tap is the ultimate objective of pandemic and business continuity plans for water agencies. This includes ongoing operation and maintenance of water treatment plants, distribution system management, water quality monitoring, compliance reporting, investigation and rectification measures and incident and emergency management.

Like all workplaces, the Water Unit was challenged by the pandemic. Being agile and adaptable was demonstrated by continuing to work while undertaking safety measures to protect everyone. These first appeared as physical distancing and wearing face masks, and then progressed to limiting office attendance and changed to ongoing working-from-home arrangements. The increased use of web-based conference programs for team meetings and to conduct liaison meetings with water agencies became second nature and set a new paradigm in effective, alternate and acceptable ways of communicating. The Water Unit also actively volunteered or were called upon to assist in particular roles with the whole-of-department's coronavirus (COVID-19) response.

While the methods of operation altered for water agencies and the Water Unit, they continued to work together throughout 2019–20 to provide the Victorian community with confidence that drinking water was safe.

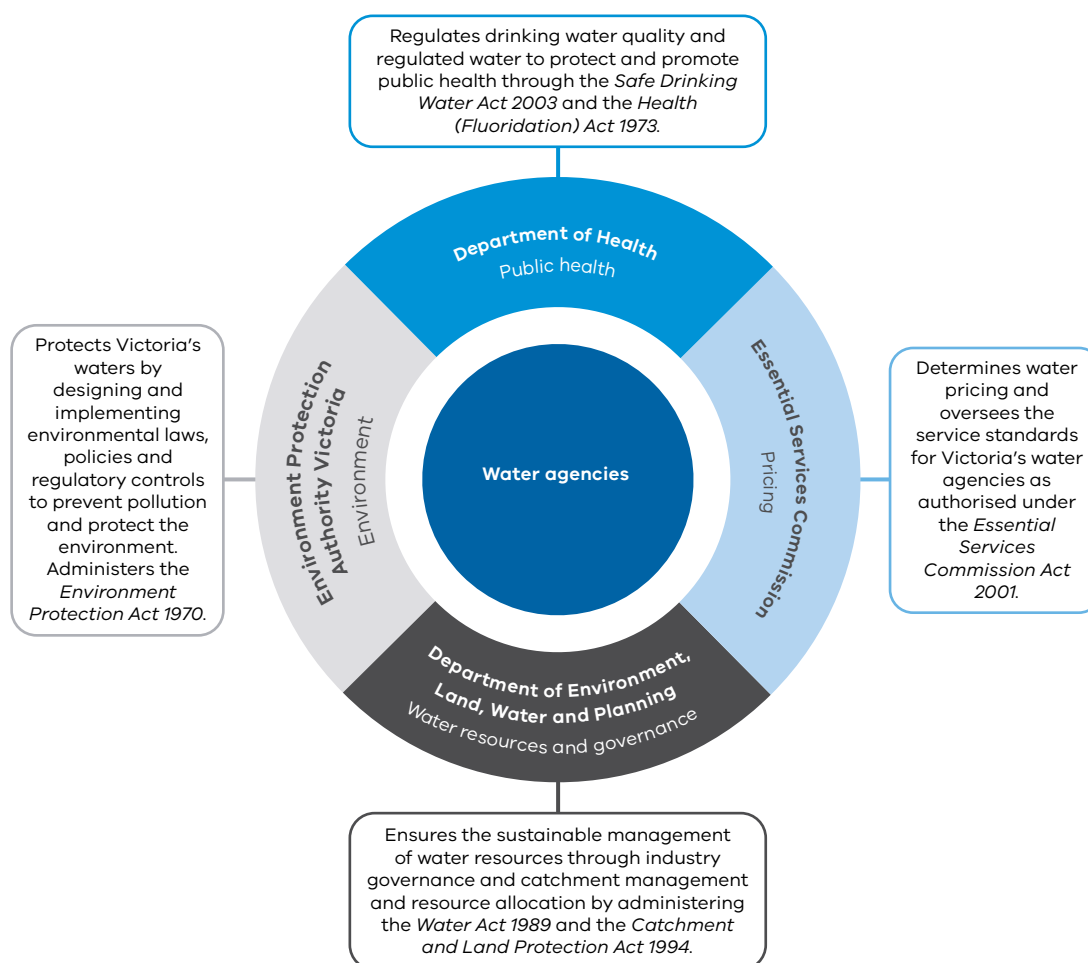
Water sector liaison is further enhanced through a whole-of-government approach including meetings with interdepartmental stakeholders and with other regulatory partners (Figure 5).

## A 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 Safe Drinking Water 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 through consultation with stakeholders required under s. 53(d) of the Act.

For 2019–20 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 for Health.
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 them with treated drinking water.

### Department expenditure associated with administering the Act

The administration levy for the 2019–20 financial year was set at \$1,310,817. 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, 2017–18 to 2019–20**

Expenditure type	2017–18	2018–19	2019–20	Variance to prior year
Salaries, allowances and salary-related on-costs	\$830,610	\$718,637	\$902,729	\$184,092
Indirect costs	\$74,432	\$62,020	\$101,139	\$39,119
Operating costs	\$76,990	\$129,323	\$110,397	-\$18,926
Communication and education	\$23,829	\$10,773	\$2,482	-\$8,291
Research and development	\$146,733	\$109,129	\$43,000	-\$66,129
Information technology	\$6,825	\$2,913	\$4,005	\$1,092
<b>Total expenditure</b>	<b>\$1,159,419</b>	<b>\$1,032,795</b>	<b>\$1,163,752</b>	<b>\$130,957</b>

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

During 2019–20 the department's salaries, related on-costs and indirect costs (office accommodation, depreciation and amortisation) were more than the previous period due to the appointment of two new liaison officers in August and September to fill two previously vacated roles in 2018–19.

## Operating costs

Operating costs include attendances at conferences and accommodation, departmental professional association memberships and the costs associated with engaging contractors for completing technical appraisals for fluoride plants and to develop guidance material to assist water agencies. The department endeavours to maintain a strong knowledge base through its memberships with Water Research Australia (WaterRA), the Water Services Association of Australia (the peak body of the Australian water industry), the Australian Water Association and the Water Information Sharing and Analysis Centre. The operating costs were less in this period due to fewer contracting assignments.

## Communication and education costs

Section 27(f) of the Act gives the Secretary the function of promoting awareness and understanding of drinking water quality issues among industry and the public. This includes informing the community and the water sector about drinking water and public health. The communication and education costs were lower than the previous period due to the coronavirus (COVID-19) pandemic and undertaking only one water agency regulatory forum at a hired venue. Another forum and other meetings were conducted via web-based conference programs.

### Water agency regulatory forums

Two regulatory forums were held during the year. The forums provide opportunities to share lessons learnt and to improve regulatory outcomes. The forum held in November 2019 was face to face, while the June 2020 forum was held online due to coronavirus (COVID-19)-related restrictions. Topics presented at each forum included the following:

#### November 2019 forum

- Interactive *E. coli* detection exercise
- Updates from the department on annual reports, risk management plan audits, the fluoride code of practice gap analysis and water sampling locality changes and gazettals
- Source water changes and managing risk
- Better regulatory practice.

### June 2020 forum

- Coronavirus (COVID-19) response and challenges
- The Collaboration on Sewage Surveillance of SARS-CoV-2 (ColoSSoS) sewage surveillance project coordinated by Water Research Australia
- Being a better regulator
- Updates from the department on risk management plan audits, the fluoride code of practice gap analysis, fluoridation plants technical appraisals and audits
- Future focus on improving regulatory practice and developing network sanitation and advisory protocols.

### **Upstream newsletter**

The purpose of the *Upstream* newsletter is to communicate about drinking water quality issues, public health matters of relevance to the water sector as well as reminders about the department's regulatory activities and upcoming events. One newsletter was produced in this reporting period.

The October 2019 edition welcomed two new members to the Water Unit and provided snapshots on:

- the new 'Climate change and health' webpage on the Better Health Channel website
- the Australian Medical Association recognising climate change as a health emergency
- regulated water supplies converted to fully treated drinking water localities
- the exclusion of fluoridated drinking water from Australia's therapeutic goods legislation
- updates about water fluoridation activity across the state and the review of the Public Health and Wellbeing Regulations 2009
- reminders about upcoming annual report submissions, risk management plan audits and the next water agency regulatory forum.

### **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.

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 public health priorities are considered in developing and delivering its research agenda.

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.

Research and development costs were less in this period due to professional membership fees being accounted for in operating costs.

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

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

The project began in 2018–19 with the department contributing \$20,000; a further \$18,000 was contributed in 2019–20. 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 ADWG 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 about 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 analyses
- lessons to date.

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

This reporting period saw completion of an information sheet and video about the 10 principles for source water protection in catchments. These principles provide an industry-wide standard approach for preventive risk management in drinking water supply systems. Future work related to this project will include the Victorian state of play case study as well as further communication about the range of benefits. The research project is expected to be completed mid-2021. For further information, visit WaterRA's website: <[www.waterra.com.au](http://www.waterra.com.au)>.

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

The project began in 2018–19 with the department contributing \$10,000; no financial contributions were made in the current reporting period.

The prevalence and impact of harmful and nuisance algal blooms (HNABs) 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 HNABs (including cyanobacteria) to the water industry. This assessment will provide an improved understanding on the economic risk posed by HNABs, which in turn will provide economic justification for adopting control and/or treatment strategies.

During 2019–20 the research team delivered a literature review of reports relevant to assessing the economic impact of HNABs within and outside Australia. The report found that the main operations and treatment-related financial impact on water utilities due to HNABs were plant shutdowns and inactivity, and there were also substantial catchment monitoring costs. The report identified limited current data published on the economic impact of HNABs on the Australian water industry. A survey of selected representatives of the Australian industry is in progress to explore this further. The responses to the survey will be used as part of the proposed economic modelling of the impacts of HNABs. This project is expected to be completed in mid-March 2021.

### **Development of a management system for emerging contaminants within the water industry (Project no: 1127)**

The department contributed \$5,000 to this project in 2019–20, with the project to begin in 2020–21. Emerging contaminants affect the entire water industry, but each water agency is affected differently. The Australian water industry has identified an opportunity to collaborate to improve understanding and management of the problem of unregulated contaminants. The project aims to develop a risk assessment tool for prioritising research needs for these contaminants. The tool employs a Bayesian network approach allowing individual water agencies to assess a contaminant against their organisational requirements. Furthermore, opportunities exist to share knowledge, water quality data and risk assessments, as well as to develop new techniques for monitoring and analysis.

