



Annual report on drinking water quality in Victoria 2016-17

Tap water, the healthy choice



Secretary's foreword

For well over a century, the provision of safe drinking water has been a public health priority and the cornerstone of the health and wellbeing of Victorian communities. In recent decades, access to fluoridated water in Victoria has increased, providing an additional health benefit in reducing oral health disease. Tap water is the healthy choice, and it is both the safety and aesthetics of these community drinking water supplies that enable the community to choose tap water with confidence.

The *Safe Drinking Water Act 2003*, administered by the department, provides the framework for managing community drinking water supplies. Our communities can have confidence in drinking water regulated under the Act.

I am pleased to present the Department of Health and Human Services' *Annual report on drinking water quality in Victoria 2016–17*. This report provides a synopsis of drinking water quality in Victoria during 2016–17, along with details of the activities of the department carried out under the Act and associated costs.

Drinking water compliance in 2016–17 remained strong, with 96 per cent of drinking water sampling localities complying with scheduled drinking water quality standards at all times. I am pleased that compliance with the safe drinking water framework remains high.

Regardless, managing risks to drinking water supplies is an ongoing challenge, and during the reporting period water agencies again responded to extreme weather events, demonstrating the effectiveness of their emergency arrangements. With the support of the department, the potential public health risks were effectively managed and safe drinking water continued to be supplied.

Our communities expect that risks to the safety and quality of drinking water are continuously managed. Continuous improvement of risk management plans, as required by the Act, positions the industry well to adapt to known and emerging potential public health issues. Enhanced catchment management is integral to managing the future challenges in protecting our precious drinking water sources.

The department will continue to work with water agencies to achieve the shared goal of safe, good-quality drinking water so that our communities embrace healthy tap water as the drink of choice.



Kym Peake

Secretary

Department of Health and Human Services

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using the National Relay Service 13 36 77 if required, or email <water@dhhs.vic.gov.au>.

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Contents

Secretary's foreword	i
Introduction	1
Highlights and achievements of 2016–17	2
A collaborative approach to drinking water regulation	3
Victoria's safe drinking water regulatory framework	4
The role of the Minister for Health	4
The role of the Department of Health and Human Services	5
The role of water agencies	7
Regulated water declarations	9
Tap water, the healthy choice	11
Reducing consumption of bottled drinks	11
Reducing tooth decay	12
Community expectations	13
Drinking water quality performance in 2016–17	14
Water quality standards	14
Notifications made under section 18 of the Safe Drinking Water Act	15
Reports made under section 22 of the Safe Drinking Water Act	19
Water quality incidents	22
Weather events affecting water quality	25
Undertakings	26
Managing risk together	27
Water sector liaison	27
Emergency preparedness	27
Education and promotion	29
Guidance	29
Advocacy and representation	29
Health-based targets	29
Water fluoridation	30

Future challenges	31
Protecting source water for drinking	31
One Health	32
Chemicals of potential concern	32
Nuisance and harmful algae research	33
Appendices	35
Appendix 1: Contact details for water agencies	35
Appendix 2: Regulated water supplies at 30 June 2017	36
Appendix 3: Water agency assets visited by Water Unit staff in 2016–17	37
Appendix 4: Water Unit presentations and representation during 2016–17	38
Glossary	39

