



# Annual report on drinking water quality in Victoria 2017–18

Delivering quality drinking water to Victorians



## Secretary's foreword

I am pleased to present the Department of Health and Human Services' *Annual report on drinking water quality in Victoria 2017–18*, which provides an annual statewide perspective of drinking water quality and water fluoridation activities.

Approximately 95 per cent of Victorians continue to receive the benefits of safe, good quality drinking water. This report acknowledges the considerable effort from all water agencies in achieving this.

Drinking water compliance in 2017–18 remained strong, with 96 per cent of Victoria's drinking water localities complying with drinking water quality standards at all times.

This report covers the third year since the Safe Drinking Water Regulations 2015 commenced and it demonstrates the tangible benefits to Victorian communities as the legislation becomes further embedded. Of note, the introduced investigation requirements following any *E. coli* detection (an indicator of microbial risk) have assisted water agencies to identify and implement process and system improvements, leading to beneficial water quality outcomes.

Access to safe, good quality drinking water supplies is fundamental to community health and wellbeing. The provision of drinking water allows communities, families and businesses to grow and prosper. However, meeting the Victorian community's needs into the future with our precious water resources will continue to pose challenges, particularly as we respond to the effects of climate change, population growth and land-use intensification in water supply catchments. These impacts increase threats to water quality, including greater potential for waterborne pathogens and harmful algal blooms, and increase the frequency of water-quality incidents.

We must not become complacent, as managing risk to the quality of drinking water is a continual, complex process that challenges us into the future. The safe drinking water regulatory framework obliges water agencies to continuously strengthen their risk management plans and systems to proactively manage hazards and risks that may affect the quality of drinking water, from catchment to tap.



Kym Peake  
Secretary  
Department of Health and Human Services

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Seymour water  
treatment plant  
(courtesy Goulburn  
Valley Water)





## Introduction

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

Section 32 of the Act requires that the Secretary 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 undertaken under the Act.

This annual report summarises Victoria's drinking water quality performance and the department's activities during the 2017–18 reporting period. This annual report recognises the department's ongoing commitment to delivering quality drinking water to Victorians.

## Delivering quality drinking water to Victorians

Water agencies strive to mitigate risks wherever possible so that their customers continue to receive safe, good-quality drinking water. To assist water agencies to continue to deliver quality water to Victorians, the department remade the Regulations in 2015. This included a key requirement that water agencies quantify microbial hazards and determine the effectiveness of barriers in all drinking water supply systems. To do this, water agencies identify and measure the hazards in the water catchment and determine if the barriers, including treatment processes, are able to adequately address those risks.

While filtration and chemical disinfection are the most common and acceptable forms of treatment to keep drinking water supplies safe, the quantification process highlighted some systems where the risk from chlorine-resistant pathogens such as protozoa needs to be better managed. As a result, in this reporting period, many water agencies have implemented upgrades to improve the quality of drinking water.

Examples of upgrades reported include the addition of UV disinfection, filtration optimisation and improved raw water storage management. These have resulted in improvements to managing high-turbidity events and protozoan risk.

Likewise, water storage managers also undertook works to improve the quality of source water in catchments, including tree planting around water storage reservoirs and additional perimeter fencing to protect storages from stock.

Mobile drinking  
water station  
(courtesy  
Westernport Water)

# Hydration Station

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## Highlights and achievements of 2017–18

In 2017–18, the department focused on embedding better regulatory practice to provide a clear focus on regulatory outcomes, demonstrate a risk-based approach to regulation, improve regulatory performance and accountability, and enable consistent oversight. Through administration of the Act, the department assists Victorian water agencies with their legislative obligations. Ensuring compliance is paramount to maintaining community confidence in drinking water supplies and protecting the public from hazards in water.

Performance against the drinking water quality standards remained strong:

- 463 localities (98.2%) continuously met the Schedule 2 water quality standards
- 455 localities (96.6%) continuously met all water quality standards
- Compliance with the *E. coli* standard improved (99.2%) from last year (98.3 %).
- Compliance with the trihalomethane standard improved (99.2%) from last year (97.9%).
- Compliance with the turbidity water quality standard improved (100.0 %) from last year (99.8 %).
- Since 2015, there has been an increased focus on the investigation process following all *E. coli* detections, which has resulted in improvements to the integrity of the drinking water supply.
- Independent audits of water agencies' risk management plans found that 22 out of 24 water agencies had plans that fully complied with the requirements of the Act and Regulations.
- Water agencies continued to progress the implementation of a health-based target for microbial safety through catchment and treatment assessments and in their pricing submissions.
- A total of 45 reports of known or suspected contamination were made under s. 22 of the Act, compared with 59 reports in 2016–17, continuing a downward trend.
- The communities of Cobram, Strathmerton and Yarroweyah received fluoridated drinking water for the first time.

# Victoria's safe drinking water regulatory framework

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

- the *Safe Drinking Water Act 2003*, and
- the *Safe Drinking Water Regulations 2015*.

The safe drinking water legislation requires:

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

This framework is consistent with the risk management approach in the *Australian drinking water guidelines 2011* and supports the *Health (Fluoridation) Act 1973*.

## Minister for Health

Under the Act the Minister for Health is responsible for:

- regulated water declarations
- approving variations of drinking water aesthetic standards
- approving exemptions from drinking water quality standards
- imposing conditions on drinking water variations or exemptions
- fixing a period for which an administration levy is payable by water agencies
- ensuring that an annual report on drinking water quality is provided to each House of Parliament on or before the sixth sitting day of the House after the report has been received.

## The Department of Health and Human Services

Under the Act the Secretary of the department is responsible for:

- protecting public health in relation to drinking water
- ensuring compliance with the Act and the Regulations
- reporting on water agencies' performance in meeting their obligations
- investigating and reporting on any aspect of drinking water quality
- making recommendations to the Minister for Health on any matter relating to drinking water or regulated water
- promoting awareness and understanding of drinking water quality issues in the industry and the broader public
- entering into undertakings with water agencies to achieve particular outcomes
- providing direction if there is a risk to public health.

## Water Unit

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

- reviewing and assessing the health significance of s. 18 notifications and s. 22 reports under the Act
- providing guidance and advice to water agencies to achieve compliance with the Act and Regulations
- providing input into national drinking water guidelines and policy development
- raising awareness across government, industry and the community on public health protection and health promotion issues related to drinking water
- reviewing technical reports for water fluoridation schemes and overseeing the operational efficacy of fluoride plants to ensure reliability in terms of safety and desired oral health benefits
- contributing to research about emerging drinking water quality issues
- leading the Victorian Government's emergency response during emergencies related to the contamination of drinking water supplies.

## Water agencies

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

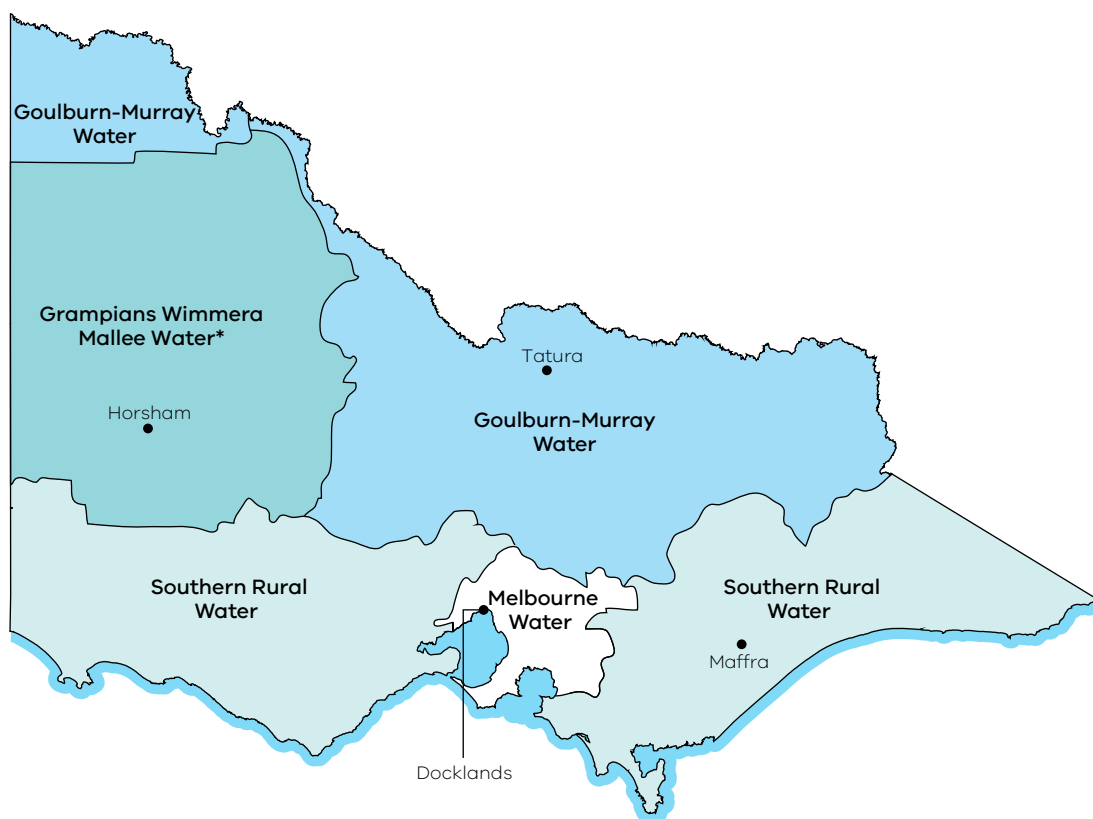
## Water storage managers

Water storage managers store and supply water to water suppliers.