A common management system can potentially assist water agencies to proactively manage risks associated with potential contaminants in drinking water sources as part of their risk management plans. This tool can also support further work with the Department of Environment, Land, Water and Planning to ensure potential risks are being proactively managed via planning mechanisms and catchment management plans based on the latest information. The project is expected to be completed in April 2021.

### **Understanding water quality risks under low and variable water level conditions (Project no: 1133)**

This project began in 2019–20, with the department contributing \$20,000. A continuing decline in rainfall and runoff in surface water catchments in many areas across Australia (including Victoria) has significant potential to affect water quantity and quality. The impacts of declining reservoir levels are further compounded by factors such as increased water demands, intensification of recreation demands, and ensuring sufficient water levels to sustain ecosystem life supporting capacity in some cases.

Dams and reservoirs have long been recognised as critical storage barriers assisting to reduce water supply contamination hazards. These water supply assets also play a role in providing ecosystem services, which can effectively reduce levels of pathogens and other contaminants. The ecosystems services provided rely heavily on water levels, and, with levels reducing, some of these services may be compromised.

Furthermore, there is potential for the water quality to be impacted by reduced and highly variable water levels. Reduced water levels may result in increased algal blooms, elevated levels of metals such as iron and manganese, and increased particulate and dissolved organic matter. Changes in water levels can also increase potential for short-circuiting of pathogens and other contaminants from inflows to dam and reservoir offtakes.

During the reporting period this project was at the early inception stage and the final project details were being developed. The project is due to be completed in August 2021 and is expected to provide valuable knowledge to water agencies to better adapt and respond to a changing climate.

### **Information technology costs**

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



# Drinking water quality performance and regulatory requirements in 2019–20

## Water sampling localities

Water suppliers are required to collect samples of drinking water from water sampling localities that have been specified under regulation 6 of the Regulations. 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.

Water suppliers must submit water sampling locality proposals to the Secretary to specify new drinking water distribution systems, including when regulated water supplies are to be upgraded to drinking water supplies. Proposals by water suppliers to vary and/or revoke existing water sampling localities may be required due to redefining of boundaries, merging or dividing current water sampling localities, or changes to supply arrangements.

The variations gazetted in 2018–19 for City West Water’s and Barwon Water’s water sampling localities took effect on 1 July 2019. During the 2019–20 period the department completed the review and gazettal of three water sampling locality proposals from Grampians Wimmera Mallee Water, South East Water and Yarra Valley Water.

As of 30 June 2020 there were 474 water sampling localities across the state, with a net increase of three new water sampling localities added from last year.

Details of changes to water sampling localities in the 2019–20 period are provided in Tables 2 and 3.

**Table 2: Water sampling locality gazettals in 2018–19, effective 1 July 2019**

<b>Water agency</b>	<b>Water sampling localities affected by notice</b>	<b>Reason for Government Gazette notice</b>	<b>Government Gazette number</b>	<b>Date notice takes effect</b>
Barwon Water	Ocean Acres (revoked) Bannockburn, Batesford, Clifton Springs, Leopold, Montpellier, Moorabool, Ocean Grove, Torquay and Teesdale (varied)	Water sampling locality changes were required to better reflect current water systems operations. Torquay water sampling locality was varied to include the boundary area previously covered by the Ocean Acres water sampling locality.	S221, Wednesday 5 June 2019	1 July 2019
City West Water	Caroline Springs, Deer Park, Taylors Lakes and Werribee (varied)	Water sampling locality changes were required to better reflect supply arrangement and expansion of water supply boundaries due to population growth.	S249, Friday 21 June 2019	1 July 2019

**Table 3: Water sampling locality gazettals in 2019–20**

<b>Water agency</b>	<b>Water sampling localities affected by notice</b>	<b>Reason for Government Gazette notice</b>	<b>Government Gazette number</b>	<b>Date notice takes effect</b>
Grampians Wimmera Mallee Water	Beulah, Brim and Woomelang* (varied)	Water sampling locality changes were required because the three water supply systems returned from regulated water to drinking water via a new water pipeline from Warracknabeal Water Treatment Plant.	S344, Friday 30 August 2019	30 August 2019
South East Water	Clyde North (new) Berwick, Cranbourne, Devon Meadows, Pakenham, Somerville and Upper Beaconsfield (varied)	Water sampling locality changes were required due to operational changes, new assets and expansion of boundaries in growth areas.  A new Clyde North water sampling locality was specified to reflect a large population growth area and the provision for the locality boundary area to receive a single source supply from the desalination water pipeline.	S355, Thursday 5 September 2019	5 September 2019
Yarra Valley Water	Mernda/Hurstbridge (revoked) Craigieburn, Kangaroo Ground and Yarrambat (new)  Brahams Road, Bundoora, Croydon, Doncaster, Eltham, Emerald, Epping, Glen Waverley, Glenroy, Healesville, Ivanhoe, Kew, Lilydale, Lower Plenty, Lyrebird Avenue, Malvern, Mitcham, Montrose, Northcote, Plenty, Preston, Ridge/Monbulk, Seville, Somerton, Wallan, Warburton, Warranwood, Whittlesea, Woori Yallock, Yarra Glen and Yarra Junction (varied)	Water sampling locality changes were required to reflect changes to water supply sources, system hydraulics and updates to coordinate references.  The Mernda/Hurstbridge water sampling locality was removed and divided into three new water sampling localities at Craigieburn, Kangaroo Ground and Yarrambat.	S304, Friday 26 June 2020	1 July 2020

\* Beulah, Brim and Woomelang were previously drinking water supplies with specified water sampling locality boundaries (S46, Thursday 8 March 2007) prior to being declared as regulated water (S52, Monday 27 February 2012) due to deterioration in raw water quality caused by floods and treatment limitations. The return of these regulated water supplies to drinking water supplies was achieved following completion of the Mallee Town Project and varying the notice from previous specification of regulated supplies to drinking water supplies.

## Drinking water quality standards

Section 17 of 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 regulation 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 (regulation 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 (regulation 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 4).

**Table 4: 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 ADWG is the authoritative reference for health-based guideline values and is used to determine compliance with regulation 12 (b) of the Regulations.

### Section 18 notifications

In the Act, section 18 refers to a notification required if non-complying 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 section 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 474 water sampling localities around Victoria and tested for water quality parameters to determine compliance with water quality standards.

In 2019–20 four water suppliers notified the department of a total of 17 notifications regarding water that did not meet a standard under either regulation 12(a) (compliance with Schedule 2 drinking water quality standards) or regulation 12(b) (compliance with any other drinking water quality standards). This is a 31 per cent increase compared with 2018–19, when 13 notifications were made to the department by eight water suppliers.

Of the 17 notifications in 2019–20, eight were related to noncompliance under regulation 12(a) and the remaining nine related to noncompliance with any other drinking water quality standards under regulation 12(b) as outlined in the sections below.

Coliban Water's water sampling localities of Bendigo Spring Gully, Bridgewater-Inglewood and Castlemaine failed to meet the water quality standard for *E. coli* and the water sampling localities of Bealiba (on two occasions), Laanecoorie and Tarnagulla failed to meet the water quality standard for total trihalomethanes.

Wannon Water's water sampling locality of Cavendish failed to meet the total trihalomethanes water quality standard on two occasions.

Appendix 2 lists all section 18 notifications for the year.

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

To demonstrate compliance with regulation 12(a), drinking water samples must be analysed for the parameters required under the Schedule 2 water quality standards of the Regulations as shown in Table 4 above.

Table 5 and Figure 6 are interlinked and refer to compliance with Schedule 2 drinking water quality standards. Table 5 represents the actual number of **water samples** that did not meet regulation 12(a) drinking water quality standards, and Figure 6 illustrates the percentage of water sampling **localities** that complied with regulation 12(a) drinking water quality standards.

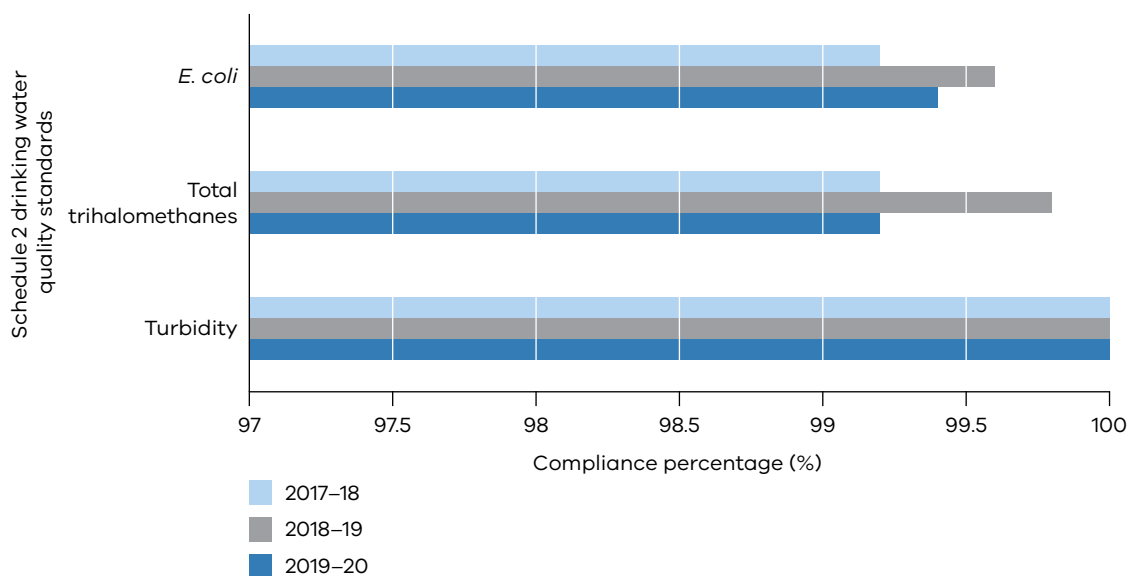
In this reporting period there were eight notifications by two water suppliers representing seven water sampling localities that did not meet two of the Schedule 2 drinking water quality standards. Coliban Water made six notifications, while Wannon Water made two notifications under section 18 of the Act.