List of tables and figures

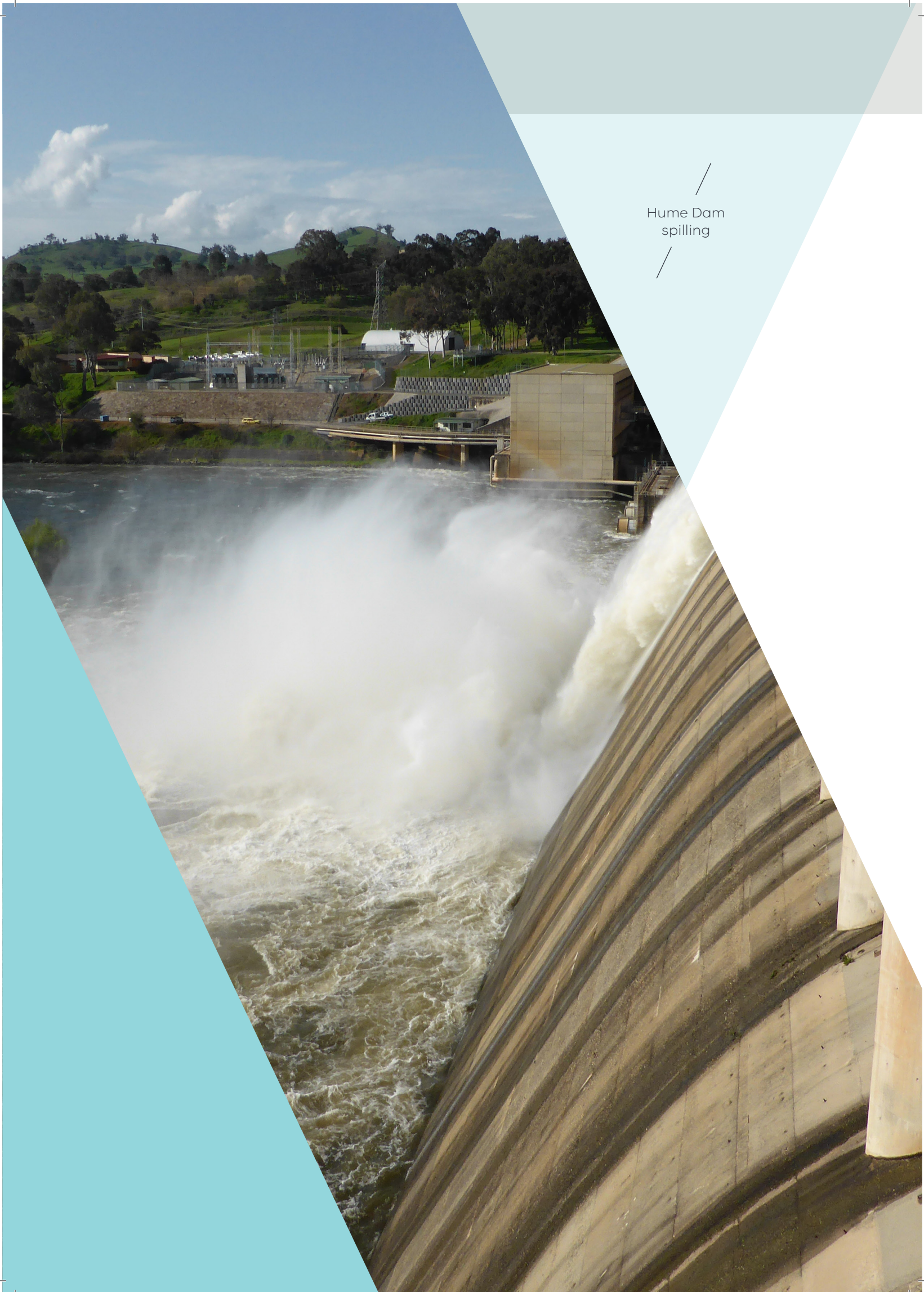
Tables

Table 1: Legislated roles associated with managing Victoria's drinking water supply	3
Table 2: The department's expenditure to administer the Safe Drinking Water Act, 2013–14 to 2016–17	6
Table 3: Safe Drinking Water Regulations Schedule 2 drinking water quality standards	14
Table 4: Water sampling localities not meeting quality standards, 2015–16 to 2016–17	15

Figures

Figure 1: Victoria's multi-jurisdictional water regulatory system	3
Figure 2: Water storage manager and water supplier boundaries	8
Figure 3: Percentage of water sampling localities continuously compliant with Schedule 2 drinking water quality standards, 2005–06 to 2016–17	16
Figure 4: Percentage of water sampling localities compliant with the Schedule 2 water quality standards, 2014–15 to 2016–17	17
Figure 5: Number of reports made under section 22 of the Safe Drinking Water Act, 2004–05 to 2016–17	20
Figure 6: Categories of reports made under section 22 of the Safe Drinking Water Act, 2014–15 to 2016–17	20

Hume Dam
spilling





Introduction

The *Safe Drinking Water Act 2003* and associated regulations provide Victorian water agencies and the Department of Health and Human Services with a framework to ensure safe drinking water is supplied to Victorian communities.

Section 32 of the Act requires that the Secretary to the department provides the Minister for Health with an annual report in respect to each financial year that gives a statewide perspective of drinking water quality, along with details of the Secretary's activities undertaken under the Act.

The Act also requires Victoria's 24 water agencies to prepare and submit annual reports to the Secretary. These reports inform the Secretary and the public about any drinking water quality issues.

This annual report summarises Victoria's drinking water quality performance and the department's activities during the 2016–17 reporting period. It provides a synopsis of drinking water quality across Victoria; water agency reports providing greater detail are available from their websites.¹

Acknowledging that the provision of safe, aesthetically pleasing drinking water supplies play a significant role in the health and wellbeing of Victorian communities, the theme of this report is 'Tap water, the healthy choice'.

¹ See Appendix 1 for water agency contact details.

Highlights and achievements of 2016–17

In 2016–17 the department continued to partner with water agencies and other government agencies to promote improvements to the safety and quality of Victoria's drinking water. Highlights and achievements over this period include the following:

- Compliance with drinking water quality standards remained strong, with 96 per cent of water sampling localities complying at all times with the scheduled standards stated in Schedule 2 of the Regulations.
- Risks to public health due to flooding in the north-east and south-west regions of the state during September 2016 were effectively managed by water agencies in collaboration with the department.
- Water agencies progressed the implementation of a health-based target for microbial safety through catchment and treatment assessments.
- A significant blackwater event in the north of the state in December 2016, which affected the aesthetics of drinking water in various communities, was well managed.
- Water agencies undertook significant community engagement to inform pricing reviews. The safety and aesthetics of drinking water is a core community expectation.
- The community of Ararat received fluoridated drinking water for the first time.
- North East Water constructed a 520-megalitre off-river storage facility and a new water treatment plant to secure reliable water supply for the communities of Bright, Wandiligong and Porepunkah.