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 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

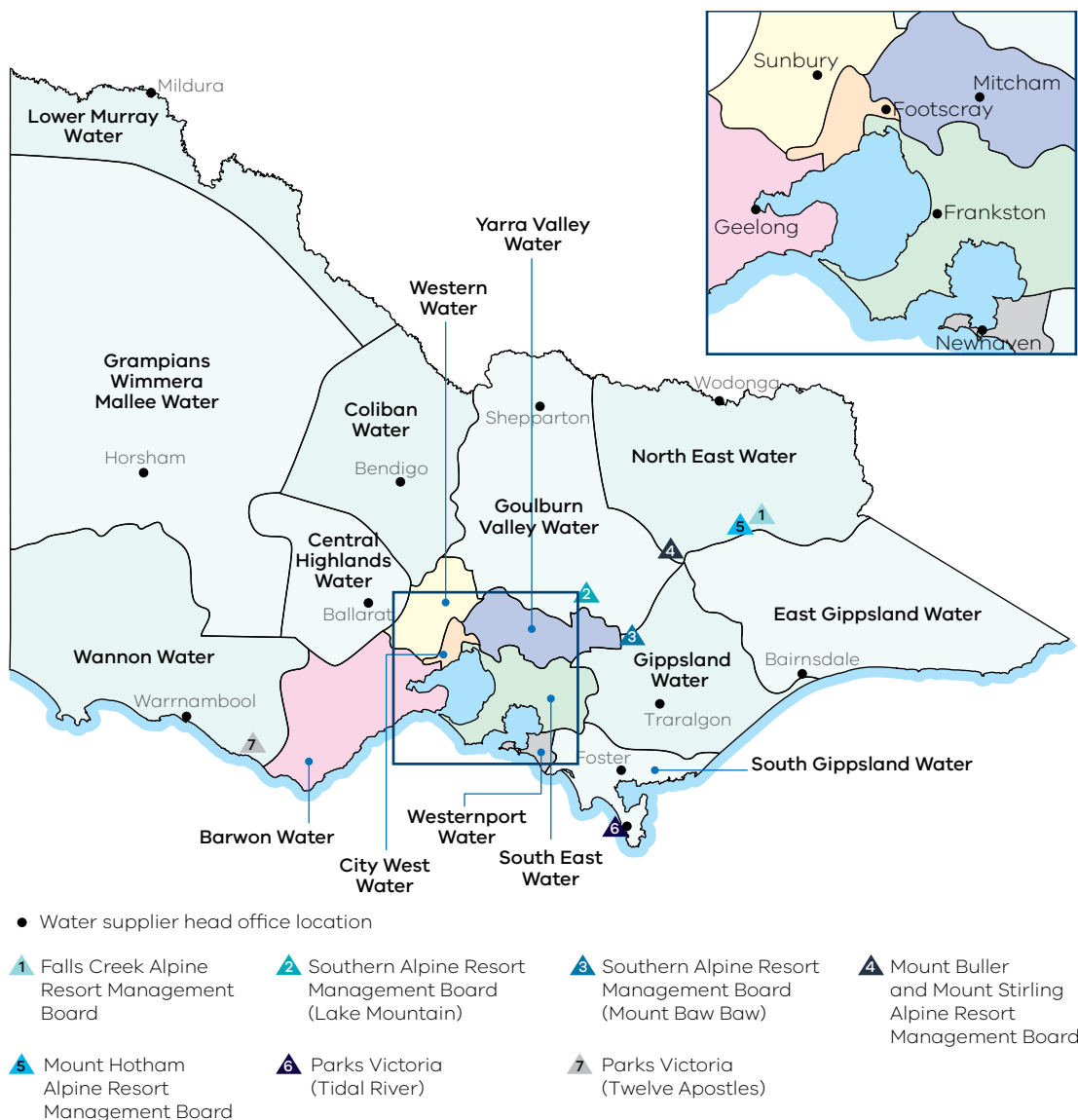
## Water suppliers

Water suppliers provide treated drinking water to approximately 95 per cent of Victoria's population. Each water supplier covers a discrete geographic area where drinking water supply areas are defined as water sampling localities under the Regulations.

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

Some water suppliers also manage regulated water supplies (water that could be mistaken for drinking water, for example untreated reticulated water for irrigation, stock use or non-drinking domestic uses).

Figure 2: Water suppliers



## Better regulation

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

### Ministerial Statement of Expectations

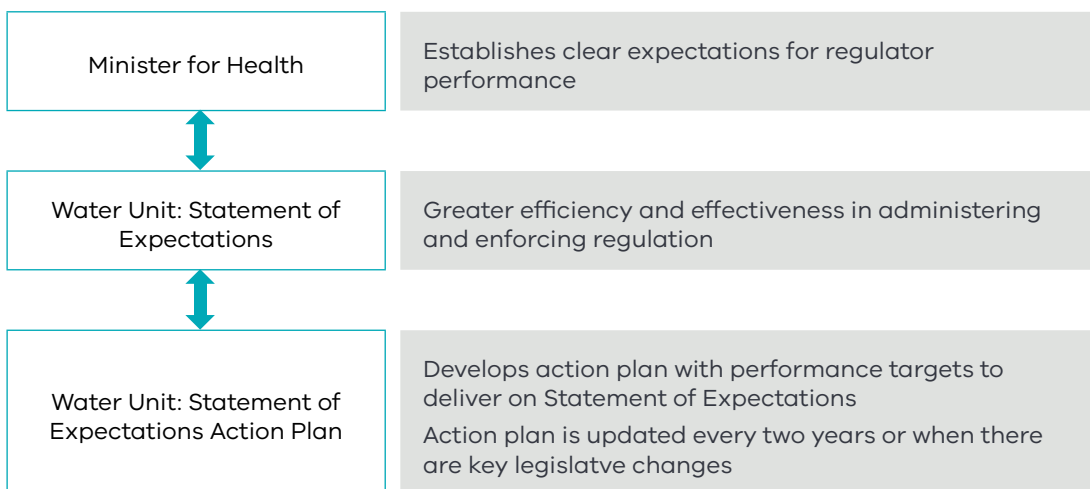
The Victorian Government has developed the *Statement of Expectations framework for regulators*. This whole-of-government initiative requires each minister to establish clear expectations for regulator performance and improvement within their respective portfolios. It aims to promote greater efficiency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

The Minister for Health has issued the Water Unit with the Statement of Expectations 2017–19 that identifies 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 has responded to the Minister's Statement of Expectations by committing to a Statement of Expectations Action Plan that clearly outlines actions and performance targets. View the Statement of Expectations and the Statement of Expectations Action Plan on the department's website <<https://dhhs.vic.gov.au/ministerial-statements-expectations-regulators>>.

**Figure 3: Statement of Expectations framework**

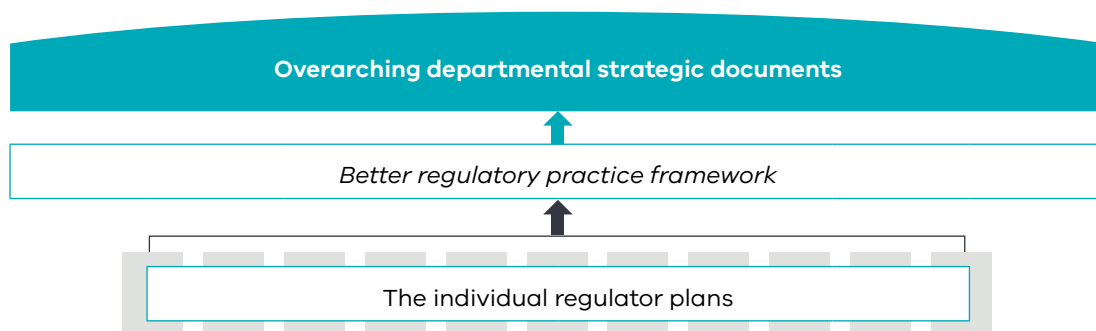




## Better regulatory practice framework

The department published its *Better regulatory practice framework* that provides clarity and consistency across the department's regulators. 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 that the Water Unit works to continuously improve its performance as a regulator. The framework has guided development of the Water Unit's Regulator Action 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 works collaboratively with water agencies by providing guidance and support to achieve regulatory outcomes in efforts to protect and improve the health of Victorian communities.

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

## Standard operating procedures review

Another example of improving regulator efficiency is ensuring regulatory practices and procedures are documented. The Water Unit commenced a review of its standard operating procedures to develop a standard and consistent approach within a document management system.

## Water sector liaison

Water Unit staff meet regularly with water agencies to discuss present and future regulatory issues and concerns. The regular meetings enable discussion about regulatory obligations and compliance. They also provide an opportunity for Water Unit staff to visit a range of water assets to better understand the issues faced by water agencies. Appendix 5 lists the assets visited in 2017–18.

Falls Creek  
water storage tanks  
(courtesy Falls Creek Alpine  
Resort Management Board)



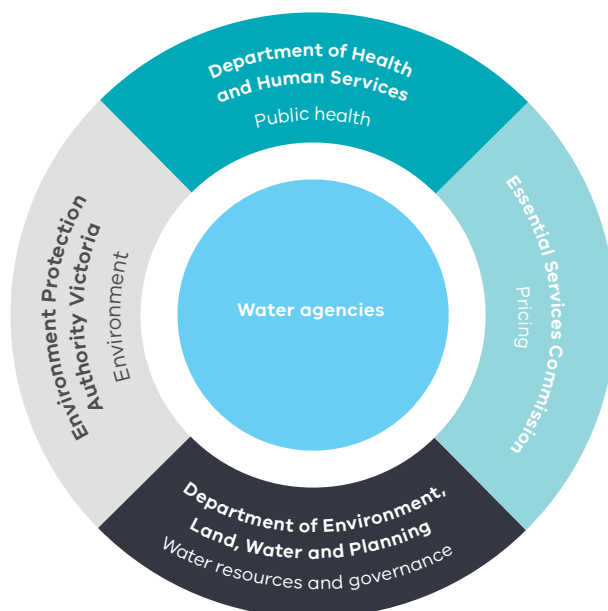
## A collaborative approach to drinking water regulation

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.