In 2019–20, water suppliers were fully compliant with the water quality standard for turbidity, as was the case in 2018–19 and 2017–18.

**Table 5: Water samples not meeting Schedule 2 drinking water quality standards, 2017–18 to 2019–20**

Parameter	2017–18	2018–19	2019–20
<i>E. coli</i>	4	2	3
Total trihalomethanes	7	2	6
Turbidity	0	0	0
<b>Total</b>	<b>11</b>	<b>4</b>	<b>9</b>

**Figure 6: Percentage of water sampling localities compliant with Schedule 2 drinking water quality standards, 2017–18 to 2019–20**



### ***Escherichia coli***

*E. coli* is a microbial indicator of drinking water quality. Schedule 2 of the Regulations requires 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 samples. The detection of *E. coli* can signal microbial contamination and therefore any detection is immediately reported under section 22 of the Act.

When *E. coli* is detected in drinking water, an investigation is undertaken by the water agency in accordance with the department's *Appendix 1: Guidelines for the investigation and reporting of E. coli detections* to determine the cause, undertake corrective actions and implement procedures 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 section 18 of the Act.

Coliban Water made three notifications under section 18 of the Act, where water samples did not meet the *E. coli* standard. There was one report each from South Gippsland Water and Western Water in the previous year. These three non-compliances were associated with:

- taking samples for investigation purposes after spot dosing the treated water tank with chlorine, which prevented the ability to confirm the validity of the original sample result
- potential rainwater ingress point at the clear water storage tank and inadequate information to determine the level of disinfectant when the sample was taken
- inadequate disinfection residual in the affected basin when the sample was taken.

A rapid risk assessment at the time of each event determined there was no immediate need to issue a 'boil water' advisory. Other samples taken in the reticulation system on the same day showed clear results. The assessment was further supported by investigations and post-corrective samples showing no detection of *E. coli*. Coliban Water has taken action to repair ingress points in tanks and to optimise residual disinfection in the systems. Coliban Water also brought forward its routine tank cleaning and inspection program.

Water agencies have been encouraged to establish strategies to ensure chlorine residual levels are kept at target operating ranges and to sample from more than one sample point within the same locality every week to maintain confidence in the drinking water quality across the network, including in the extremities of the system.

During the reporting year, 99.4 per cent of all water sampling localities complied with the *E. coli* drinking water quality standard compared with 99.6 per cent in the previous year (Figure 6).

### **Total trihalomethanes**

Total trihalomethanes are by-products of disinfection; formed when chlorine comes into contact with organic matter in water. Schedule 2 of the Regulations require drinking water to be tested for total trihalomethanes to ensure the result is compliant with the standard of less than or equal to 0.25 mg/L.

During the year, three notifications were received from Coliban Water across three water sampling localities (one notification covered two water sampling localities) for total trihalomethanes exceedances. Coliban Water has taken appropriate measures to manage the concentration of total trihalomethanes by ceasing temporary disinfection using free chlorine and returning to residual disinfection using chloramination.

Wannon Water made two notifications for total trihalomethanes exceedances at one water sampling locality (there were two notifications in 2018–19 at the same water sampling locality). Wannon Water has taken several measures to manage the concentration of total trihalomethanes including increased flushing of the supply system, installation of an inlet spray bar and splashboard in the clear water storage tank to volatilise total trihalomethanes and a planned upgrade of the Cavendish disinfection plant to rectify this issue.

Mt Hotham and Falls Creek alpine resort management boards have not been sampling for total trihalomethanes as the primary water treatment used by these two water suppliers is ultraviolet disinfection. Coliban Water has not been sampling for total trihalomethanes at Elmore. East Gippsland Water undertook some sampling for total trihalomethanes at Dinner Plains. Ultraviolet disinfection is the primary water treatment used by these two water suppliers at these localities. However, best practice to maintain safety throughout the supply and reticulation system requires the addition of a residual disinfectant.

The department has reminded these water agencies that under Schedule 2 of the Regulations they are required to sample for total trihalomethanes. All four water agencies have committed to meet compliance with the Regulations.

The percentage of water sampling localities that were compliant with total trihalomethanes standard in 2019–20 was 99.2 per cent, a decrease from 99.8 per cent compliance in 2018–19 (Figure 6).

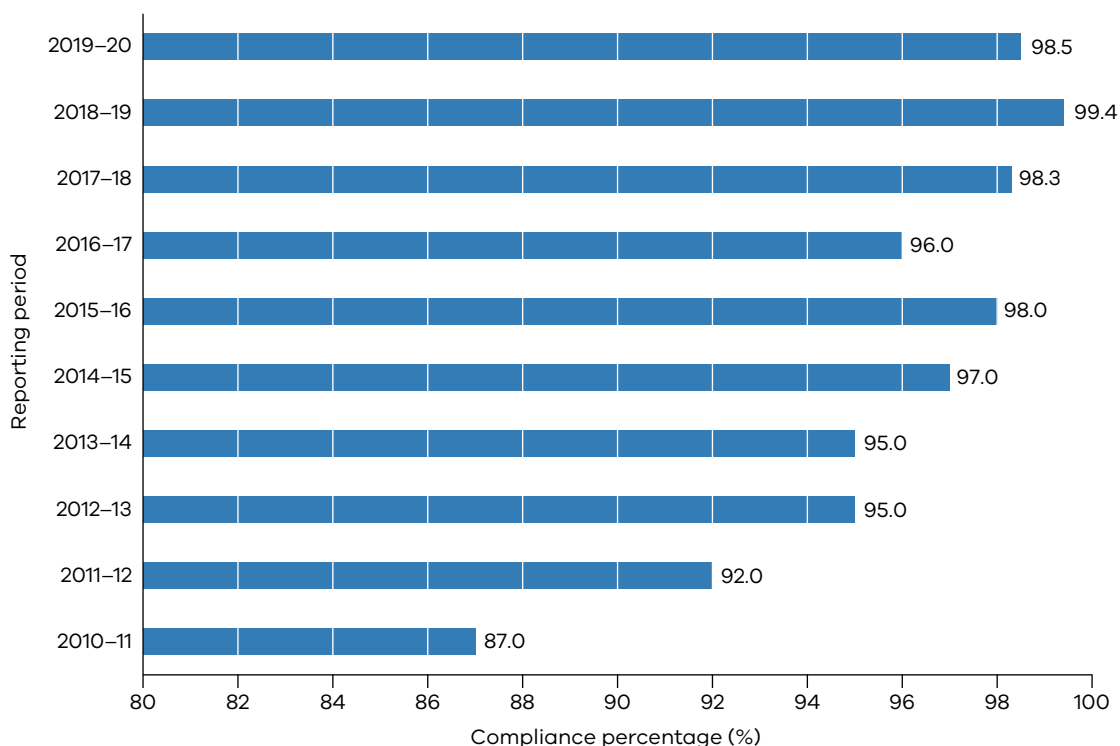


## Turbidity

Turbidity is the cloudiness of water caused by the presence of fine, suspended matter in drinking water. Schedule 2 of the Regulations requires the 95th percentile of results for samples in any 12 month period to be less than or equal to 5.0 Nephelometric Turbidity Units (NTU). In the 2019–20 reporting period, 100 per cent compliance with the turbidity water quality standard was achieved. The same result has been achieved since 2017–18.

Figure 7 presents the past 10 years of performance of water sampling localities continuously compliant with Schedule 2 parameters. During the reporting year, of the 474 sampling localities, 467 continuously met Schedule 2 drinking water quality standards, achieving an overall compliance of 98.5 per cent compared with 99.4 per cent compliance in 2018–19.

**Figure 7: Percentage of water sampling localities continuously compliant with Schedule 2 drinking water quality standards, 2010–11 to 2019–20**



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

To demonstrate compliance with regulation 12(b), and as part of their water sampling program, water suppliers use a risk-based approach to determine the water quality parameters, water sampling locations and frequency of testing in their risk management plans. Water suppliers 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 suppliers' water sampling programs are commensurate with this risk and tailored to each water sampling locality and supply system.

Table 6 summarises water samples not meeting other drinking water quality standards in 2019–20 compared with the two previous reporting periods.

**Table 6: Water samples not meeting other drinking water quality standards, 2017–18 to 2019–20**

Parameter	2017–18	2018–19	2019–20
Chlorine	0	1	2
Bromate*	1	0	0
Chloral hydrate*	0	0	3
Dichloroacetic acid*	0	0	0
N-Nitrosodimethylamine*	0	0	3
Trichloroacetic acid*	5	1	0
Aluminium	0	1	2
Lead	1	5	0
Manganese	0	0	0
Nickel	5	1	0
<b>Total</b>	<b>12</b>	<b>9</b>	<b>10</b>

\* 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. While long-term high concentrations of disinfection by-products may increase risks to human health, short-term low-level exceedances of the health guideline values do not present a risk to health. The ADWG states that:

*Although the microbial quality of drinking water is of primary importance and must never be compromised, chlorine levels and the formation of chlorination by-products should be controlled to prevent any adverse health effects that may eventually be found to be attributable to disinfection by-products.*

While total trihalomethanes are addressed in the Schedule 2 standards, water agencies also sample for other disinfection by-products where relevant. In 2019–20 Goulburn Valley Water had three drinking water samples from three different localities that did not meet the standard for chloral hydrate. Coliban Water made two notifications for three localities that did not meet the standard for N-Nitrosodimethylamine (NDMA).

## Metals

Metals may be present in drinking water due to 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).

This reporting period saw an improvement in compliance with the standards for metals.

## Variations of aesthetic standards

Section 19 of the Act allows the Minister for Health to vary aesthetic standards on application by a water supplier as it applies to drinking water supplied by the water supplier. During 2019–20 there were no applications by water suppliers to vary aesthetic standards.

## Exemption from water quality standards

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 existing exemptions from meeting a water quality standard.

## Section 22 reports of known or suspected contamination

Under section 22 of the Act, water agency and council officers must **immediately** report to the Secretary 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 to ensure water agencies are appropriately managing the issue and to minimise any potential impact to public health. In the absence of immediate reporting to the department, there is a risk that the incident may lead to harms that could have been avoided or minimised. As such, there may be penalties associated with a water agency not meeting the requirement of section 22 of the Act to immediately report to the department any known or suspected contamination.