Bright Water
Treatment Plant

A collaborative approach to drinking water regulation

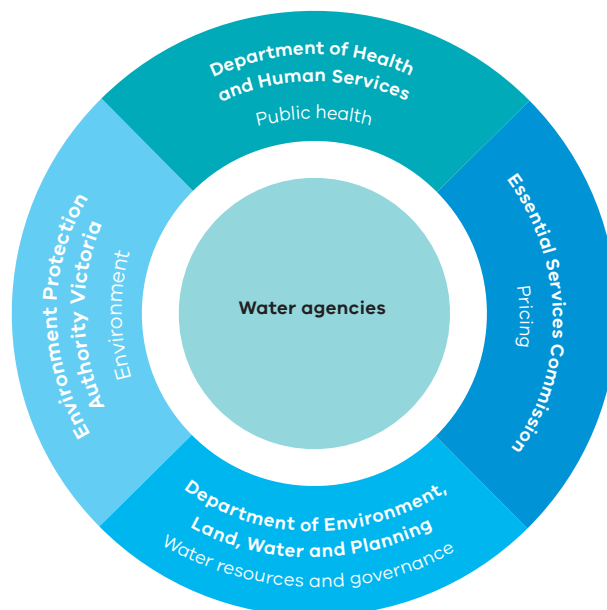
Victoria’s water industry is regulated through a comprehensive, multi-jurisdictional regulatory approach. Four government agencies are involved in planning, managing and regulating Victoria’s water resources and water agencies, with each agency having a regulatory and oversight role that is defined in various Acts of Parliament, regulations, guidelines and codes of practice (Table 1). Collectively, these agencies set the economic, environmental, social and safety obligations that water agencies must meet.

While each agency has a clearly defined regulatory role, there is significant interagency collaboration (Figure 1). This ensures an integrated and coordinated approach to planning and oversight of the water industry.

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 1: Victoria’s multi-jurisdictional water regulatory system





Victoria's safe drinking water regulatory framework

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

- the Safe Drinking Water Act
- the Safe Drinking Water Regulations.

The safe drinking water legislation requires:

- a 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*² and supports the Health (Fluoridation) Act.

The role of the Minister for Health

The Act establishes a number of decision-making functions for the Minister for Health:

- declaring a non-potable water supply to be regulated water
- approving applications for variations of drinking water aesthetic standards
- exempting water suppliers from having to comply with a drinking water quality standard
- imposing conditions on drinking water variations or exemptions
- fixing a period for which an administration levy is payable by water agencies, seeking advice from the Secretary on the costs (or likely costs) of administering the Safe Drinking Water Act, and apportioning the levy fairly between all 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.

² NHMRC, NRMCC 2011, *Australian drinking water guidelines, Paper 6, National water quality management strategy*, National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

The role of the Department of Health and Human Services

The Secretary to the department also has an important role under the Act in safeguarding drinking water and facilitating the safe use of regulated water. 'Regulated water' refers to non-potable water that may be mistaken for drinking water.

The specific functions of the Secretary as prescribed in s. 27 of the Act are to:

- protect public health in relation to drinking water
- monitor and enforce compliance with the Act and the Regulations
- report on water agencies' performance in meeting their obligations
- investigate and report on any aspect of drinking water quality in Victoria
- make recommendations to the Minister for Health on any matter relating to drinking water or regulated water
- promote awareness and understanding of drinking water quality issues in the industry and among the public.

The Secretary may enter into undertakings with water agencies to achieve particular outcomes and may provide direction if there is a risk to public health. The department has a dedicated Water Unit that administers Victoria's safe drinking water regulatory framework on behalf of the Secretary.

Water Unit

The department's Water Unit is part of the Health Protection branch, located within the Regulation, Health Protection and Emergency Management division. The Water Unit's regulatory approach relies on maintaining up-to-date knowledge about health-related drinking water risks, together with efficient and effective regulatory oversight.

The Water Unit's activities include:

- reviewing and assessing the health significance of notifications and reports made to the department under ss. 18 and 22 of the Act
- working with water agencies to achieve compliance with the Act
- 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 fluoridation delivery system technologies to ensure reliability in terms of safety and desired oral health benefits
- publishing guidance material on the safe drinking water regulatory framework to assist water agencies in complying with legislative requirements
- providing guidance and advice to water agencies on drinking water quality issues
- keeping up to date with current research and emerging drinking water quality issues and contributing to research
- leading the Victorian Government's emergency response during emergencies related to the contamination of drinking water supplies.

Department expenditure associated with administering the Act

Department expenditure associated with administering the Act in this reporting period, along with a comparison with the previous two financial years, is shown in Table 2.

Section 51 of the Act allows the Minister for Health to set a levy amount for a specified period to assist in defraying the costs of administering the Act and apportioning this levy amount in a fair manner between all water agencies for payment. The administration levy amount for the 2016–17 financial year was set at \$1,233,419. 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, 2013–14 to 2016–17

Expenditure type	2014–15	2015–16	2016–17	Variance between 2016–17 and 2015–16
Salaries, allowances and salary-related on-costs	\$755,418	\$677,354	\$752,881	\$75,527
Indirect costs	\$60,749	\$63,784	\$71,694	\$7,910
Operating costs	\$227,322	\$168,984	\$218,081	\$49,097
Communication and education	\$25,154	\$10,214	\$32,937	\$22,723
Research and development	\$276,574	\$131,755	\$33,025	-\$98,730
Information technology	\$5,165	\$7,221	\$3,617	-\$3,604
Total expenditure	\$1,350,382	\$1,059,312	\$1,112,235	\$52,923



Flood waters in Apex Park Wangaratta

The role of water agencies

The Act requires Victoria's water agencies to provide safe, good-quality drinking water. The Act applies to a range of agencies involved with water storage, water treatment and the supply of public drinking water and regulated water.