**Table 1: Legislated roles associated with managing Victoria's drinking water supply**

Agency	Role
Department of Health and Human Services	Regulates drinking water quality and regulated water to protect and promote public health through the <i>Safe Drinking Water Act 2003</i> and the <i>Health (Fluoridation) Act 1973</i>
Department of Environment, Land, Water and Planning	Ensures the sustainable management of water resources through industry governance and catchment management and resource allocation by administering the <i>Water Act 1989</i> and the <i>Catchment and Land Protection Act 1994</i>
Environment Protection Authority (EPA) Victoria	Protects Victoria's waters by designing and implementing environmental laws, policies and regulatory controls to prevent pollution and protect the environment Administers the <i>Environment Protection Act 1970</i>
Essential Services Commission	Determines water pricing and oversees the service standards for Victoria's water agencies as authorised under the <i>Essential Services Commission Act 2001</i>

**Figure 5: Victoria's multi-jurisdictional water regulatory system**



## Essential Services Commission encouraging customer focus

Victoria's Essential Services Commission (ESC) regulates the prices and service standards of some essential service providers, including water agencies. In 2016, following extensive consultation with water agencies and other government stakeholders, the ESC introduced a new approach to its water pricing review process.

This approach ensured that customer outcomes such as water price, quality and service reliability were at the forefront of water agencies' decision making. It introduced a greater emphasis on the role of customer engagement to inform and influence the price submissions of water agencies. The purpose of this engagement with customers was to understand their concerns, priorities and preferences, ensuring that agencies' water pricing submissions were expressed in terms of the outcomes valued by their customers. This customer-centric approach reinforced that the reliable supply of safe, good-quality drinking water is a priority for Victorian communities.

Following consultation with the ESC, the Department of Environment, Land, Water and Planning (DELWP) and the Environment Protection Authority (EPA) Victoria, the Water Unit published guidance for water agencies in relation to the water pricing review. The aim of this guidance was to ensure that water agencies made allowance in their pricing submissions for any capital expenditure required in the proposed timeframe to meet the public health obligations of the Act and Regulations. Key areas to be accounted for in proposed pricing submissions included:

- source water protection
- water treatment plant capability
- distribution system integrity
- preventive maintenance activities
- incident response capability.

## Safe drinking water administration levy

In accordance with s. 51 of the Act, an administration levy is paid by water agencies to assist in defraying the costs of administering the Act. The proportion of this levy that each water agency pays is calculated 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 2017–18, there was no change to the levy methodology. Key steps in its calculation were:

- the department estimated its annual cost of administering the Act
- 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
- 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
- the levy for the three metropolitan water suppliers was discounted by 25 per cent, and this proportion was allocated to Melbourne Water, which supplied their treated drinking water.

During 2017–18, the department commissioned an independent review of the Safe Drinking Water Administration Levy's apportionment methodology. The department will consult with water agencies and key stakeholders during the next annual reporting period on any proposed changes to the apportionment methodology.

### Department expenditure associated with administering the Act

Table 2 shows the department's expenditure associated with administering the Act in this reporting period, along with a comparison with the previous two financial years.

In this period, operating costs were less which was consistent with the reduced number of fluoride plant technical assessments and audits in this period.

Research and development expenditure increased in this reporting period with the department contributing to projects of interest and benefit to the water industry by supporting Water Research Australia and the National Health and Medical Research Council.

The administration levy amount for the 2017–18 financial year was set at \$1,258,088. Receipts totalling this amount were paid into the government's Consolidated Fund; equivalent funds were then appropriated to the department.

**Table 2: The department's expenditure to administer the Safe Drinking Water Act, 2015-16 to 2017-18**

<b>Expenditure type</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>Variance 2017-18 and 2016-17</b>
Salaries, allowances and salary-related on-costs	\$677,534	\$752,881	\$830,610	\$77,729
Indirect costs	\$63,784	\$71,694	\$74,432	\$2,738
Operating costs	\$168,984	\$218,081	\$76,990	-\$141,091
Communication and education	\$10,214	\$32,937	\$23,829	-\$9,108
Research and development	\$131,755	\$33,025	\$146,733	\$113,708
Information technology	\$7,221	\$3,617	\$6,825	\$3,208
<b>Total expenditure</b>	<b>\$1,059,312</b>	<b>\$1,112,235</b>	<b>\$1,159,419</b>	<b>\$47,184</b>

## Regulatory requirements in 2017–18

### Water sampling localities

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

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

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

In this reporting period, there were two variations to water sampling localities approved by the department and published in the *Victoria Government Gazette*:

- On 9 March 2018, Coliban Water varied the boundaries of most of its existing water sampling localities. See Gazette No. S107.
- On 30 May 2018, Westernport Water merged several of its existing water sampling localities. See Gazette No. S252.

As of 30 June 2018, there were 471 water sampling localities across the state.

## Water quality standards

The Act requires that a water supplier must ensure that all drinking water supplied complies with quality standards. The drinking water quality standards are specified under Regulation 12, 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 12a)
- 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 12b).

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

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

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

For parameters not specified in Schedule 2 of the Regulations, the *Australian Drinking Water Guidelines 2011* (ADWG) is the authoritative reference for health-based guideline values and is used to determine compliance.

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

### Section 18 notifications

During the 2017–18 reporting period, drinking water samples were collected from 471 water sampling localities around Victoria and tested for numerous water quality parameters, to demonstrate compliance with water quality standards.

If a water supplier becomes aware it has supplied water that does not comply, or is not likely to comply, with a drinking water quality standard, it must notify the Secretary within 10 calendar days. This notification under s. 18 of the Act, ensures the department is aware of non-compliant drinking water, the corrective measures in place to mitigate any potential public health impacts, and actions undertaken to prevent recurrences.



In 2017–18, there were 23 notifications regarding water that did not meet a standard under both Regulations 12(a) and 12(b). Of these notifications, 16 water sampling localities failed to meet a quality standard, with four localities failing to meet a water quality standard on more than one occasion. Each exceedance was marginal, of a short duration, and involved corrective actions to ensure the water supplied did not present a risk to public health. Appendix 2 lists all s. 18 notifications received during the year.

### Regulation 12(a): compliance with Schedule 2 water quality standards

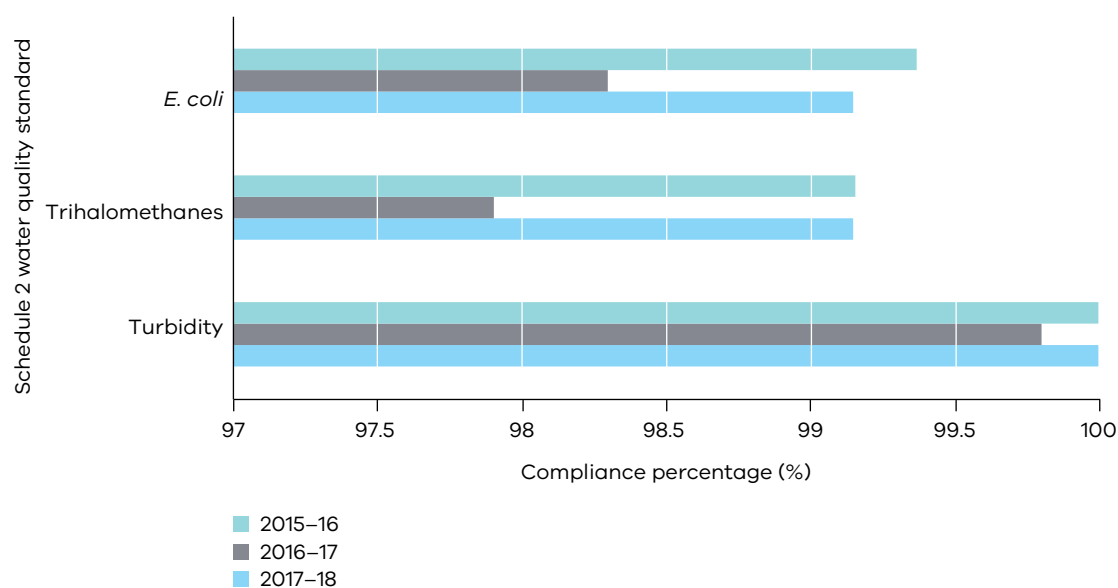
In this reporting period, there were 11 notifications indicating eight water sampling localities that did not meet the Schedule 2 standards and two localities failing to meet the trihalomethane standard more than once.

Table 4 and Figure 6 show the comparison with the previous two years. This indicates that compliance has improved from last year’s report and is comparable with the year before last, 2015–16.