The department works with water agencies to ensure all relevant corrective actions are taken to minimise risks and that preventive actions are implemented to minimise recurrence of the issue.

Understanding trends in section 22 reports helps identify potential systemic issues or emerging threats to the supply of drinking water, enabling a strategic response.

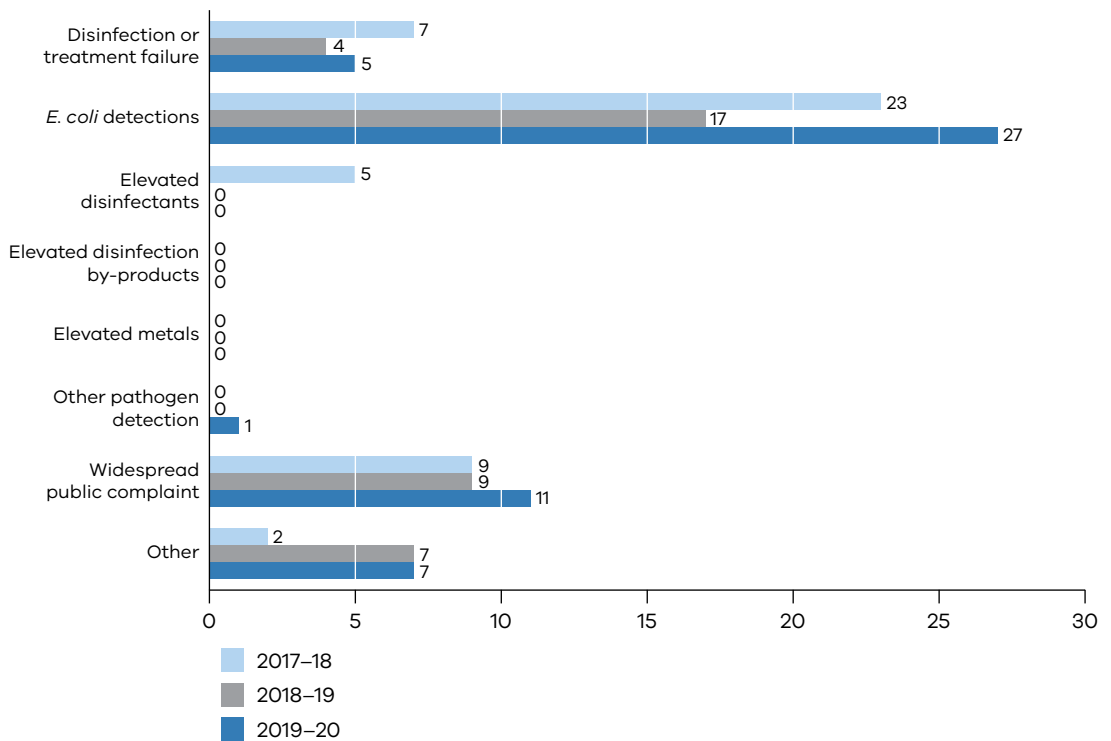
Section 22 reports have generally been declining from a peak of 199 reports in 2010–11 to an average of around 50 over the past five years (a 75 per cent decrease). This can be attributed to water agencies' investment in infrastructure, the maturity of water agency risk management practices, the strong focus on the audit process and continuous improvement.

In 2019–20 there were 51 reports made under section 22 of the Act by 14 water agencies, compared with 37 reports the previous year (Table 7). These reported issues are broadly grouped into various categories in Figure 8, which shows there was an increase in three categories that contributed to the overall increase in the number of reports. These reports are discussed in further detail below.

**Table 7: Number of reports made under section 22 of the Act, 2017–18 to 2019–20**

Reporting period	Number of reports
2019–20	51
2018–19	37
2017–18	45

**Figure 8: Categories of reports made under section 22 of the Act, 2017–18 to 2019–20**



## Disinfection or treatment failure

There were five reports to the department related to disinfection/treatment failure during the 2019–20 reporting period.

- **Rochester Water Treatment Plant, Coliban Water:** Investigations of the issue revealed that one membrane train was in operation without performing integrity tests for a period of time and one of the membrane modules in the affected train may have had an integrity breach. This issue raised a concern of the potential for inadequate pathogen removal in the drinking water produced. Coliban Water implemented improvement actions to better identify and respond to failed integrity tests. Coliban Water did not detect this incident in a timely manner.
- **Buchan Water Treatment Plant, East Gippsland Water:** Issued a 'do not drink' water advisory with the intention to bypass the plant to keep up with the demand for firefighting, however mechanical difficulties prevented the bypass. It was subsequently identified that the sodium hypochlorite tank was empty with no secondary chlorination. The uncertainty in the quality of drinking water being supplied resulted in maintaining the 'do not drink' water advisory issued. East Gippsland Water subsequently implemented constant SCADA checks, high flow alarms and installed back up communications.
- **Moe Water Treatment Plant, Gippsland Water:** A significant storm event caused a partial power failure at the plant, which in turn caused a mains power supply phase fault. This led to the plant automatically restarting without re-engaging critical process control alarms. The event also caused the raw water quality from the Narracan catchment to rapidly deteriorate. As the process control alarms were not active, a treatment failure occurred, allowing out-of-specification high-turbidity water to enter the clear water storage that supplies Moe and surrounding townships. Gippsland Water issued a 'boil water' advisory to the affected customers and investigated, rectified and verified the correct operations of process control alarms. A full process control alarm verification test program was successfully completed to ensure the plant would not experience the same process failure. In addition, Gippsland Water also checked, rectified and tested all critical process controls at all of its water treatment plants.
- **Oxley Water Treatment Plant, North East Water:** A flaw in the electrical configuration of the plant allowed raw water to enter the reticulation system without the chlorination system running. As a result, inadequately disinfected water entered the distribution system and North East Water issued a 'boil water' advisory to Oxley customers. Following the identification and rectification of the systemic faults that led to the incident, the lessons were applied to other water treatment plants of similar configuration.

- **Merrimu Water Treatment Plant, Western Water:** A prolonged exceedance of the critical control point limit for filtered water turbidity resulted in a minor increase of turbidity for 20 minutes during normal operation. Western Water reviewed filter performance using the SCADA system, historical review of untreated water quality results, treated water quality and other treatment processes and all associated sample results. The filtered water turbidity critical control point limit exceedance was due to interference from biofilm within the sample line. The cause of the control system fault was resolved by implementing maintenance on the turbidity probe and sample line.

### **Escherichia coli detections**

During this reporting period there were 27 reports of *E. coli* detections compared with 17 in the previous year, an increase of 59 per cent. Following investigations by the water agencies, 24 of the 27 *E. coli* detections were found to be false positive samples. A false positive sample occurs where the *E. coli* detection is found to be not representative of the drinking water being supplied.<sup>2</sup> This increase is concerning to the department as samples are expected to represent the water supplied to assure water quality. These concerns been raised with the water agencies to implement measures to rectify the number of false positive sample results.

Investigations into these detections revealed that a majority have been attributed to sampler error or issues with sampling procedures or analysis. Other causes include weather/rain events, dust and vulnerability due to the location and configuration of sampling taps potentially exposing them to contamination.

Ten water agencies reported *E. coli* detections, with North East Water reporting on seven occasions.

### **Widespread public complaints**

Regulation 16(j) requires water suppliers to provide in their annual reports a summary of complaints received by the water supplier relating to the quality of drinking water supplied and a summary of the responses and analysis of the issues arising from the complaints.

The most common drinking water quality complaint was for discoloured/dirty water, followed by taste and odour. A range of factors can result in drinking water tasting, smelling and appearing unpleasant. Where water supplied or to be supplied may cause widespread public complaints, the water agency must inform the department in accordance with section 22 of the Act.

There were 11 reports of widespread public complaints in this reporting period, a 22 per cent increase on 2018–19.

<sup>2</sup> For a detailed description of **a false positive sample**, refer to Schedule 2 of the Safe Drinking Water Regulations 2015 at <<https://www.legislation.vic.gov.au/in-force/statutory-rules/safe-drinking-water-regulations-2015>>.

In 2019–20 there were 7,498 drinking water quality complaints received by 16 water suppliers, a 6 per cent increase compared with the previous year. Overall, nine water suppliers reported an increase in drinking water quality complaints in 2019–20, and seven reported a decrease in complaints. Appendix 5 presents details of drinking water quality complaints to individual water suppliers.

City West Water reported a large increase of 34 per cent in drinking water quality complaints due to an increased proportion of discoloured water complaints associated with the withdrawal of discoloured water from the lower depths of Greenvale Reservoir (via a partially open, low-level withdrawal gate at the outlet tower) reported in February 2019. This event deposited significant sediment material in the distribution network, resulting in ongoing reports of discoloured water in 2019–20.

In absolute terms, Yarra Valley Water reported the highest number of complaints in 2019–20, an increase of 4 per cent compared with 2018–19. Two principal reasons for the increase in discoloured water complaints were due to planned works in the Somerton Reservoir, with subsequent recharging of the main resulting in resuspension of the naturally occurring sediments; and a large burst on a 150 mm main in the Glen Waverley area, resulting in resuspension of the naturally occurring sediments.

The reasons identified across these reports in the 2019–20 reporting period included complaints due to presence of algae producing taste and odour compounds (high 2-Methylisoborneol and geosmin), burst mains and the presence of naturally organic compounds.

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

All water suppliers are implementing appropriate actions to minimise the number of drinking water quality complaints.

### **Other incidents**

There were seven 'Other' category of incidents reported that included water main bursts, raw water being drawn into treated water, treatment process bypasses to keep up with unprecedented water demand for firefighting purposes, impacts on water treatment processes from algal blooms and increased source water turbidity, backflow of water from an air valve pit into the mains and an incident involving pathogen detection in a drinking water reservoir. These incidents have been placed in the 'Other' category to allow comparison with the previous two reporting periods (see Appendix 3 for all section 22 reports received by the department). This indicates that, while there are common categories for section 22 reports, there can always be other events that need to be managed and controlled in a timely manner.