As of 30 June 2017 there were 24 water agencies regulated by the department, with the Act distinguishing between two types of water agency: water storage manager and water supplier.

On 1 January 2017 Southern Alpine Resort Management Board was created, merging the boards previously responsible for managing Mt Baw Baw and Lake Mountain. This reduced the number of water agencies regulated under the Act in the reporting period from 25 to 24.

Water storage managers

Water storage managers are agencies that store water and supply it to water suppliers. There are four water storage managers in Victoria, one of which is also a water supplier (Figure 2). Three of these water storage managers supply untreated water to water suppliers, and one treats and supplies this water.

Water suppliers

Water suppliers provide drinking water to approximately 95 per cent of Victoria's population. Most water suppliers are responsible for treating water to drinking water standard. Some water suppliers also manage regulated water supplies – that is, water that is not drinking water but could be mistaken for drinking water such as untreated reticulated water that is used for irrigation, stock use or for non-drinking domestic uses.

There are 21 water suppliers in Victoria, one of which is also a water storage manager (Figure 2). Each water supplier covers a discrete geographic area where drinking water supplies are defined as water sampling localities declared under the Regulations. As of 30 June 2017 there were 477 water sampling localities across the state.³

³ A list of water sampling localities can be found on the department's website at <<https://www2.health.vic.gov.au/public-health/water/drinking-water-in-victoria/water-suppliers>>.

Figure 2: Water storage manager and water supplier boundaries



Water storage managers

- Goulburn-Murray Water
- - - GWMWater*
- Melbourne Water
- Southern Rural Water

Water suppliers

- Barwon Water
- East Gippsland Water
- Lower Murray Water
- Wannon Water
- Central Highlands Water
- Gippsland Water
- North East Water
- Western Water
- City West Water
- Goulburn Valley Water
- South East Water
- Westernport Water
- Coliban Water
- GWMWater*
- South Gippsland Water
- Yarra Valley Water

- ▲ Falls Creek Alpine Resort Management Board
- ▲ SouthernAlpine Resort Management Board (Mount Baw Baw)
- ▲ Mount Hotham Alpine Resort Management Board
- ▲ Southern Alpine Resort Management Board (Lake Mountain)
- ▲ Mount Buller and Mount Stirling Alpine Resort Management Board
- ▲ Parks Victoria

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

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 s. 6 of the Act, declare the water to be regulated water.

Regulated water declarations are a mechanism for bringing the management of 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 in situations where a water supply that is intended for drinking water deteriorates in quality to the point where drinking water quality standards cannot be met. This has occurred in the past where extreme weather events have significantly changed the water quality characteristics of source water.

No changes were made to regulated water declarations during this reporting period. A list of regulated water supplies as of 30 June 2017 is at Appendix 2.

Tidal River weir at
Wilsons Promontory





Heathcote Water
Treatment Plant



Tap water, the healthy choice

The provision of safe drinking water underpins the health and wellbeing of our communities. Tap water offers a healthy, affordable and reliable choice of drink.

Managing the safety of drinking water has long been recognised as a significant public health intervention in preventing infectious disease. More recently, tap water has offered added public health benefits through fluoridated water, improving dental health. These benefits, however, can only be realised when tap water is the drink of choice. A concerted effort by all water agencies and government departments is required to address the challenges that potentially undermine this aspiration.

Reducing consumption of bottled drinks

Drink choices in bottled form, particularly sugar-sweetened drinks, have expanded significantly and entice us away from the drink that has sustained us through history. Marketing campaigns for many of these drinks have been founded on linking drink choices and lifestyle or, in some cases, health. However, the adverse health consequence of these choices is only just starting to be understood. Tap water provides a healthy alternative to sugar-sweetened drinks and avoids the risks associated with drinking from private water supplies.

The consumption of sugar-sweetened drinks is not only associated with weight gain but also with increased risk of other adverse health effects such as tooth decay, type 2 diabetes and cardiovascular disease. Frequent consumption of sugar is the main dietary cause of tooth decay and, despite being largely preventable, tooth decay is a prevalent health problem in Australia.

The *Victorian Population Health Survey 2014: Modifiable risk factors contributing to chronic disease in Victoria*⁴ reported that 11.2 per cent of adult Victorians drink sugar-sweetened soft drinks daily. For children aged two to 18 years, over one-third (35 per cent) drank sugar-sweetened drinks in the 24 hours preceding the survey.⁵

These findings have informed the *Victorian public health and wellbeing plan 2015–2019*, which has created a priority for healthier eating and active living. The recent VicHealth 'H30 Challenge campaign' was part of an integrated water initiative with the goal of 'more Victorians choosing water instead of drinks with added sugar'. The challenge aimed to help establish healthier habits and encouraged Victorians, particularly 18–34 year olds with a skew towards men and lower socio-economic status groups, to switch every sugary drink they would normally consume with water for 30 days. Adults in the 18–34-year age group are some of the highest consumers of sugary drinks.