**Table 4: Water samples not meeting Schedule 2 quality standards 2015–16 to 2017–18**

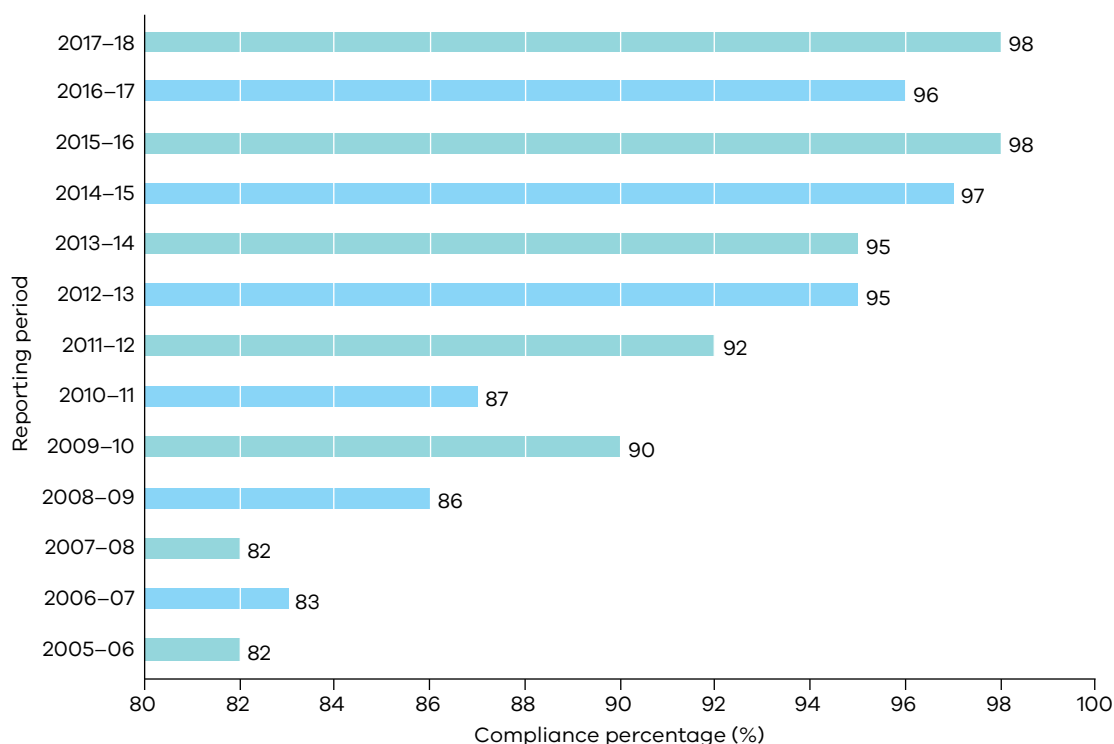
Parameter	Water samples not meeting the quality standard		
	2015–16	2016–17	2017–18
Trihalomethanes	9	23	7
<i>E. coli</i>	3	8	4
Turbidity	0	1	0

**Figure 6: Percentage of water sampling localities compliant with the Schedule 2 water quality standards, 2015–16 to 2017–18**



For the Schedule 2 standards, 463 of 471 localities continuously met the water quality standards, achieving an overall compliance of 98.2 per cent shown in Figure 7. This is an improvement from 2016–17 and equals the highest ever compliance percentage achieved in 2015–16.

**Figure 7: Percentage of water sampling localities continuously compliant with Schedule 2 drinking water quality standards, 2005–06 to 2017–18**



### Escherichia coli

*Escherichia coli* (*E. coli*) is a microbial indicator of drinking water quality. The Regulations require that all drinking water samples collected are found to contain zero *E. coli* per 100 mL of drinking water, with the exception of any false-positive sample as defined in Schedule 2 of the Regulations.

The detection of *E. coli* can signal microbial contamination, therefore any detection is immediately reported under s. 22 of the Act and investigated. If the investigation concludes the detection is representative of the water being supplied, then the standard has not been met and a s. 18 notification must be submitted.

This requirement recognises that it is not desirable for any drinking water samples to contain *E. coli*. However, it also acknowledges that detections of *E. coli* can occasionally occur in the absence of evidence of any system or treatment failures due to vulnerabilities in the sampling process.

When *E. coli* is detected in drinking water samples, water agency staff are expected to thoroughly investigate the issue to determine the cause, correct the issue, and implement preventive actions to stop the issue from recurring in the future.

In 2017–18, there were four notifications under s. 18 where water samples did not meet the *E. coli* standard. These four non-compliances were associated with:

- potential ingress into the drinking water supply system leading to contamination
- inadequate disinfection residual and reduced protection of the supply system to contamination
- failure to submit the investigation report in the timeframe specified in the Regulations.

There were a further 16 *E. coli* reports investigated that concluded the detection was not representative of the drinking water supplied, and therefore the water sampling locality met the standard. This indicates a high rate of compliance with the *E. coli* water quality standard in this reporting period, with 99.2 per cent of all water sampling localities complying with the standard (see Figure 6).

In all cases, water agencies implemented preventive actions to improve future compliance with the *E. coli* water quality standard.

### Total trihalomethanes

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

In the 2017–18 period, there was 99.2 per cent compliance with the trihalomethanes standard, an improvement from 97.9 per cent compliance in 2016–17 (see Figure 6).

The trend for 2017–18 is largely attributed to fewer climatic events, such as floods. In 2016–17, there were several weather events that affected raw water quality, which contributed to elevated trihalomethanes. Changing conditions in source water that lead to increased concentration of organic matter in reservoirs often require an increase in chlorination, resulting in a higher prevalence of trihalomethanes.

For 2017–18, any trihalomethane exceedance that did occur was at a concentration that did not pose a risk to public health. However, water agencies are required to continue to implement strategies to reduce the presence of trihalomethanes. Strategies may involve alternative treatment or reducing the organic content in source water to reduce the potential for trihalomethane formation, particularly following intense rainfall events.

### Turbidity

Turbidity is a measure of the amount of suspended matter in drinking water. The Regulations require the 95th percentile of results in any 12-month period to be less than or equal to 5.0 nephelometric turbidity units (NTU). In the 2017–18 reporting period, 100 per cent compliance with the turbidity water quality standard was achieved. This was an improvement from 99.8 per cent in 2016–17 (see Figure 6).

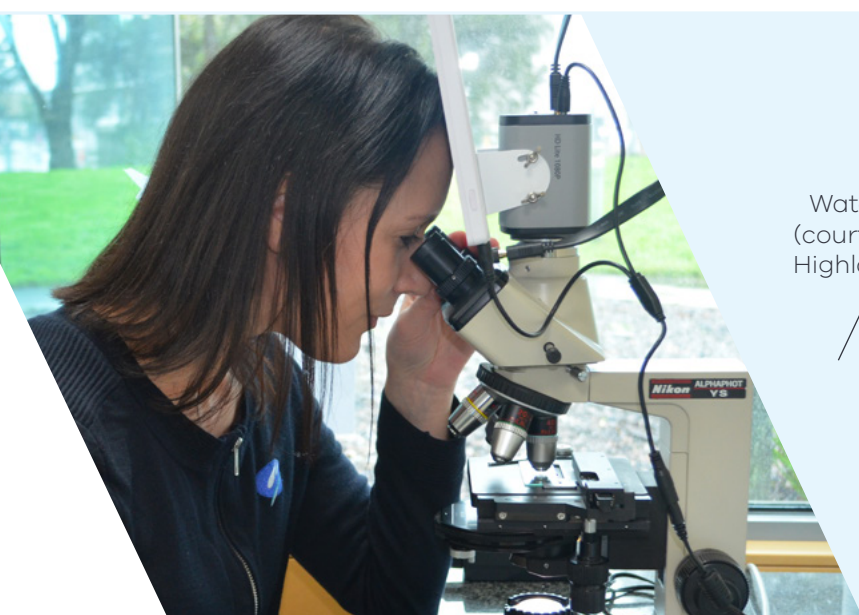
## Regulation 12b: compliance with other water quality standards

Table 5 summarises water samples not meeting other water quality standards in 2017–18 and compared with previous years.

**Table 5: Water samples not meeting the quality standard in accordance with Australian drinking water guidelines values**

Parameter	Water samples not meeting the quality standard		
	2015-16	2016-17	2017-18
Chlorine	1	1	0
Bromate*	0	0	1
Chloral Hydrate*	0	1	0
Dichloroacetic acid*	0	6	0
N-Nitrosodimethylamine*	0	2	0
Trichloroacetic acid*	1	19	5
Aluminium	4	1	0
Lead	2	0	1
Manganese	0	1	0
Nickel	3	3	5
pH	1	0	0

\* Disinfection by-products



Water analysis  
(courtesy Central  
Highlands Water)

## Disinfection by-products

While trihalomethanes are addressed in the Schedule 2 standards, water agencies also sample for other disinfection by-products (DBP) where relevant.

In 2017–18, six drinking water samples did not meet other DBP water quality standards, namely bromate and trichloroacetic acid, which is a substantial reduction from 28 DBP exceedances in the previous year.

In this reporting period, three water sampling localities did not meet the standard for DBP, compared with 11 water sampling localities in 2016–17. The reduced number of non-compliances was due to fewer extreme weather events impacting storages and disinfection regimes.

At no time did the concentration of these DBP exceedances pose a risk to public health.

## Metals

Metals may be present in drinking water due to a number of reasons including: those naturally present in source waters and insufficient removal; leaching from metal pipework; or their use as a treatment aid (such as alum coagulant).

In 2017–18, there were six drinking water samples that exceeded quality standards for metals. The number of exceedances was low and consistent with the previous two years.

## Exemption from a water quality standard

Section 20 of the Act allows the Minister for Health to exempt a water supplier from the obligation to comply with a drinking water quality standard for a specified period of time, provided that adequate measures are proposed to eliminate or minimise any risks to public health. During the year, there were no water suppliers exempted from meeting a water quality standard under the Regulations.

## Reporting known or suspected contamination

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

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

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

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

The requirement to report relevant issues often leads to investigation findings that human health was not compromised. The majority of reports relate to minor, isolated issues that water agencies manage without significant departmental support. However, where the reported issue is more complex, the water agency may require departmental support, advice or additional direction. During 2017–18, there were no water quality events reported under s. 22 that required significant departmental intervention or support to manage public health risk.