## Risk management plan audits

Sections 7 and 8 of the Act require water suppliers and water storage managers respectively to prepare, implement, continuously review and revise risk management plans. Section 10 of the Act requires risk management plans to be audited by an approved auditor to determine whether a water supplier and/or a water storage manager has complied with the obligations imposed by sections 7(1) and/or 8(1) during the audit period respectively. Section 11 of the Act empowers the Secretary of 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 October 2019, under section 11 of the Act, the Secretary by delegation and written notice required water suppliers and water storage managers to have their risk management plans audited between 1 November 2019 and 31 May 2020. However, due to the coronavirus (COVID-19) pandemic, and its impact on water agencies' normal business activities and operational challenges, and to ensure high-quality audits, the specified date to conduct the audit was extended from 31 May 2020 to 28 August 2020. Seven of the 24 water agencies completed their risk management plan audits during the reporting period (Table 8).

The audit outcomes of the 17 water agencies that completed their risk management plan audits from 1 July 2020 to 28 August 2020 will be reported in the 2020–21 water quality annual report.

**Table 8: Water agencies' risk management plans audit outcomes**

Water agency	Audit outcome	No. of opportunities for improvement	Key opportunities for improvement (OFI)
Central Highlands Water	Complied with the obligations imposed by section 7(1) during the audit period.	1	Alignment of process flow diagram with actual system configuration.
Falls Creek Alpine Resort Management Board	Complied with the obligations imposed by section 7(1) during the audit period.	8	In total, eight opportunities for improvement (OFIs) were identified during the audit. The high-priority OFIs focused on improvements to SCADA systems for water supply assets, improved alarms and reviews of protocols and training needs. Other OFIs were identified with the supply system performance and resilience, with improvements to hypochlorite dosing alarms, procedures for flushing pipework and installation of an emergency standby generator for water pumps.
Lower Murray Water	Complied with the obligations imposed by section 7(1) during the audit period.	19	The audit identified 19 OFIs across different water supply assets. The main OFIs of note relate to water storage asset integrity including asset condition and vermin-proofing.
Mt Buller and Mt Stirling Alpine Resort Management Board	Complied with the obligations imposed by section 7(1) during the audit period.	7	The audit identified seven OFIs. The OFIs identified potential improvements to training of operations staff, enhancing SCADA systems, developing alarms, aligning ultraviolet intensity against water turbidity, reviews and upgrades to chlorine dosing, upgrades to water storage reservoirs and upgrades to security measures.
Parks Victoria	Complied with the obligations imposed by section 7(1) during the audit period.	1	Develop a schedule for scenario testing of incident and emergency management procedures.
Southern Alpine Resort Management Board	Complied with the obligations imposed by section 7(1) during the audit period.	2	The audit identified two OFIs. An opportunity was found to improve the SCADA system. The other OFI related to upgrading the Lake Mountain Supply (currently regulated water) to potable water supply standard.
Wannon Water*	<b>Did not comply</b> with the obligations imposed by section 7(1) during the audit period (three minor non-compliances relating to establishing preventative measures; establishing and implementing critical control points; and quantifying microbial risk.)* Audit recommendations focused on the review of microbial risk assessments and risks associated with waste return to the head of the treatment plant and the need for aligning treatment critical control points and critical control limits with the microbial risk profile.	2	In addition to the noncompliant finding, OFIs were identified with the risk assessment review process. The OFIs related to improvements to establishing the regular review of all risks identified in the risk assessment, which includes analysing available water quality data. Also identified was establishing a process in the risk assessment methodology for assessing residual risk.

\* This is the second consecutive risk management audit that Wannon Water has been assessed to be noncompliant. Wannon Water has submitted a plan to address its risk management plan audit noncompliance issues.

## Regulated water declarations

Some 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 section 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.

There was one variation made to regulated water declarations during this reporting period for the regulated supplies for Beulah, Brim and Woomelang. In August 2019 Grampians Wimmera Mallee Water completed its Mallee Towns Drinking Water Supply Project, with the upgrade of these three regulated supplies returning to reticulated drinking water. Consequently, these three supplies were re-gazetted as water sampling localities under regulation 6 of the Regulations.

Grampians Wimmera Mallee Water has the largest number of regulated supplies in Victoria, with 39 rural towns supplied with regulated water. In addition to these regulated water supplies, Grampians Wimmera Mallee Water also has 10 domestic and stock water supply pipelines that are gazetted as regulated supplies.

Other water suppliers with regulated supplies include Central Highlands Water (three supplies), Coliban Water (seven supplies), Goulburn Valley Water (six supplies) and Lower Murray Water and Wannon Water (two supplies each). In addition, the Southern Alpine Resort Management Board provides a regulated supply to its Lake Mountain area.

Appendix 4 lists the regulated water supplies for this reporting period.

## Undertakings

Under section 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. During the reporting period there were no undertakings in place.

## Annual reports

Under section 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 each water agency's website by the next business day. Part 5 of the Regulations outlines the details to be included in the annual reports, and the department's *Guidance: Water quality annual report* assists water agencies in meeting the annual report requirements under the Act and Regulations.

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

All water agencies submitted their annual reports to the department within the required timeframe for this reporting period. Individual water quality annual reports can be viewed on each agency's website. Appendix 1 lists the contact details for each water agency.

## Emergency preparedness and incident management

There were six 'boil water' advisories and two 'do not drink' water advisories issued by five water suppliers between December 2019 and April 2020. Whilst some were due to extreme weather events (extreme heat, algal blooms, bushfires and storms), others were due to preventable circumstances. The advisories issued and the event(s) that triggered these advisories are discussed below.

### Boil water advisory due to algal blooms affecting Red Cliffs Water Treatment Plant – Lower Murray Water

During December 2019 an unprecedented blue-green algal (BGA) bloom developed in the Murray River, exacerbated by extreme and prolonged heat conditions in the region.

On the day of the incident, the sludge collector in the pre-sedimentation tank at the Red Cliffs Water Treatment Plant (WTP) failed due to an excessive amount of sludge accumulating at the bottom of the tank, which was associated with the BGA bloom. The poor water quality, which was further affected by the sludge collection mechanism failure, subsequently affected the performance of the filters.

On 15 December 2019, Lower Murray Water notified the department and submitted a section 22 report as a result of exceeding the ADWG filtered water turbidity guideline value of 0.2 NTU, and breaching the filtered water turbidity Critical Control Point (CCP) limit of 0.5NTU at the Red Cliffs WTP. All noncompliant water was diverted away from the clear water storage tank. Lower Murray Water issued a 'boil water' advisory to Red Cliffs customers as a precaution following a risk assessment which identified that Lower Murray Water might have been unable to treat the water to the required standard when the storage needed replenishing. The advisory was lifted on 16 December 2019 after completing repairs to the sludge rake and verifying the safety and quality of drinking water.

#### Key vulnerabilities that led to the incident

The BGA bloom included species that affected the settling characteristics of flocs during the sedimentation stage; forming compact flocs that rapidly settle out, leaving relatively large volume of micro flocs suspended in the settled water. Consequently, these micro flocs were carried over into the filters, in turn affecting filter performance and resulting in turbidity breakthrough.

#### Lessons/mitigation measures undertaken

To recover the treatment process, Lower Murray Water engaged and consulted with other water agencies who had similar BGA events that affected the water treatment process.

It was found that the *Dolichospermum* coiled species that affected the treatment process can generate extracellular polymeric substances as a result of physiological stress or due to being at the end of its growth phase. The presence of extracellular polymeric substances in water affects the settling characteristics of flocs during the sedimentation stage of water treatment by forming compact flocs as described above.

Actions have been developed in relation to increased monitoring of sludge wasting from the clarifiers and adjustments to alum dosing. Lower Murray Water is actively monitoring BGA using in-house resources, with microscopes at WTPs and operators trained to measure biovolumes. Lower Murray Water is also conducting more taste and odour monitoring and monthly sampling for verification purposes.

## **Boil water advisory for Oxley due to inadequate disinfection – North East Water**

A flaw in the electrical configuration of the WTP at Oxley allowed raw water to enter the reticulation without the chlorination system running. As a result, inadequately disinfected water entered the distribution system. On 22 December 2019 North East water issued a 'boil water' advisory to Oxley customers. Once chlorination was restored at the WTP, a flushing program began to draw chlorinated water through the reticulation, with free chlorine levels reaching greater than 0.5 mg/L in the reticulation. Following sampling to verify the safety of drinking water, the 'boil water' advisory was lifted on 24 December 2019.

### **Key vulnerabilities that led to the incident**

When installing a new raw water turbidity meter in 2019, the need for interlocks related to raw water turbidity and no-flow scenarios was not included. This allowed the raw water pump to run when the plant was not operating. The result was raw water entering the filters while the plant was 'off', which meant the chlorination system did not operate as normal. While the ultraviolet system operates continuously, there was concern that alone it did not provide sufficient disinfection due to elevated turbidity.

### **Lessons/mitigation measures undertaken**

Following the identification and rectification of the systemic faults that led to the incident, the lessons were applied to other WTPs with similar configuration.

## **Boil water advisory for Mallacoota, do not drink water advisories for Buchan and Omeo following bushfires and inadequate secondary disinfection – East Gippsland Water**

From late December 2019 to January 2020, bushfires across the East Gippsland Water service region strongly challenged the agency's ability to continue supplying safe drinking water to many of its towns due to direct fire impacts to water treatment assets and the unprecedented water demand on supply systems used for firefighting. Despite these challenges, water supply was predominantly maintained with a 'boil water' advisory issued for Mallacoota and two 'do not drink' water advisories issued for Buchan and Omeo because the safety of the water for these supply systems could not be guaranteed. While the intent of the advisory issued for Buchan was due to bypassing the WTP to meet water for firefighting demand, the advisory remained in place due to an empty sodium hypochlorite tank and therefore no provision for secondary chlorination.

On 31 December 2019 East Gippsland Water advised the department of its intention to bypass the secondary chlorination treatment process at the Mallacoota WTP because it was deemed to be flow limiting in meeting the unprecedented demand for water for firefighting purposes. East Gippsland Water issued a 'boil water' advisory to Mallacoota customers. The bypass was only implemented for a brief period because it did not provide the operational benefits initially anticipated by East Gippsland Water. Following confirmation of treatment plant performance and free chlorine residuals in the distribution network to verify the safety of drinking water, the 'boil water' advisory was lifted on 1 January 2020.