Many Victorian water agencies have partnered with an initiative to reduce consumption of bottled drinks through a 'Choose Tap' campaign. The campaign promotes tap water as 'the best choice for your health, your hip pocket and the environment' and has facilitated greater access to tap water in public spaces.

Together these two initiatives support the aspiration to make tap water the drink of choice.

4 Available from the department's website at <<https://www2.health.vic.gov.au/about/publications/researchandreports/victorian-population-health-survey-2014>>.

5 From *Victoria's health, The Chief Health Officer's report 2014*: <<https://www2.health.vic.gov.au/about/publications/researchandreports/cho-report-2014>>.

Reducing tooth decay

Tooth decay is a largely preventable disease affecting both children and adults and can cause considerable pain and suffering. There is reliable evidence that a very small amount of fluoride in drinking water helps to reduce tooth decay. Fluoride in drinking water acts like a constant repair kit that neutralises the effect of acids that cause decay and helps to repair damage before it becomes permanent. It benefits people of all ages throughout their life regardless of education, income or access to dental care.

Water fluoridation reduces tooth decay in children by 26–44 per cent.⁶ Dental conditions are the highest cause of all preventable hospitalisations for Victorians under 10 years of age and the second highest for all ages. Tooth decay is most prevalent in non-fluoridated rural areas, with children experiencing higher rates of potentially preventable dental hospitalisations than children in metropolitan areas. Studies in Victoria have shown that young children living in areas with water fluoridation have a 37 per cent lower rate of admissions to hospital for dental treatment compared with children living in non-fluoridated areas, when controlling for access to dental health professionals and socioeconomic status. Oral health conditions are the second most expensive condition to treat, just below cardiovascular disease, with \$3.03 billion spent on dental treatment in Victoria in 2015–16.⁷ A departmental analysis in the 2016–17 reporting period determined that for each dollar invested in water fluoridation, \$4.32 worth of benefits would accrue.

Healthy Mouths Healthy Lives: Australia's national oral health plan 2015–2024 has been endorsed by all state and territory governments and identifies the extension of water fluoridation as a key public health measure. Fluoridation is supported by a wide range of public health organisations including the World Health Organization (WHO), United States Centers for Disease Control and Prevention (CDC) and Australia's National Health Medical Research Council (NHMRC).

Water fluoridation is the most cost-effective population-wide intervention to prevent tooth decay. Tooth decay can develop at any age, so water fluoridation is an important way of reducing tooth decay in children and adults.⁸ Of course, the public health benefit will only be realised when tap water with fluoride is the drink of choice.

While 90 per cent of Victorians have access to fluoridated water, there are over 60 communities with a population of approximately 2000 or greater that receive non-fluoridated reticulated drinking water. The delivery of this proven public health measure requires strong partnerships with water agencies and ongoing commitment to ensure the addition of fluoride to drinking water is safe and effective.

6 NHMRC 2017, *Water fluoridation and human health in Australia: Questions and answers*, available at: <<https://www.nhmrc.gov.au/health-topics/health-effects-water-fluoridation>>.

7 Australian Institute of Health and Welfare 2017, *Health expenditure Australia 2015–16*, Health and welfare expenditure series no. 58. Cat. no. HWE 68, AIHW, Canberra.

8 NHMRC 2017, Information Paper – Water fluoridation: dental and other human health outcomes, available at: <<https://www.nhmrc.gov.au/guidelines-publications/e44-0>>.

Community expectations

The Essential Services Commission is Victoria's economic regulator of water and sewerage services. The commission's water pricing approach assists to ensure that the interests of regulators, water agencies and the customers they serve are aligned. During 2016–17 water agencies undertook extensive consultation with their communities to comply with a new pricing review approach to deliver better outcomes for customers regarding water price, quality and service reliability. The outcomes of this consultation reinforced that the reliable supply of safe, aesthetically pleasing drinking water is an expectation of our communities. A failure to meet community expectations regarding water quality will lead to consumers seeking out alternatives, which will not realise the benefits of fluoridated water, may be less safe, and may have significant health impacts in the long term where sugar-sweetened beverage consumption increases.

Confidence in the safety of water and good aesthetic quality enables our communities to easily make the healthy choice to drink tap water. The *Safe drinking water framework* supports water agencies to provide Victorian communities with high-quality, safe drinking water. Approximately 95 per cent of all Victorians receive a reticulated drinking water supply, and approximately 90 per cent of Victorians receive the benefit of fluoridated drinking water.

The *Safe drinking water framework* adopts a catchment-to-tap risk management approach: protecting water at the source, ensuring appropriate treatment and managing the system of supply effectively to deliver safe and aesthetically pleasing water to each household. Victorians can have confidence in the quality of water they receive because the framework requires:

- continuous improvement of risk management plans
- that water quality standards are met
- public reporting of water agency activities and water quality test results
- the department's oversight of water agencies.