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

In the reporting period there were 45 reports made under s. 22 of the Act; a decrease on the previous year (Table 6). These reported issues are broadly grouped into various categories shown in Figure 8, which shows a reduced number of reports related to *E. coli* detections, widespread public complaints and 'other risks'. This year however saw an increase in reports related to disinfection or treatment failures (seven) compared with two reports last year. Appendix 3 details all s. 22 reports received during 2017–18.

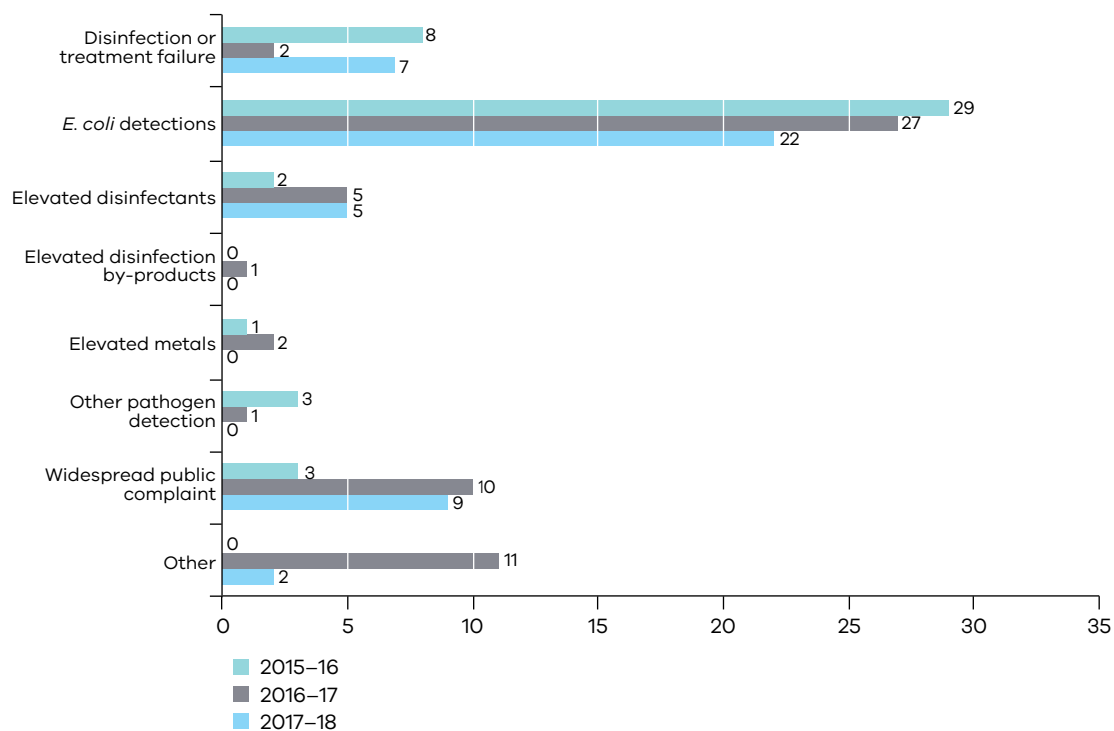
**Table 6: Number of reports made under s. 22 of the Safe Drinking Water Act, 2015–16 to 2017–18**

Reporting period	Number of s. 22s
2017–18	45
2016–17	59
2015–16	46



Water analysis  
(courtesy Central  
Highlands Water)

**Figure 8: Categories of reports made under s. 22 of the Act 2015–16 to 2017–18**



### Disinfection or treatment failure

There were seven reports to the department related to disinfection/treatment failure during the 2017–18 reporting period. This is an increase from last year.

Four reports were directly related to planned and unplanned power outages, resulting in disinfection failure for a short period of time.

Two reports related to filter failures that produced water with elevated turbidity. One filter failure was a result of human error, while the other was due to treatment plant controls failing to shut down.

One report related to a chemical dosing failure due to mechanical problems which was immediately rectified.

All reports were isolated events, occurred for short periods of time and assessed to be a low risk to public health.

### *Escherichia coli* detections

During this reporting period there were 22 reports of *E. coli* detections. Of these, 20 reports were from water sampling localities and have been discussed in the 'Regulation 12(a): Compliance with Schedule 2 standards' section.

The other two reports were detections in water supplied from portable drinking water trailers in a regulated water supply area. The investigation process identified sampling error, indicating the *E. coli* detection was not representative of the water being supplied.

Since remaking the Regulations in 2015, an increased focus on the investigation process following all *E. coli* detections has assisted water agencies in applying a consistent approach to assessing microbial hazards. It also enables agencies to identify opportunities to continuously improve the integrity of supply systems, ultimately leading to safer drinking water for Victorian communities.

### **Widespread public complaint**

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

Nine reports were made to the department in 2017–18, compared with 10 reports in 2016–17. Although these reports identified undesirable aesthetic water quality issues, they did not represent a direct public health risk. Taste and odour issues may however result in the consumption of less healthy drinks, such as sugar-sweetened beverages.

Five of these reports were associated with discoloured water due to resuspension of sediment or manganese in the distribution system.

A further three reports related to taste and odour issues due to the presence of compounds associated with blue-green algae in source water and water network changes.

A single issue was also reported regarding white water, an indicator of excess air trapped in water.

The department worked with all agencies to ensure these issues were resolved in a timely manner and that community confidence in drinking water supplies remains high.

### **Other Section 22 reports**

During the reporting period, two isolated issues were reported under s. 22 of the Act. The effect of these was localised and water agencies, in conjunction with the department, worked to assess public health risks and apply corrective actions in each case.

One incident resulted from unauthorised access at a water facility. The water agency immediately referred the matter to Victoria Police and reported the issue to the department. The matter was promptly investigated, and it was deemed there was no risk to the drinking water supply. The water agency applied the lessons learned, both at the affected asset and to other similar assets in its water supply network.

The second incident was an investigation following a customer complaint regarding the odour of their drinking water. The investigation identified drinking water supplied to four customers was contaminated with raw dam water from an industrial facility. The lack of a backflow prevention device at the premises was the root cause of the issue. Actions taken in response to the incident to reduce the immediate risk of further contamination included ceasing the supply of drinking water to the facility until a backflow prevention device was installed, and flushing water through the distribution system to draw through safe drinking water to nearby properties.



In the 2017–18 reporting period, there were a lower number of asset-related events compared with 2016–17. In 2016–17, there were seven reports related to damaged storages and cross-connections that did not occur in the current year.

## Risk management plan audits

During 2017–18, the sixth round of risk management plan audits was undertaken. The Secretary required all water agencies to undertake an independent audit of their risk management plans by 1 June 2018.

As it was the first audit period in which the requirements of the remade Regulations fully applied, the audit process involved greater scrutiny of the Regulations.

The Water Unit published the *Audit guidance for water agencies*; and held a briefing session with water agency staff and prospective auditors to explain the process and audit requirements.

Of the 24 audits conducted during this reporting period, 22 water agencies were found to have compliant risk management plans, and two were found to have minor non-compliances which did not compromise the quality of the drinking water supplied.

The minor non-compliances detailed in Table 7 were associated with administrative requirements including the level of documentation in risk management plans and improvements to computer programming at water treatment plants. The water agencies have resolved these minor non-compliances.

Chlorination at  
Cardinia water  
treatment plant



**Table 7: Risk management plan audit non-compliances**

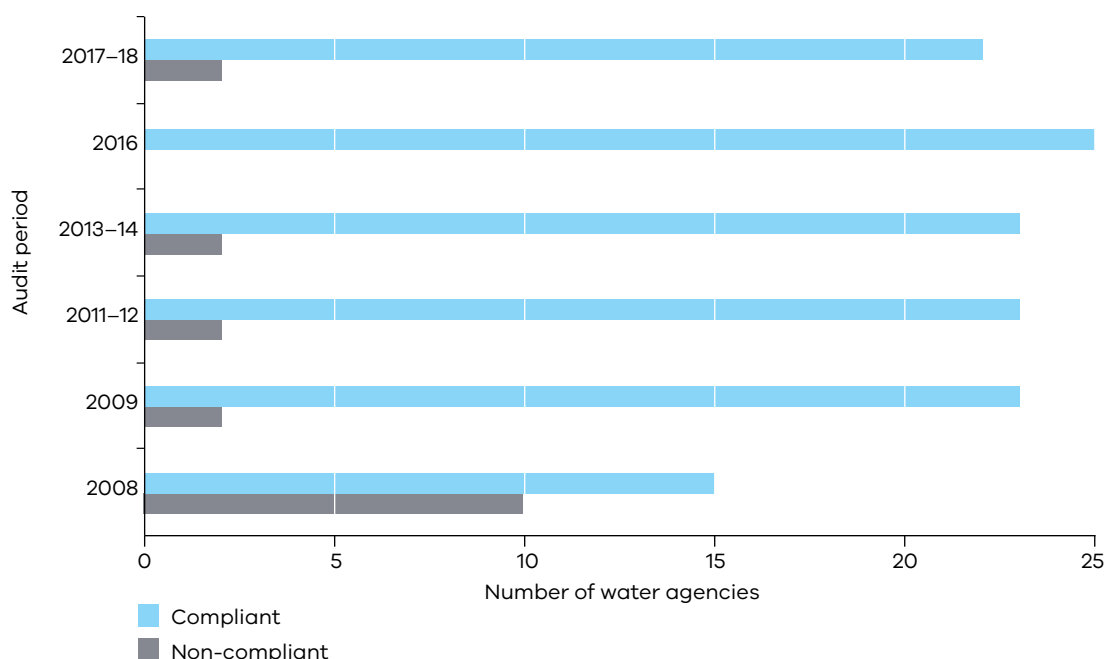
Water agency	Non-compliances
Wannon Water	Minor non-compliances related to documentation detailing roles and responsibilities, sampling and the quantification of microbial hazards in the risk management plan
Grampians Wimmera Mallee Water	Minor non-compliance related to the action limits and time delays in Supervisory Control and Data Acquisition which were not in accordance with the critical limits detailed in the risk management plan

Through this audit, a number of opportunities that water agencies could implement to ensure continuous improvement were also identified. The three most common recommendations were classified as: administration, report and review; distribution system, tanks and back flow; and source water risk identification. Detailed information on individual water agency audit outcomes, including details of identified improvement opportunities, can be found in the individual water agencies’ annual reports on drinking water quality.