On 3 January 2020 East Gippsland Water issued a 'do not drink' water advisory for Buchan customers because it intended to bypass the Buchan WTP to meet the unprecedented demand for firefighting. This was not able to occur due to mechanical difficulties. Treatment operators were able to restore normal treatment plant operation to fill the emptied clear water storages to maintain supply. However, further inspection of the tank site identified that the sodium hypochlorite tank was empty, with no secondary chlorination. Due to the uncertainty of the quality of drinking water entering the Buchan supply system, the advisory remained in place. Following reinstatement of the Buchan WTP and disinfection supply, with flushing and subsequent sampling to verify the safety of the drinking water, the 'do not drink' water advisory was lifted on 14 January 2020.

On 4 January 2020 East Gippsland Water advised the department of its intention to bypass the Omeo WTP and onsite clear water storages to meet the unprecedented demand for water for firefighting purposes. East Gippsland Water issued a 'do not drink' water advisory for Omeo customers. The Omeo WTP was reinstated on 5 January 2020 and, following remedial actions including increasing the free chlorine residual to sanitise the system, extensive flushing and subsequent sampling to verify the safety of the drinking water, the 'do not drink' water advisory was lifted on 16 January 2020.

#### **Key vulnerabilities that led to the incident**

The unprecedented demand for firefighting water was beyond the normal design capacity of the water supply system.

#### **Lessons/mitigation measures undertaken**

East Gippsland Water continued to monitor drinking water system performance using field observations and SCADA. It overcame logistical challenges using Australian Defence Force and Country Fire Authority convoys to prioritise access to WTPs and used the supply and monitoring of chemical treatments and sampling to verify water quality. East Gippsland Water was able to maintain remote visibility of sites via cameras to monitor fire activity in proximity to assets and the functionality of sprinklers.

In response to high-turbidity events during the aftermath of the fires and heavy rainfall, East Gippsland Water installed turbidity monitoring at river offtakes to enable selective harvesting and realised the benefits of recent projects to increase raw water storage capacity. Clear water tanks and pre-treatment equipment (lamella clarifiers) were also installed.

## Boil water advisory for Cudgewa following bushfires – North East Water

The aftermath of the fire front near Cudgewa saw significant property losses in the town of Cudgewa and minor damage to North East Water's clear water storages and trunk mains. Inspections following the incident noticed a dead animal (thought to be bush rat) in the clear water basin. Further inspection showed that some PVC pipework had melted due to the heat of the bushfires, creating a gap for entry into the basin.

Due to the microbial hazard associated with animal carcasses, North East Water issued a 'boil water' advisory to Cudgewa customers on 28 January 2020.

To restore network sanitation, the approach was to increase chlorination and flush to remove the potentially contaminated water from the basin by turning over the volume three times. The damaged PVC pipe was replaced to prevent further vermin access to the basin. Once these measures had been completed and following sampling to verify the safety of drinking water, North East Water lifted the advisory on 3 February 2020.

### Key vulnerabilities that led to the incident

The heat intensity of the bushfires caused damage without any direct contact with the fire front.

### Lessons/mitigation measures undertaken

The value of conducting detailed asset inspections following any event that can affect key water supply infrastructure.

## Boil water advisory from storms causing treatment failure at Moe – Gippsland Water

A significant storm event in February 2020 in the Moe area caused a partial power failure to the Moe WTP. This caused a mains power supply phase fault situation, which led to the Moe WTP automatically restarting without re-engaging critical process control alarms. These critical process controls automatically shut down the plant in the event of treatment process failures.

The storm event and associated rainfall also caused the raw water quality from the Narracan catchment to rapidly deteriorate. As the process control alarms were not active, a treatment failure occurred, allowing out-of-specification high-turbidity water (up to 300 NTU) to enter the clear water storage that supplies the Moe and surrounding water supply systems. In response, on 15 February 2020, Gippsland Water issued a 'boil water' advisory to the affected customers.

Corrective actions taken by Gippsland Water included immediate investigation and rectification of the process alarm mechanisms, isolation of a number of water sampling localities to prevent the distribution system not receiving fully treated drinking water, flushing of the Moe clear water storage and affected reticulation network to remove the high turbidity water, and extensive water quality sampling to verify the safety of the drinking water. The 'boil water' advisory was lifted on 28 February 2020.



### **Key vulnerabilities that led to the incident**

Investigation into the root cause identified process control issues associated with a coding error for a phase fault alarm.

### **Lessons/mitigation measures undertaken**

On 15 February 2020 the critical process controls at the Moe WTP were corrected and the phase fault simulated to confirm the process control alarms were correctly reactivated. Alarms alerting water treatment technicians that a fault at the plant had occurred were also verified. Critical process controls at all of Gippsland Water's WTPs have been checked for similar issues, rectified and tested as necessary. During 24–25 February 2020 a full process control alarm verification test program was successfully completed to ensure the Moe WTP would not experience the same process failure.

## **Boil water advisory following storm events in Mt Buller village – Mt Buller and Mt Stirling Alpine Resort Management Board**

In early April 2020 a significant rainfall event caused disturbed ground from construction works to enter the west end of the raw water storage at Burnt Hut Reservoir in the Mt Buller village.

On 2 April 2020 WTP operators identified high turbidity via the trend on the SCADA system (alarms had failed) and observed an average turbidity of 16 NTU, with peaks of 30 NTU. The earthen diversion drain around the side of the reservoir was unblocked so turbid runoff was diverted away from the reservoir and a silt containment fence was installed. While the turbidity dropped, further rainfall caused more sediment runoff into the reservoir, again raising the turbidity.

On 3 April 2020 Mt Buller and Mt Stirling Alpine Resort Management Board notified the department and issued a 'boil water' advisory because the high turbidity may have compromised the efficacy of the disinfection processes.

The west end of the reservoir was isolated and raw water supply was taken from the east end of the reservoir, which successfully decreased turbidity. The sediment-laden water was pumped out from the west end and then replaced with new raw water before being put back into service. The reticulation lines were flushed, and free chlorine and turbidity tests were conducted throughout the day. The chlorine dosing set point at the WTP was increased to elevate the residual within the reticulation system. The diversion drain, silt fencing and silt traps were further improved and monitored, which successfully prevented further runoff. Flushing and turning over affected reticulation network to remove the high turbid water continued, along with daily testing for chlorine residual and turbidity. Following sampling to verify the safety of the drinking water, the 'boil water' advisory was lifted on 24 April 2020.

### **Key vulnerabilities that led to the incident**

Absence of consequence planning for construction works during rain events and implementing control measures and failure of SCADA alarms to alert operational staff.

### **Lessons/mitigation measures undertaken**

Following this incident, the inspection of diversion drains of reservoirs have been incorporated into routine operations, especially prior to significant rainfall events to prevent a recurrence. Alarm functionality has been rectified and improved to enable alerts to adverse water quality conditions. Lessons were also emphasised within the water operations team to assess construction worksites to ensure appropriate stormwater drainage is in place.

## **Algal blooms affecting drinking water supplies**

### **Case study: Goulburn Valley Water's preparedness and response to harmful algal bloom risks to drinking water**

#### **Background**

In 2018–19 a large harmful algal bloom occurred in the Goulburn Weir and Waranga basin in the Goulburn Valley Water catchment. On reflection, the behaviour of the algal bloom in Tongala changed very rapidly. In less than two weeks the system went from stable to unstable. The algae produced excessive amounts of a gelatinous exopolysaccharide, which interfered with flocculation and resulted in fine particulates moving through the filters that could not be removed during coagulation. Consequently, a 'boil water' advisory was issued for the Tongala water supply due to the impacts of the algae on the filtration process.

Valuable insights were gained during this experience and Goulburn Valley Water has since implemented a multifaceted algal bloom prevention and early intervention–focused risk management system. These approaches are designed to strengthen the resilience of the system and prepare for the possibility of larger and more frequent algal blooms in future.

In early 2019 a decision was made across the business to develop a series of projects to tackle the potential risks posed to the treatment system from harmful and nuisance algal blooms. An investment of close to \$1 million funded projects that aimed to either directly tackle algal blooms or indirectly manage the impacts that they can have on water treatment processes. These initiatives are described below.

#### **Enhanced monitoring and early warning systems**

Raw water offtake pH monitoring was implemented to provide an early indicator of developing algal blooms when the pH increases outside normal levels.

A swarm buoy is being tested to monitor changes in water quality parameters, which may indicate suitable conditions for increased algal growth or the presence of increased algal cell numbers. Parameters monitored include conductivity, dissolved oxygen, ultraviolet absorbance, turbidity, temperature, chlorophyll, phycocyanin, phycoerythrin, depth and water speed.

### **Early intervention systems**

Mobile powdered activated carbon dosing units were customised to Goulburn Valley Water's requirements and deployed at key water source offtake points to facilitate dosing directly into raw water. Activated carbon was dosed into raw water when necessary before filtration.

Undertaking activated carbon dosing prior to the water entering the treatment plant is intended to reduce the taste and odour compounds throughout the water treatment process. Activated carbon can be implemented in a multi-barrier approach in conjunction with chlorine oxidation in the event of algal toxin release.

Coagulant self-contained pre-dosing units were also used to reduce algae growth in raw water storages by coagulating the algal cells and reducing phosphorus in the stored raw water.

### **Plant design and infrastructure modifications to address algal bloom impacts on water treatment processes**

Blooms experienced by Goulburn Valley Water prior to 2019 were manageable, with algal biovolumes in the 10–20 mm<sup>3</sup>/L range; however, the biovolume for the 2019 bloom was larger than ever experienced (the biovolume exceeded 40 mm<sup>3</sup>/L).

Many clarifier-style WTPs were established in the 1960s, with newer style dissolved air floatation plants constructed in the 1990s following algal blooms in the Murray/Darling rivers. The older plants were not originally designed to address such large algal biovolumes with excessive exopolysaccharide production. Specifically, the clarifier-style treatment facilities were not designed to remove buoyant algal flocs. Modifications to these plants are necessary to ensure the water treatment process can cope with larger algal blooms.