With confidence, Victorians can make the healthy choice and turn to tap water as their drink of choice.

Drinking water quality performance in 2016–17

Notifications and reporting mechanisms under the Act provide the department with information regarding performance and challenges in relation to drinking water quality. Section 18 of the Act requires a water supplier to notify the department when water quality standards have not been met. Section 22 of the Act requires a water supplier or water storage manager to report to the department known or suspected contamination. The department also requires audits of water agencies' risk management plans, usually biennially. No audits were conducted during the 2016–17 reporting period.

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 in r. 12 of the Regulations, stating that drinking water supplied within a water sampling locality must not:

- exceed the standard set out in Schedule 2 of the Regulations
- contain any toxin, pathogen, substance or chemical in such amounts that may pose a risk to human health.

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 (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 ⁹
Total trihalomethanes	Monthly	≤ 0.25 mg/L
Turbidity	Weekly	The 95th percentile of results in any 12-month rolling period must be ≤ 5.0 nephelometric turbidity units

The *Australian drinking water guidelines* (ADWG) is the authoritative reference for health-based guideline values and is used to determine compliance for parameters not specified in Schedule 2 of the Regulations. Water agencies determine and document in their risk management plans the frequency, location and parameters to be tested to demonstrate compliance with this part of the Regulations. Water agencies may face different risks depending on a wide range of factors and therefore sample and analyse for different water quality parameters commensurate with this risk.

During the 2016–17 reporting period, drinking water was tested within 477 water sampling localities around Victoria for numerous water quality parameters to demonstrate compliance with the quality standards.

⁹ As per the meaning of 'false positive' in Schedule 2 of the Safe Drinking Water Regulations 2015.

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. At 30 June 2017 there were no water suppliers exempted from meeting a water quality standard under the regulations.

Notifications made under section 18 of the Safe Drinking Water Act

When water suppliers become aware that they have supplied water that does not comply, or is not likely to comply, with a drinking water quality standard, they are required to notify the department within 10 days, in accordance with s. 18 of the Act. This ensures that the department as regulator is aware of any noncompliant drinking water supplied and that the agency implements adequate corrective measures to minimise any potential public health impacts, along with preventive actions to prevent recurrences.

In 2016–17, 30 water sampling localities did not continuously meet the quality standards (Table 4), with some localities failing to meet more than one quality standard. These events were generally of a short duration and corrective actions were undertaken to ensure the water supplied did not present a risk to health. The glossary (page 39) contains further information about the parameters listed in Table 4.

Table 4: Water sampling localities not meeting quality standards, 2015–16 to 2016–17

Type	Quality standard	Water sampling localities not meeting the quality standard in 2015–16	Water sampling localities not meeting the quality standard in 2016–17
Disinfectant	Chlorine	1	1
Disinfection by-products	Chloral hydrate	0	1
	Dichloroacetic acid	0	4
	N-Nitrosodimethylamine	0	2
	Trichloroacetic acid	1	6
	Trihalomethanes*	7	11
Metals	Aluminium	3	1
	Lead	2	0
	Manganese	0	1
	Nickel	3	2
Microbial	<i>E. coli</i> *	3	8
Physico-chemical	pH	1	0
	Turbidity*	0	1

* Safe Drinking Water Regulations 2015, Schedule 2 drinking water quality standards

Compliance with Schedule 2 water quality standards

In this reporting period, 458 of 477 localities continuously met the Schedule 2 water quality standards, achieving an overall compliance of 96 per cent. While compliance with each of the three Schedule 2 water quality standards remained high in the 2016–17 period (Figure 3), this is a reduction in compliance when compared with the 2015–16 period (Figure 4).

Figure 3: Percentage of water sampling localities continuously compliant with Schedule 2 drinking water quality standards, 2005–06 to 2016–17