This year’s audit result was comparable with earlier audits. Figure 9 shows risk management plan audit outcomes since the commencement of audits in 2008.

Following the risk management plan audit period, the Water Unit presented the audit findings to the water agencies.

**Figure 9: Water agency risk management plan audit outcomes, 2008 to 2018**



## Regulated water declarations

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

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

The process for considering whether a particular supply is declared as regulated water involves consultation between the water supplier and the affected community. Regulated water declarations can also be made if a water supply intended for drinking water deteriorates to the point where drinking water quality standards cannot be met. This has occurred in the past when extreme weather events have significantly changed the characteristics of source water quality.

No changes were made to regulated water declarations during this reporting period. Appendix 4 lists regulated water supplies as of 30 June 2018.

Seymour water  
treatment plant  
(courtesy Goulburn  
Valley Water)



## Undertakings

Under s. 30 of the Act, the Secretary may accept undertakings to address water quality issues and deliver permanent water quality improvements. A water agency may enter into an undertaking with the Secretary when the department or the water agency identifies a contravention under the safe drinking water regulatory framework. The undertaking describes what the water agency will do to resolve the issue, and how any public health risks are managed while the agency resolves the contravention within a specified timeframe.

In this reporting period, there was one undertaking in place. Coliban Water entered into an undertaking for the period 1 June 2017 to 30 June 2018, in response to several instances of non-compliance with the trihalomethanes drinking water quality standard in the Bridgewater and Laanecoorie water supply systems. The raw water for these water supply systems is sourced from the Loddon River, which contains high concentrations of naturally occurring organic matter. High levels of organic matter combined with long water age in the chlorinated water supply systems can increase the formation of trihalomethanes.

While the standard was exceeded on a number of occasions, the option of reducing the concentration of the chlorine disinfectant was not possible as it was important to maintain an appropriate level of disinfection in these systems. By maintaining a reliable disinfection level, the risk to public health was considered low, and Coliban Water's request for an undertaking was approved.

During the undertaking period, Coliban Water reported on progress of the following actions:

- recommissioning and optimising the Bridgewater reverse osmosis plant to remove organic matter
- investigating the feasibility of a dual coagulant dosing system at the Bridgewater water treatment plant to remove organic matter
- reviewing the operation of both water supply systems with the aim of reducing water age
- assessing the capability of Bridgewater and Laanecoorie water treatment plants to remove natural organic matter from the raw water
- reviewing disinfection processes, and upgrading the booster chlorinator at Bealiba, to reduce the formation of disinfection by-products.

At the end of the undertaking period, Coliban Water reported that all agreed actions were completed, with the exception of an upgrade to the chlorine dosing system at Inglewood basin within the Bridgewater water supply system. Due to the poor structural condition of the basin roof that requires significant remedial works, Coliban Water has committed to this additional upgrade as a part of a broader planned capital upgrade to the Inglewood treated water storages.

On the basis there were no non-compliances with the trihalomethanes water quality standard during the undertaking period, the department accepted Coliban Water's final undertaking report, which was submitted on 9 July 2018.

## Annual reports

Under s. 26 of the Act, all water agencies must provide an annual report on issues relating to the quality of drinking water and regulated water for every financial year. Reports must be finalised by 31 October and made available to the public on the respective water agency website by the next business day. Part 5 of the Regulations outlines the details to be included in the annual reports, and water agencies receive additional guidance to assist with explaining the regulatory requirements.

This year was the first period in which water suppliers reported on the implementation of health-based targets to determine protection from microbial risk. The water agency activities involved catchment assessment and quantifying barrier effectiveness, which led to further improvements to many supply systems.

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

Benalla water treatment plant  
(courtesy North East Water)



## Emergency preparedness and incident management

The department and its stakeholders work together to respond to and manage emergencies affecting the safety and quality of reticulated drinking water supplies.

The department works under the requirements of the *Emergency management manual Victoria* (EMMV), which identifies agencies' roles and responsibilities for response. The department is the control agency for drinking water contamination.

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

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

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

In 2017–18, the following incidents occurred that required assistance from the department.

### Lead

#### Public drinking water fountains

In March 2018, following advice from Barwon Water, the City of Greater Geelong tested a random selection of its public drinking water fountains. These test results found that in some fountains, levels of lead and some other metals (copper and nickel) exceeded the *Australian drinking water guidelines* health-related guideline values. In response, the City of Greater Geelong then tested more than 140 public drinking fountains it manages. As a precaution, public drinking fountains found with levels of metals exceeding the guideline values were closed during the investigation.

The City of Greater Geelong commenced an investigation into this issue, working with the department and industry experts to identify the source of lead. The department also collaborated with other government departments and authorities, including building, planning, plumbing and water stakeholders, to better understand and resolve the problem.

This was not an issue associated with the drinking water supply; the issue was due to the leaching of lead from plumbing components in some fountains. An independent human health risk assessment found that, for the majority of these drinking water fountains, the levels of lead detected were of minimal or negligible concern to health.

## Plumbing products

Lead is not beneficial or necessary for humans, and can be harmful to health. All efforts should be made to reduce exposure to lead. Internationally, it has long been recognised that lead has the potential to migrate from drinking water plumbing systems into drinking water. However, historic issues in countries such as the United States of America, Canada and the United Kingdom have often been associated with the use of lead-lined water service pipes.

Unlike some parts of the world, it is unusual to find drinking water pipes containing lead in Australia. Lead may be present in plumbing systems due to the historic use of lead-based solder, however its use was phased out by plumbing regulators in the 1990s. Lead is still permitted in some brass plumbing products, assisting in their manufacture. This presence of lead in some plumbing products increases the risk of it leaching into drinking water. Ultimately, reducing the lead content of plumbing products is the most effective means to reduce this risk.

Australia's Environmental Health Standing Committee published a guidance statement associated with this issue, including precautionary advice on how people can reduce their potential exposure to lead in drinking water. The guidance statement can be found on its website: <<http://www.health.gov.au/internet/main/publishing.nsf/content/health-pubhlth-publicat-enviro.htm>>

The department will continue to work with a number of government agencies, both at state and national levels, to resolve this important public health issue.

## Asbestos in water

In March 2018, concern was raised by Wangaratta CFA during a routine training exercise of the presence of a very small amount of white material on the ground near the hydrant being used. The CFA reported its concern to North East Water, who commenced an investigation to confirm if the material was asbestos cement and its origin. Many water pipes within Victoria are constructed from asbestos cement, including many areas within the drinking water distribution system in Wangaratta. North East Water suspected the hydrant used created flow and pressures changes within the distribution system causing a small amount of asbestos cement to break away from inside the pipe.

North East Water advised the department about the CFA's concerns. A Regional Incident Management Team was formed to manage this issue, with the department nominated as incident controller.

The asbestos cement material was isolated to the Wangaratta CFA property only. As a precaution, the Wangaratta Fire Station remained closed until a thorough investigation and clean up was undertaken. The water supply was not affected and remained safe to drink.

The effects of asbestos in water pipes has been studied extensively, and results show that there is no increased risk of asbestos-related diseases from drinking or using water supplied through asbestos cement pipes.



## Recycled water cross-connections with a drinking water supply

Class A recycled water is supplied to many households, schools, parks and businesses in a separate recycled water pipe for garden watering, toilet flushing and other non-drinking purposes. Occasionally incorrect plumbing and plumbing errors can create a cross-connection of Class A recycled water systems with the drinking water supply that adversely affects the quality of drinking water supplied to individual residences or facilities. The early identification and rectification of these situations is essential to protect the quality of drinking water and health of people consuming it.

While there were no reported incidents of Class A recycled water cross-connection with a drinking water supply this year, the department worked with other agencies to identify improvements. This work included an analysis of previous cross-connection events to inform improvements to mitigating, investigating and responding to future water cross-connection events.

Bellbridge high level  
water tanks (courtesy  
North East Water)



## Water fluoridation

The NHMRC released its *Public statement 2017: water fluoridation and human health in Australia* in November 2017. The NHMRC strongly recommends community water fluoridation as a safe, effective and ethical way to help reduce tooth decay across the population. This statement updates and replaces the 2007 public statement to reflect recent evidence. The NHMRC also released several supporting publications in 2017, including *Water fluoridation and human health in Australia: questions and answers* and *Information paper: water fluoridation – dental and other human health outcomes*.

Dental conditions are the highest cause of all potentially preventable hospitalisations for Victorian children under 10 years of age and the third highest cause for all ages. A total of \$3 billion was spent in Victoria on dental treatment in 2015–16. Water fluoridation reduces dental decay rates by 26 to 44 per cent in children and adolescents and by about 27 per cent in adults. For every dollar invested in water fluoridation, between \$7 and \$18 is saved due to avoided dental decay treatment costs.