### **Enhanced communications processes**

In addition to the investment in activities to address algal bloom risks to water treatment processes, Goulburn Valley Water has also enhanced its communication capacity and capability. Its ability to quickly implement a letter drop and send out SMS notifications has been expanded. When an algal bloom alert occurs, Goulburn Valley Water engages in social media and website updates as a communication tool early in the process.

Due to experiences with community concern about taste and odour compounds, Goulburn Valley Water has also developed a fact sheet for the community about taste and odour compounds in drinking water.

### **Changing algal species and increasing bloom size and frequency**

Over time, Goulburn Valley Water has observed changes in the species and the sizes of algal blooms in its catchment. Where previously smaller blooms of toxic *Microcystis* spp. was common, now large blooms of non-toxic species that have the potential to interfere with water treatment processes and produce taste and odour compounds are detected more often. Some previous algal blooms experienced in Goulburn Valley Water's catchment had biovolumes in the range of 10–20 mm<sup>3</sup>/L, and these could be managed by existing water treatment processes. However, more recently, some blooms with biovolumes exceeding 40 mm<sup>3</sup>/L have been experienced and the impacts of this on drinking water treatment processes are more challenging to manage. The increase in biovolumes has a direct impact on coagulant demand, water treatment process, pH and solids loading on treatment plants. The dose rates to adequately enmesh algae and particulates can exceed 200 mg/L, which are in many cases not typical for the design of the older facilities and can place stress on treatment systems.

### **Take-home messages**

Climate change, warmer temperatures and altered flow regimes are likely to result in more harmful algal blooms, creating challenges for ensuring drinking water supplies continue to be safe and aesthetically acceptable.

Understanding bloom risks in the catchment and having timely information about changes in bloom risks are the keys to taking an approach of prevention and early intervention to mitigate the potential impacts of algal blooms on drinking water. A multifaceted whole-of-business approach to harmful algal bloom risk management enhanced the resilience of Goulburn Valley Water's water treatment systems. Goulburn Valley Water's experience and responses have demonstrated the value of investment in prevention and early intervention to secure the integrity of the water treatment process.

## Improving oral health by increasing access to water fluoridation

Good oral health is fundamental to general health, wellbeing and quality of life. While there have been significant improvements over the past 30 years, there is still evidence of poor oral health among many Victorians. Tooth decay is the most prevalent disease in Victoria. Dental conditions are the highest cause of all potentially preventable hospitalisations in children aged 0–9 years, predominantly because of tooth decay.

Fluoride acts as a constant repair kit for teeth. Water fluoridation is the process of adjusting the amount of fluoride in reticulated drinking water supplies to reach a level that can help reduce tooth decay. The National Health and Medical Research Council's Public Statement 2017 *Water fluoridation and human health in Australia* states that community water fluoridation is strongly recommended as a safe, effective and ethical way to help reduce tooth decay across the population.

Since 2013–14 five more water fluoridation plants have been built, providing another 76,000 people across 14 towns access to fluoridated drinking water. There are still many Victorians living in rural and regional areas without access to this important public health initiative.

**The Victorian action plan to prevent oral disease 2020–30, released in March 2020, sets out a vision to achieve good oral health for all Victorians by 2030 and to reduce the gap in oral health for people who are at higher risk of oral disease.**

**A key goal in the action plan is to increase the proportion of rural and regional Victorians accessing fluoridated drinking water from a baseline of 87 per cent to 95 per cent by 2030.**

Visit the department's website to access the full *Victorian action plan to prevent oral disease 2020–30* <<https://www2.health.vic.gov.au/public-health/preventive-health/oral-health-promotion/oral-health-planning>>.

### Priority 2: Promote healthy environments

#### Victorians will benefit from settings and environments that support good oral health

##### What will be different

- Victorians are supported to make healthy food and drink choices in the places they live, learn, work and play.
- More Victorians have access to fluoridated water or topical fluorides and affordable oral health products to protect their teeth from decay.

##### Priority actions

###### Improve oral health policies and practice in key places

- Embed oral health promotion policy into practice, including healthy eating and drinking in key places such as early childhood services, supported playgroups, schools, sports and recreation clubs, hospitals, Aboriginal Community Controlled Organisations (ACCOs) and residential services.
- Promote the oral health of children and their families through the expansion of prevention initiatives such as Smiles 4 Miles and Healthy Families Healthy Smiles.
- Increase the use of mouthguards in sport, recreation and leisure settings.

###### Increase access to the benefits of fluoride

- Increase the coverage of fluoridated drinking water.
- Provide other fluoride measures, such as fluoride varnish programs to populations at higher risk of tooth decay, such as preschool children and older people in residential aged care facilities.
- Collaborate with water businesses to promote the benefits of drinking water, preferably fluoridated water.

## Activities under the Health (Fluoridation) Act

Under the Health (Fluoridation) Act, the department oversees the ongoing compliance and performance of existing water fluoridation plants in Victoria and increasing access to water fluoridation in areas with non-fluoridated water supplies. Before adding fluoride to any water supply, a water agency must submit plans and specifications to the department for consideration.

The department conducts a technical appraisal of the fluoridation plant to assess the plans and specifications 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 relevant issues, the department approves 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 the 2019–20 reporting period, construction was underway for fluoride plants at Coliban Water's Cohuna and Wannon Water's Camperdown water treatment plants; however, coronavirus (COVID-19)-related restrictions delayed progress. A technical appraisal for the Cohuna fluoride plant has been completed and Coliban Water is addressing recommendations, with commissioning expected in 2021. The technical appraisal and commissioning of the Camperdown Fluoride Plant is expected to occur in 2021.

In 2019–20 audit reports of the Maryborough, Maffra and Cardinia water fluoridation plants were completed. The water agencies have identified actions to address the findings from the audits and will inform the Water Unit once actions have been completed.

## Fluoridation Code of Practice gap analysis

The *Code of practice for fluoridation of drinking water supplies, Second edition* was released in March 2018, adopting a risk-based approach and providing guidance to water agencies on good practice in the design, establishment and operation of fluoridation plants to ensure safe and effective addition of fluoride into Victoria's drinking water supplies. The purpose of the code of practice is to ensure water fluoridation plants are designed safely and that their operation achieves the optimum fluoride concentration while protecting against overdosing.

Following the release of the second edition of the code, the department requested the 14 water agencies operating fluoridation plants and the desalination plant operated by Aquasure to undertake a gap analysis of their fluoride plants against the revised code of practice.

At the time of writing, most water agencies had progressed towards meeting compliance with the code of practice and have updated the department.

## On the horizon

### Preparedness and responsiveness – risks to drinking water quality

The department has developed its first *Pilot health and human services climate change adaptation action plan, 2019–21*. The plan's vision is "A health and human services system resilient to climate change and ecologically sustainable, achieving the best health, wellbeing and safety of all Victorians so that they can live a life that they value".<sup>3</sup> Action 15 of the plan states, "Investigate how food-borne and water-borne pathogens and contaminants, for example *Salmonella* in food and opportunistic pathogens in water supplies, are influenced by climate factors such as extreme weather events, particularly high temperatures and humidity." The outcome is to predict risks, communicate risks and to design effective interventions to protect and improve public health.

Water agencies continued to be exposed to increasing pressure for recreational access to water storages and catchments, and land use intensification within water supply catchments. These activities especially in combination with impacts of climate change and declining reservoir levels increase the inherent risk to drinking water supplies by introducing contaminants and increasing the potential for outbreaks of waterborne diseases. In 2019–20 the department continued to support research, managed by Water Research Australia, into understanding impacts of recreational access to drinking water catchments and storages in Australia and future water quality in reservoirs. This research will continue to be supported in the 2020–21 financial year.

Disaster risk reduction and response measures are pivotal in water agencies planning for potential threats so that the provision of safe drinking water supply can be continually assured. For water agencies being prepared and responsive from catchment to tap is fundamental to managing current and future challenges, especially when acute challenges arise to drinking water quality. Recent water quality incidents, especially those resulting from the devastating bushfires and the algal blooms of the 2019–20 summer, highlighted that in responding to these incidents, guidance is needed to support water agencies in making critical decisions in a timely manner to protect public health. In response the department has commenced work developing a set of protocols to guide consistent and defensible approaches to issuing and rescinding drinking water advisories in response to scenarios where drinking water safety may be compromised.

The department remains committed to working collaboratively with water agencies and other government agencies to be better prepared and responsive; from catchment to tap.

<sup>3</sup> *Pilot health and human services climate change adaptation action plan, 2019–21*, <<https://www.dhhs.vic.gov.au/sites/default/files/documents/201912/Pilot%20health%20and%20human%20services%20climate%20change%20adaptation%20action%20plan%202019-21-20191209.pdf>>.

## Appendices

### Appendix 1: Water agency contact details

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



## Appendix 2: Section 18 notifications for drinking water quality standards, 2019–20

Water agency	Water sampling locality	Water quality standard
Coliban Water	Dunolly	N-Nitrosodimethylamine
Coliban Water	Boort	Elevated chlorine
Coliban Water	Laanecoorie, Tarnagulla	N-Nitrosodimethylamine
Coliban Water	Bealiba	Total trihalomethane
Coliban Water	Bealiba, Tarnagulla	Total trihalomethane
Coliban Water	Laanecoorie	Total trihalomethane
Coliban Water	Bridgewater-Inglewood	<i>E. coli</i>
Coliban Water	Bendigo Spring Gully	<i>E. coli</i>
Coliban Water	Castlemaine	<i>E. coli</i>
Goulburn Valley Water	Kyabram	Aluminium
Goulburn Valley Water	Rushworth	Aluminium
Goulburn Valley Water	Buxton	Chloral hydrate
Goulburn Valley Water	Nagambie	Chloral hydrate
Goulburn Valley Water	Colbinabbin	Chloral hydrate
North East Water	St James	Elevated chlorine
Wannon Water	Cavendish	Total trihalomethane
Wannon Water	Cavendish	Total trihalomethane