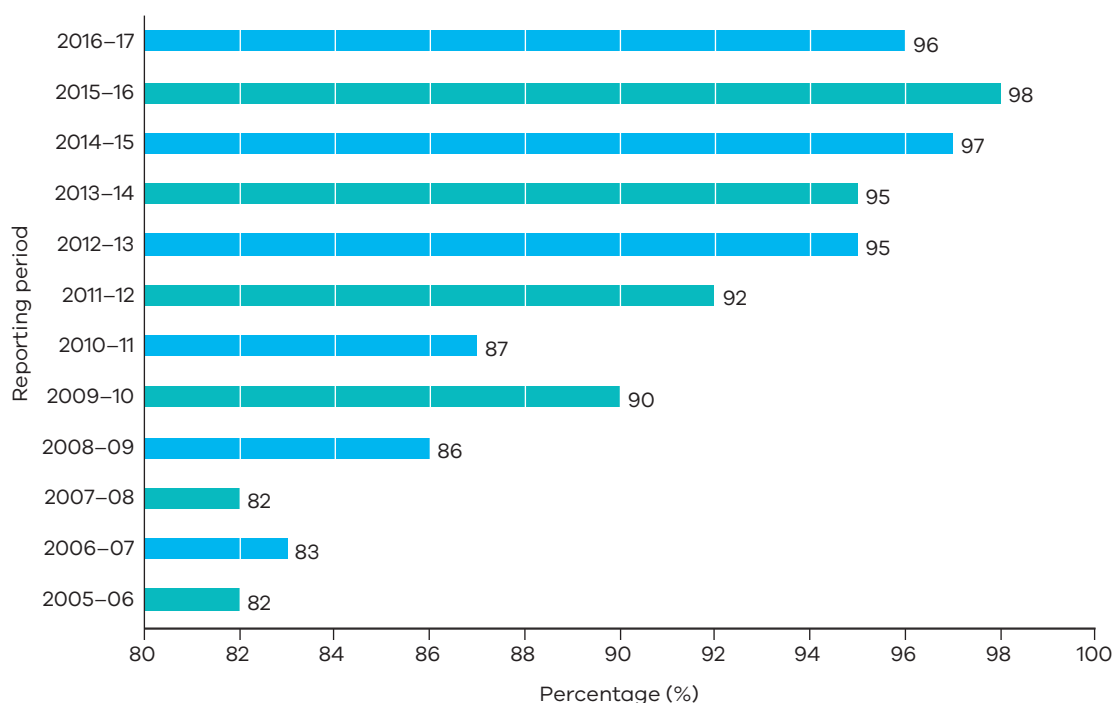
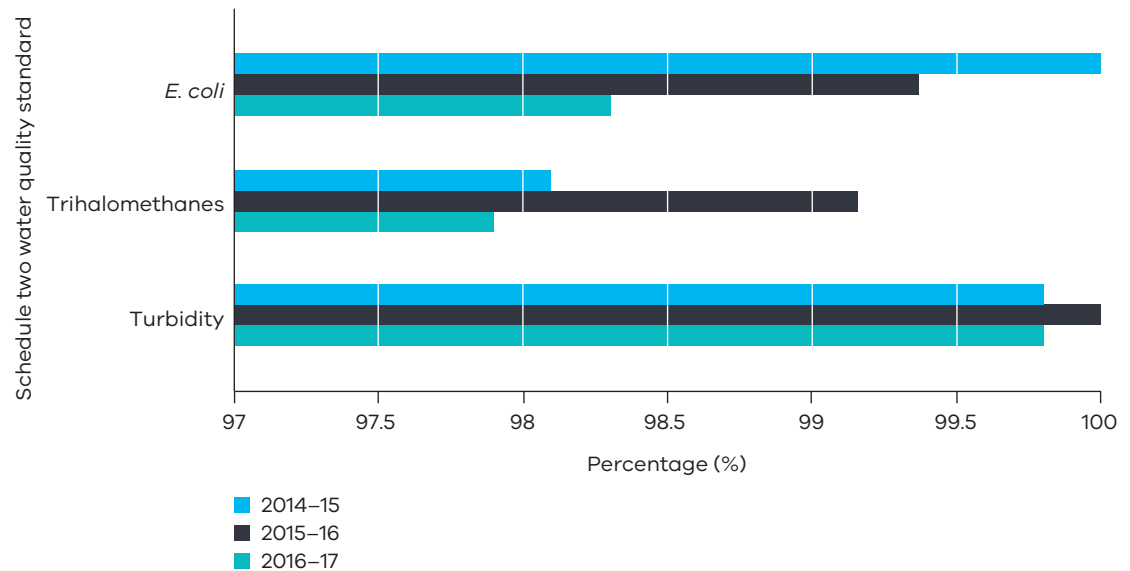


Figure 4: Percentage of water sampling localities compliant with the Schedule 2 water quality standards, 2014–15 to 2016–17



Escherichia coli

E. coli is a microbial indicator of drinking water quality. The Regulations require that all drinking water samples be free of *E. coli*, with the exception of any false-positive sample. 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.

There was 98.3 per cent compliance with the *E. coli* standard in this reporting period, which is a slight reduction from 99.4 per cent compliance in 2015–16. Compliance in 2014–15 was associated with a different standard as per the previous regulations.

Since the introduction of the Regulations in 2015 an increased focus on the investigation process following all *E. coli* detections has identified opportunities to improve supply systems, ultimately leading to safer drinking water for Victorian communities.

When *E. coli* is detected in drinking water samples, water agencies are expected to thoroughly investigate the issue to determine the cause, implementing the relevant corrective and preventive actions to reduce the risk to acceptable levels. Relevant corrective actions may include isolating water supply systems to cease the supply of potentially contaminated water, flushing water mains to remove any potentially contaminated water, and issuing boil water advisories where appropriate.

Total trihalomethanes

Trihalomethanes are a disinfection by-product resulting from chlorine disinfectant coming into contact with organic matter in water. There was 97.9 per cent compliance with the trihalomethanes standard in the 2016–17 period, reduced from 99.2 per cent compliance in 2015–16.

Various weather events around the state during 2016–17 increased the concentration of organic matter in many source waters (see 'Flooding' on page 25). This elevated concentration of organic matter often required an increase in chlorination, resulting in a higher prevalence of disinfection by-products.

These fluctuations in trihalomethanes did not pose a risk to public health. The *Australian drinking water guidelines* state that the guideline values (quality standards) for chemical concentrations in drinking water, such as disinfection by-products, is the concentration that, based on present knowledge, does not result in any significant risk to the health of the consumer over a lifetime of consumption. Given the conservative nature in the derivation of these guideline values, occasional exceedances do not necessarily present a health risk to consumers.