More than 90 per cent of Victorians drink water with either naturally occurring or added fluoride, however more than half a million Victorians living in regional areas still do not receive fluoridated water. This gap comprises more than 250,000 people who receive a non-fluoridated reticulated drinking water supply. The department continues to partner with water agencies in relation to extending water fluoridation where possible across the state.

Under the *Health (Fluoridation) Act 1973*, the department oversees the extension of water fluoridation in Victoria and the ongoing compliance of fluoride plants in operation. Before adding fluoride to any water supply, a water agency must submit plans and specifications to the department for consideration. The department conducts a technical appraisal of the fluoride plant in accordance with the *Code of practice for fluoridation of drinking water supplies* (Second edition) to ensure that the fluoride plant can operate safely and reliably. Upon completion of the technical appraisal, an approval is provided to commence operation.

In 2017–18, the following activities occurred:

- Following a technical appraisal and after receiving the Secretary's approval to fluoridate, Goulburn Valley Water commenced operation of the Cobram fluoride plant. The communities of Cobram, Strathmerton and Yarroweyah are now receiving a fluoridated drinking water supply.
- Following a technical appraisal, an approval was given to Melbourne Water to operate the Cardinia fluoride plant, which contributes to Melbourne's drinking water supply. This new plant was designed to improve safety and efficiency and replaced the previous fluoride plant.

Fluoride audits are arranged within 12 months of operation to verify the recommendations from the technical appraisal and any other requirements at the time the approval was provided. During 2017–18, there were no fluoride audits undertaken.

In March 2018, the revised *Code of practice for fluoridation of drinking water supplies* (Second edition) was published. Water agencies use this guidance to ensure the safe and effective design and operation of fluoride plants.

Operator training  
(courtesy Water Industry  
Operators Association  
of Australia)



## Education and promotion

Section 27(f) of the Act gives the Secretary the function of promoting industry and public awareness and understanding of drinking water quality issues. The Water Unit takes an active role on behalf of the Secretary.

This includes educating the public and the water sector about the health benefits and risks associated with drinking water and promoting ways to mitigate and manage potential risk. The following provides an overview of the information and guidance provided to our partners. Appendix 6 lists the presentations and representations by the Water Unit in 2017–18.

### Guidance

The Water Unit published three guidance papers in the past year.

The *Safe Drinking Water Act 2003 risk management plan audit: guidance information* assists auditors in understanding the risk management plan audit requirements under the Act. This guidance includes:

- information regarding the risk management plan audit process for all stakeholders
- the auditor certification and approval process
- information to assist auditors' consistent assessment and reporting of compliance outcomes
- risk management plan requirements relating to key areas of assessment.

The *Water sampling localities: submitting proposals* guidance assists water suppliers in submitting water sampling locality proposals that meet the requirements of the 2015 Regulations. Any new water sampling localities, such as new discrete drinking water distribution systems or changes to existing water sampling locality boundaries, are required to be specified as such via publication in the *Victoria Government Gazette* under the Regulations by the Secretary of the department.

The *Code of practice for fluoridation of drinking water supplies* (Second edition) supports the *Health (Fluoridation) Act 1973* and has been designed to help water agencies prepare submissions for proposed fluoridation plants. The code of practice outlines the design, construction, commissioning, approval and operating requirements for water fluoridation plants.

These are available on the department's website <<https://www2.health.vic.gov.au/public-health/water/drinking-water-in-victoria>>.

### Water agency forums

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

Topics discussed in the November 2017 forum included:

- recycled water cross-connections and s. 22 reporting requirements
- Ministerial Statement of Expectations (<<https://dhhs.vic.gov.au/ministerial-statements-expectations-regulators>>) and the department's Better regulatory practice framework including the Water Unit's regulator plan March 2018 – June 2019 (<<https://dhhs.vic.gov.au/publications/better-regulatory-practice-framework>>).
- Safe Drinking Water Levy apportionment review
- *Code of practice for fluoridation of drinking water supplies* (Second edition) update.

Topics discussed in the June 2018 forum included:

- Wangaratta CFA asbestos pipe incident
- water fluoridation update
- national water quality update
- investigation into drinking water fountains
- overview of 2017–18 risk management plan audits
- South East Water cross-connection case study
- national carp control program.

## Upstream newsletter

The Water Unit published three issues of its *Upstream* industry newsletter during the year.

Upstream provides industry news and upcoming event details, as well as guidance updates from the Water Unit. Topics included:

- quarterly compliance reporting information
- avoidance of recycled water cross-connections
- update on the development of the *Code of practice for fluoridation of drinking water supplies* (Second edition)
- guidance on water sampling location proposals
- aquatic facility outbreak prevention and response
- Havelock North (NZ) water contamination findings
- lead in brass plumbing fittings
- extreme weather event preparedness and response.

## Water Industry Officer Association Victorian conference

Every year, the department participates in the Water Industry Officer Association Victorian conference. The conference provides an opportunity to discuss water related matters with water operators. In 2017, the department's session presented real drinking water contamination case studies that demonstrate the vigilance required to protect drinking water. These presentations included the East Gippsland Water Cann River drinking water contamination incident previously reported in the department's 2016–17 annual report, and the inquiry findings of the 2016 Havelock North, New Zealand waterborne disease outbreak.

## Victorian framework for water treatment operator competencies

The review of the Victorian framework for water treatment operator competencies, *Best practice guidelines 2010*, continued during the reporting period. The review considered the *National operators within drinking water treatment systems certification framework 2017*, developed by the Water Industry Skills Taskforce which was released in July 2017. Recommendations from the review are to be considered by the project committee, which includes representatives from the department, Victorian Water Industry Association (VicWater), Water Industry Operators Association Australia and Victorian water agencies. Outcomes of the review will be implemented in 2018–19.

Operator training  
(courtesy Water  
Industry Operators  
Association  
of Australia)





Maroondah Reservoir  
(courtesy Melbourne  
Water)



## On the horizon

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

### Antimicrobial resistance in water

*'Without urgent, coordinated action, the world is headed for a post-antibiotic era, in which common infections which have been treatable for decades can once again kill.'* Dr Keiji Fukuda, World Health Organization Assistant Director-General for Health Security.

The World Health Organization has developed the *Global action plan on antimicrobial resistance (2015)* to increase knowledge, reduce infections, optimise use of antimicrobial agents and develop strategies for the future.

Antimicrobial resistance is one of the biggest threats to both human and animal health; requiring a One Health response. Australia's first *National antimicrobial resistance strategy 2015–2019* guides actions to address antimicrobial resistance. This strategy sets priorities to minimise development of antimicrobial resistance and supports the national and global response efforts.

Understanding the possible effects and interventions in drinking water supply systems is essential for managing risk and protecting public health into the future.

The department contributed to this area of health research by attending the Antibiotic Resistance in Water workshop convened by the University of South Australia and Water Research Australia. The workshop resulted in an application for a national research project. The department committed expert personnel to this research proposal and will maintain future involvement in this field.

### Source water protection

Under the Act, water storage managers and water suppliers are responsible for developing and implementing risk management plans that adopt a proactive catchment-to-tap approach for the provision of safe drinking water supplies.

Protected water supply catchments underpin the safety, reputation and affordability of drinking water supplies. The *Australian drinking water guidelines* state that the prevention of contamination provides greater surety than removal of contaminants by treatment, and therefore the most effective barrier to contamination must be the protection of source waters to the maximum degree possible.

Potential threats to drinking water catchments include human inhabitation, intensification of land use including agriculture, and recreational access in and around water storage catchments. These threats are likely to be further exacerbated by the effects of climate change and extreme climatic events.

If drinking water supply catchments and water storages are compromised, the following risks can affect drinking water quality and affordability in the following ways:

- increased risk of pathogenic microorganisms which would require expensive treatment augmentation

- increased frequency and duration of harmful algal blooms as a result of increased nutrient loads. Harmful algal blooms have been known to overwhelm the capability of treatment plants, resulting in expensive alternatives (water carts or bottled water)
- increased fire risk affecting longer-term water security.

Therefore, every effort should be made to protect and enhance drinking water supply catchments, including storage water reservoir management as part of the multiple barrier approach to safeguarding the security, safety and affordability of drinking water supplies now and into the future.



Lake Guy,  
Bogong Village  
water storage

## 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	03 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	03 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	03 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>
Mount Buller and Mount Stirling Alpine Resort Management Board	03 5777 6077	<a href="http://www.mtbuller.com.au">www.mtbuller.com.au</a>
Mount Hotham Alpine Resort Management Board	03 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	03 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 304 688	<a href="http://www.yvw.com.au">www.yvw.com.au</a>

## Appendix 2: Section 18 notifications for drinking water quality standards, 2017–18

Water agency	Water sampling locality	Water quality standard
Central Highlands Water	Wendouree	<i>E. coli</i>
Coliban Water	Harcourt	Bromate
Coliban Water	Newstead	<i>E. coli</i>
Coliban Water	Echuca	Nickel
Coliban Water	Bendigo	Nickel
Coliban Water	Castlemaine	Nickel
Coliban Water	Tooborac	Nickel
Coliban Water	Bendigo	Nickel
Coliban Water	Junortoun	Lead
Goulburn Valley Water	Buxton	Trichloroacetic acid
Goulburn Valley Water	Katamatite	Trihalomethanes
Grampians Wimmera Mallee Water	Lake Bolac	<i>E. coli</i>
Grampians Wimmera Mallee Water	Edenhope	Trihalomethanes
Mt Buller and Mt Stirling Alpine Resort Management Board	Mt Stirling	Trichloroacetic acid
Mt Buller and Mt Stirling Alpine Resort Management Board	Mt Stirling	Trichloroacetic acid
Mt Buller and Mt Stirling Alpine Resort Management Board	Mt Stirling	Trichloroacetic acid
Mt Buller and Mt Stirling Alpine Resort Management Board	Mt Stirling	Trichloroacetic acid
Parks Victoria	Tidal River	Trihalomethanes
Parks Victoria	Tidal River	Trihalomethanes
Wannon Water	Cavendish	Trihalomethanes
Wannon Water	Cavendish	Trihalomethanes
Wannon Water	Cavendish	Trihalomethanes
Yarra Valley Water	Emerald	<i>E. coli</i>