## Appendix 3: Section 22 reports of known or suspected contamination, 2019–20

Water agency	Water sampling locality	Reason
Barwon Water	Lovely Banks	Widespread public complaint
Barwon Water	Birregurra	<i>E. coli</i> detection
Coliban Water	Trentham	Widespread public complaint
Coliban Water	Bridgewater- Inglewood	Other (water main burst)
Coliban Water	Bridgewater- Inglewood	<i>E. coli</i> detection
Coliban Water	Bendigo – Spring Gully	<i>E. coli</i> detection
Coliban Water	Leitchville	Widespread public complaint
Coliban Water	Cohuna, Echuca, Gunbower	Widespread public complaint
Coliban Water	Rochester	Disinfection or treatment failure
Coliban Water	Cohuna	Other (raw water drawn into treated water storage tank)
Coliban Water	Castlemaine	<i>E. coli</i> detection
East Gippsland Water	Mallacoota	<i>E. coli</i> detection
East Gippsland Water	Omeo	Other (treatment plant bypass)**
East Gippsland Water	Buchan	Disinfection or treatment failure**
East Gippsland Water	Mallacoota	Other (secondary disinfection bypass)*
Gippsland Water	Moe	Disinfection or treatment failure*
Goulburn Valley Water	Numurkah	Widespread public complaint
Grampians Wimmera Mallee Water	St Arnaud	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Willaura	<i>E. coli</i> detection
Lower Murray Water	Red Cliffs	Other (blue-green algae impacts on water treatment process)*

\* Boil water advisory issued

\*\* Do not drink water advisory issued

Water agency	Water sampling locality	Reason
Melbourne Water	Dromana	<i>E. coli</i> detection
Melbourne Water	Mornington	Other (backflow of water from air valve pit into mains)
Melbourne Water	Mt View reservoir	<i>E. coli</i> detection
Mt Buller and Mt Stirling Alpine Resort Management Board	Mt Buller low level system	Other (turbidity)*
North East Water	Bellbridge	<i>E. coli</i> detection
North East Water	Yarrawonga	Widespread public complaint
North East Water	Wahgunyah	Widespread public complaint
North East Water	Wodonga, Barranduda High level, Barnawatha, Chiltern	Widespread public complaint
North East Water	Cudgewa	Other (pathogen detection, dead animal)*
North East Water	Bright	<i>E. coli</i> detection
North East Water	Harrietville	<i>E. coli</i> detection
North East Water	Oxley	Disinfection or treatment failure*
North East Water	Bright	<i>E. coli</i> detection
North East Water	Myrtleford	<i>E. coli</i> detection
North East Water	Devenish	<i>E. coli</i> detection
North East Water	Tawonga	<i>E. coli</i> detection
South East Water	Frankston	<i>E. coli</i> detection
South East Water	Lang Lang	<i>E. coli</i> detection
South East Water	Mount Martha	Widespread public complaint
South East Water	Upper Beaconsfield	<i>E. coli</i> detection

\* Boil water advisory issued

\*\* Do not drink water advisory issued

Water agency	Water sampling locality	Reason
South Gippsland Water	Meeniyan	<i>E. coli</i> detection
Wannon Water	Caramut	<i>E. coli</i> detection
Wannon Water	Port Fairy	<i>E. coli</i> detection
Wannon Water	Mortlake	<i>E. coli</i> detection
Western Water	Darley	<i>E. coli</i> detection
Western Water	Romsey	<i>E. coli</i> detection
Western Water	Merrimu	Disinfection or treatment failure
Western Water	Bulla	<i>E. coli</i> detection
Western Water	Maddingley	<i>E. coli</i> detection
Yarra Valley Water	Somerton	Widespread public complaint
Yarra Valley Water	Glen Waverley	Widespread public complaint

\* Boil water advisory issued

\*\* Do not drink water advisory issued

## Appendix 4: Regulated water supplies at 30 June 2020

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, 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, Tempy, Ultima, Waitchie, Walpeup, Watchem, Westmere, Wickliffe, 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

## Appendix 5: Drinking water quality complaints reported by water suppliers, 2019–20

		Number of complaints				Type of complaints		
		2019–20	2018–19	Variance to 2018–19	2017–18	Discolour/turbidity/dirty water	Taste or odour	Other
<b>Metropolitan water suppliers</b>								
1	City West Water <sup>4</sup>	745	555	▲ 34% <sup>b</sup>	330	***	**	*
2	South East Water	849	816	▲ 4%	778	***	**	*
3	Yarra Valley Water <sup>5</sup>	4,224	4,071	▲ 4%	2,586	***	**	*
<b>Regional water suppliers</b>								
4	Barwon Water	197	174	▲ 13%	131	**	***	**
5	Central Highlands	83	116	▼ 28% <sup>c</sup>	141	***	**	*
6	Coliban Water	218	253	▼ 14%	183	***	**	*
7	East Gippsland Water	64	57	▲ 12%	60	***	*	**
8	Gippsland Water	136	191	▼ 28%	161	**	***	*
9	Goulburn Valley Water	179	173	▲ 3%	117	***	**	*
10	Grampians Wimmera Mallee Water	89	75	▲ 19%	86	***	*	**
11	Lower Murray Water	35	57	▼ 39%	34	**	***	*
12	North East Water	246	114	▲ 116%	110	**	***	*
13	South Gippsland Water	70	87	▼ 20%	227	***	**	**
14	Wannon Water	135	149	▼ 9%	206	***	**	*
15	Western Water	214	177	▲ 21%	167	***	**	*
16	Westernport Water	14	37	▼ 62%	30	***	**	*
<b>Other water suppliers<sup>a</sup></b>								

Notes:

a) Parks Victoria and the four Alpine Resort Management Boards did not have any water quality complaints during the reporting year

b) Figures with a grey upwards arrow denote an increase to 2019

c) Figures with a blue downwards arrow denote a decrease to 2019

\*\*\* most common

\*\* second most common

4 City West Water's water quality complaints when normalised as per 1,000 customers, its performance is 1.5 complaints per 1,000 customers, a 25 per cent increase on 2019.

5 Yarra Valley Water's water quality complaints when normalised as per 1,000 customers, its performance is 5.03 complaints per 1,000 customers, a 1.6 per cent increase on 2019.

## Glossary

<b>Blue-green algae</b>	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'.
<b>'Boil water' advisory</b>	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.
<b>Catchment</b>	An area of land that collects rainfall and contributes to surface water (streams, rivers, wetlands) or to groundwater.
<b>Catchment to tap</b>	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.
<b>Chloral hydrate</b>	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
<b>Corrective actions</b>	Actions put in place following an incident or issue to alleviate immediate concerns.
<b>Dichloroacetic acid</b>	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
<b>Disinfectant</b>	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.
<b>Disinfection</b>	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.
<b>Disinfection by-products</b>	Products formed from the reaction between disinfectants, particularly chlorine, and naturally occurring organic materials in water.
<b>Distribution system</b>	A network of pipes leading from a water treatment plant to customers' plumbing systems.

<b>'Do not drink' advisory</b>	<p>Advice issued by a water supplier when water supply is suspected or is confirmed to have unacceptable levels of chemical contaminants present in the drinking water supply that can pose an unacceptable risk to public health if ingested.</p> <p>Consumers are usually advised to 'do not drink water or use affected water for human consumption such as food preparation, tooth brushing or ice making'. In such cases boiling water will not make it safe for drinking and an alternative drinking water source is required.</p>
<b>Drinking water</b>	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).
<b>Drinking water quality standards</b>	Drinking water quality standards specified in regulation 12 of the Safe Drinking Water Regulations 2015 for the purposes of section 17 of the <i>Safe Drinking Water Act 2003</i> .
<b><i>Escherichia coli</i></b>	<i>E. coli</i> is a type of faecal coliform bacteria that indicates 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.
<b>False-positive sample</b>	Where an investigation concludes 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.
<b>Groundwater</b>	Water contained in rocks or subsoil.
<b>Harmful algal bloom</b>	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.
<b>Hazard</b>	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.
<b>N-Nitrosodimethylamine</b>	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
<b>Nephelometric turbidity unit (NTU)</b>	A measure of clarity determined by a nephelometer that emits a light beam through water.



<b>Notification</b>	Verbal and written communication received by the department from water suppliers under section 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.
<b>Parameters</b>	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.
<b>Pathogen</b>	Disease-causing microorganisms including types of virus, protozoa and bacteria.
<b>Preventive actions</b>	Actions put in place following immediate corrective actions to minimise the risk of a recurrence of an incident or issue.
<b>Raw water</b>	Water found in the environment – such as rainwater, groundwater, reservoir water and river water – that has not been treated.
<b>Regulated water</b>	Water that is not intended for drinking but that could reasonably be mistaken for drinking water.
<b>Report</b>	Verbal or written communication received by the department from water suppliers, water storage managers or council officers under section 22 of the <i>Safe Drinking Water Act 2003</i> regarding known or suspected contamination of water.
<b>Reticulated drinking water supply</b>	The piped drinking water network.
<b>Risk</b>	The likelihood and consequence of a hazard causing harm in exposed populations in a specified timeframe.
<b>Risk management</b>	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.
<b>Risk management plan</b>	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.

<b>Safe drinking water regulatory framework</b>	The legislation used to regulate the supply of Victoria's drinking water. The framework consists of the <i>Safe Drinking Water Act 2003</i> and the Safe Drinking Water Regulations 2015. 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> .
<b>Section 18</b>	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'.
<b>Section 22</b>	Refers to the legislative requirement for 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"> <li>• may be the cause of an illness; or</li> <li>• may be the means by which an illness is being, has been or will be, transmitted; or</li> <li>• 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</li> <li>• may cause widespread public complaint'.</li> </ul> A section 22 must be reported immediately to the Secretary.
<b>Surface water</b>	Water naturally open to the atmosphere, such as that in rivers, streams, lakes and reservoirs.
<b>The Act</b>	<i>Safe Drinking Water Act 2003</i>
<b>The Regulations</b>	Safe Drinking Water Regulations 2015
<b>Trichloroacetic acid</b>	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
<b>Trihalomethanes</b>	Organic compounds formed when chlorine reacts with naturally occurring organic matter in water supplies.
<b>Turbidity</b>	The cloudiness of water caused by the presence of fine, suspended matter.
<b>Ultraviolet disinfection</b>	A method of water disinfection in which light in the 100–400 nanometer wavelength range is applied to kill microbial pathogens.
<b>Water agency</b>	The collective term for water storage managers and water suppliers.

<b>Water fluoridation</b>	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.
<b>Water sampling locality</b>	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.
<b>Water storage manager</b>	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> .
<b>Water supplier</b>	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> .