## Appendix 3: Section 22 reports, 2017–18

Water agency	Water sampling locality	Reason
Barwon Water	Cressy	Elevated chlorine
Central Highlands Water	Wendouree	<i>E. coli</i> detection
Central Highlands Water	Creswick	<i>E. coli</i> detection
City West Water	Tullamarine	Widespread public complaint
Coliban Water	Elmore	Disinfection/treatment failure
Coliban Water	Newstead	<i>E. coli</i> detection
East Gippsland Water	Bemm River	Disinfection/treatment failure
East Gippsland Water	Bemm River	Disinfection/treatment failure
East Gippsland Water	Cann River	Disinfection/treatment failure
Falls Creek Alpine Resort Management Board	Falls Creek	Disinfection/treatment failure
Falls Creek Alpine Resort Management Board	Falls Creek	<i>E. coli</i> detection
Gippsland Water	Boolarra	<i>E. coli</i> detection
Goulburn Valley Water	Alexandra	Disinfection/treatment failure
Grampians Wimmera Mallee Water	Drinking water trailers	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Drinking water trailers	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Lake Bolac	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Lake Bolac	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Halls Gap	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Ararat	<i>E. coli</i> detection
Grampians Wimmera Mallee Water	Natimuk	Elevated chlorine
Mt Buller and Mt Stirling Alpine Resort Management Board	Mt Buller	<i>E. coli</i> detection
North East Water	Bellbridge	<i>E. coli</i> detection

Water agency	Water sampling locality	Reason
South East Water	Upper Beaconsfield	<i>E. coli</i> detection
South East Water	Frankston South	Elevated chlorine
South Gippsland Water	Korumburra	Widespread public complaint
South Gippsland Water	Little Bass	Widespread public complaint
South Gippsland Water	Lance Creek	Widespread public complaint
Wannon Water	Caramut	<i>E. coli</i> detection
Wannon Water	Balmoral	<i>E. coli</i> detection
Wannon Water	Warrnambool	Suspected contamination
Wannon Water	Heywood	Suspected contamination
Western Water	Myrniong	<i>E. coli</i> detection
Western Water	Gisborne South	<i>E. coli</i> detection
Western Water	Merrimu	<i>E. coli</i> detection
Western Water	Darley	Elevated chlorine
Western Water	Woodend	Disinfection/Treatment failure
Yarra Valley Water	Emerald	<i>E. coli</i> detection
Yarra Valley Water	Plenty	<i>E. coli</i> detection
Yarra Valley Water	Ivanhoe	<i>E. coli</i> detection
Yarra Valley Water	Montrose	Elevated chlorine
Yarra Valley Water	Croydon	Widespread public complaint
Yarra Valley Water	Somerton	Widespread public complaint
Yarra Valley Water	Warburton	Widespread public complaint
Yarra Valley Water	Northcote	Widespread public complaint
Yarra Valley Water	Glenroy	Widespread public complaint

## Appendix 4: Regulated water supplies at 30 June 2018

Water agency	Water supply area
Central Highlands Water	Amphitheatre, Raglan, Redbank
Coliban Water	Borong, Dingee, Jarklin, Macorna, Mitiamo, Mysia, Wychitella
Goulburn Valley Water	Corop, Goulburn Weir, Kirwans Bridge, Molesworth, Strathbogie, Woods Point
Grampians Wimmera Mallee Water	Antwerp, Apsley, Berriwillock, Beulah, Brim, Buangor, Chillingollah, Chinkapook, Cowangie, Culgoa, Dooen, Elmhurst, Glenorchy, Goroke, Harrow, Jung, Kaniva, Kiata, Lalbert, Lascelles, Lillimur, Marnoo, Miram, Moyston, Murrayville, Nandaly, Nullawil, Patchewollock, Pimpinio, Serviceton, Speed, Streatham, Tarranyurk, Tempy, Ultima, Waitchie, Walpeup, Watchem, Westmere, Wickliffe, Woomelang, Yaapect  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

Victorian  
Desalination Plant



## Appendix 5: Water agency assets visited in 2017–18

Central Highlands Water	Maryborough Water Treatment Plant
Central Highlands Water	Tullaroop Reservoir
Central Highlands Water	White Swan Water Treatment Plant
Coliban Water	Bendigo Recycled Water Treatment Plant
Coliban Water	Kyneton Water Treatment Plant
Coliban Water	Laanecoorie Water Treatment Plant
Coliban Water	Boort Water Treatment Plant
Coliban Water	Korong Vale Water Treatment Plant
Coliban Water	Pyramid Hill Water Treatment Plant
Goulburn Valley Water	Nagambie Water Treatment Plant
Grampians Wimmera Mallee Water	Mount Zero Water Treatment Plant
Grampians Wimmera Mallee Water	Quambatook Water Treatment Plant
Melbourne Water	Western Treatment Plant
Parks Victoria	Tidal River Water Treatment Plant
South East Water	East Frankston Water Storage Tank
South East Water	Koo Wee Rup Water Storage Tank
South Gippsland Water	Lance Creek Water Connection Pipeline
South Gippsland Water	Lance Creek Water Treatment Plant
Wannon Water	Camperdown Water Treatment Plant
Wannon Water	Terang Water Treatment Plant
Western Water	Lancefield Water Treatment Plant
Westernport Water	Ian Bartlett Water Treatment Plant



## Appendix 6: Water Unit presentations and representation during 2017–18

### Presentations

- Department of Health and Human Services – Water agency forums
- Environmental Health Professionals Association – Water forum workshop
- Melbourne University School of Population and Global Health – Partnerships and collaboration for water fluoridation
- Lower Murray Water – Safe drinking water
- GWMWater – The critical nature of supplying safe drinking water
- Water Industry Operators Association of Australia – Network Operator Development program (fluoride, operator competency)
- Safe Drinking Water Act risk management plan auditor briefing
- Water Industry Operators Association of Australia – 2017 Victorian Conference
- GWMWater Wimmera Region Staff Meeting
- Our Catchments Our Communities – Strategic reference group
- Water Sector Resilience Network – State Health Emergency Response Plan
- Environmental Health Professionals Australia (Victoria) – Managing risk to private drinking water supplies
- Environmental Health Professionals Australia Symposium – Drinking water at public events
- Melbourne University Bachelor of Health students – Water fluoridation in Victoria

### Representation

- DELWP Riparian Forum
- DELWP and EPA – State Environment Protection Policy (Waters) working group
- Victorian Carp Control Working Group
- Environmental Health Standing Committee Water Quality Expert Reference Panel
- Environment Protection Authority Water Industry Reference Group
- National Health and Medical Research Council
- Ozwater Conference – Brisbane, May 2018

Whitfield water treatment plant  
(courtesy North East Water)



## 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.
<b>Boil water advisory</b>	Advice issued by a water supplier that requires consumers to boil their drinking water supply prior to consumption (or for purposes connected to human consumption such as 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>Coagulation</b>	Clumping together of fine particles into larger particles using chemicals that neutralise the electrical charges of the fine particles, allowing them to be removed to assist water clarification.
<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>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 <i>Safe Drinking Water Regulations 2015</i> for the purposes of s.17 of the <i>Safe Drinking Water Act 2003</i> .

<b>Dual pipe (scheme)</b>	An urban water recycling scheme where an alternative water supply is provided to households for certain uses via a reticulation system that is separated from the drinking water supply. Sometimes referred to as a 'third pipe' scheme.
<b>Escherichia coli</b>	<i>Escherichia coli</i> (also known as <i>E. coli</i> ) is a type of faecal coliform bacteria. The presence of <i>E. coli</i> is an indicator of the presence of contamination from human or animal waste. Its presence most likely indicates a breach of a water quality treatment barrier or contamination during the distribution of the water, and is used as an indicator for the presence of microbial pathogens.
<b>False positive</b>	An investigation concluded that the detection of <i>E. coli</i> in a sample was not representative of the water in the relevant water sampling locality. Refer to the meaning of 'false positive' in Schedule 2 of the <i>Safe Drinking Water Regulations 2015</i> .
<b>Groundwater</b>	Water contained in rocks or subsoil.
<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 units</b>	A measure of clarity determined by a nephelometer that emits a light beam through water.
<b>Non-potable water</b>	Any source of water that is unsuitable for drinking.
<b>Notification</b>	Verbal and written communication received by the department from water suppliers under s.18 of the <i>Safe Drinking Water Act 2003</i> when drinking water supplied to the public does not (or is not likely to) comply with drinking water quality standards.
<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 and written communication received by the department from water suppliers, water storage managers or council officers under s.22 of the <i>Safe Drinking Water Act 2003</i> regarding known or suspected contamination of water.
<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 is referred to as the safe drinking water regulatory framework. The framework consists of the <i>Safe Drinking Water Act 2003</i> and the <i>Safe Drinking Water Regulations 2015</i> . The safe drinking water regulatory framework supports the <i>Health (Fluoridation) Act 1973</i> and is consistent with the risk management approach in the <i>Australian Drinking Water Guidelines 2011</i> .
<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>	<i>Safe Drinking Water Regulations 2015</i>
<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 (UV)</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>	Water storage managers and water suppliers are referred to collectively as water agencies.
<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> .