However, water agencies are implementing strategies, including additional treatment, to reduce the organic content in source waters and therefore 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. Compliance with the turbidity water quality standard remained high in the 2016–17 period at 99.8 per cent, with only one locality not meeting the required standard.

Compliance with other water quality standards

Disinfection by-products

Table 4 shows that in 2016–17 a significant number of drinking water samples did not meet a number of disinfection by-product water quality standards: chloral hydrate, dichloroacetic acid, N-Nitrosodimethylamine, trichloroacetic acid and trihalomethanes. Of the 477 water sampling localities, 17 failed to meet disinfection by-product water quality standards in the reporting period, compared with eight not meeting quality standards in 2015–16. At no time did the concentration of these disinfection by-products pose a significant risk to public health. The majority of the exceedances were associated with weather events (see 'Flooding' on page 25).

Metals

Metals may be present in drinking water due to a number of reasons: they may be naturally present in source waters and may not be adequately removed from drinking water, they may be present due to leaching from metal pipework, and they may result from their use as a treatment aid (such as alum coagulant). In 2016–17 there was generally a decrease in the number of drinking water samples that exceeded quality standards for metals content compared with the previous reporting period.

Reports made under section 22 of the Safe Drinking Water Act

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 may:

- cause an illness
- transmit an illness
- contain a pathogen, substance, chemical or blue-green algae toxin, alone or in combination, at levels that may pose a risk to human health
- 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 precautionary requirement to report relevant issues often leads to investigation findings that human health risk was in no way 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. Such situations may be referred to as 'incidents' (see 'Water quality incidents' on page 22).

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 focus on continuous improvement and the development of water agency risk management practices.

During 2016–17 there were 59 reports made under s. 22 of the Act; this is an increase from the previous two reporting periods (Figure 5). However, it is not a cause for concern because it demonstrates the vigilance and oversight of water agencies regarding their management of risk. The department has spent a significant amount of time promoting the reporting requirements of the Act, which has had the intended outcome of increasing the emphasis on reporting issues when necessary. The number of *E. coli* detections remained similar to previous years, and the increase in reports can largely be attributed to an increase in reporting of widespread public complaints and other incidents. These reported issues can be broadly grouped into various categories (Figure 6), some of which are described further.

Figure 5: Number of reports made under section 22 of the Safe Drinking Water Act, 2004–05 to 2016–17

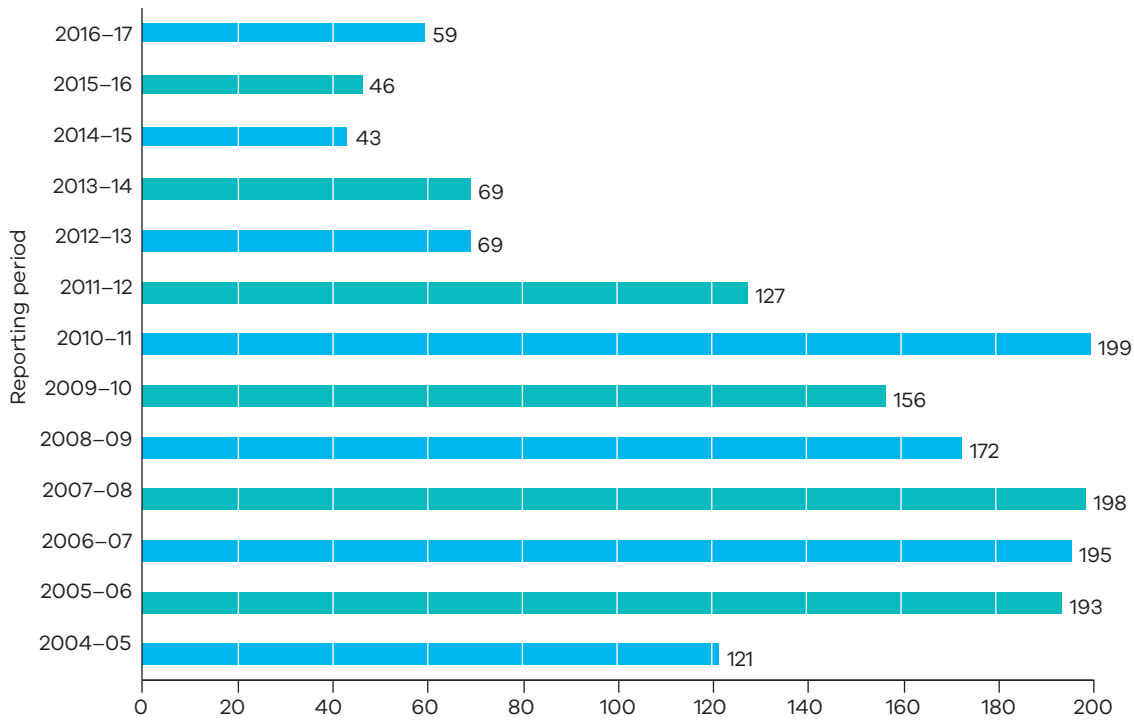
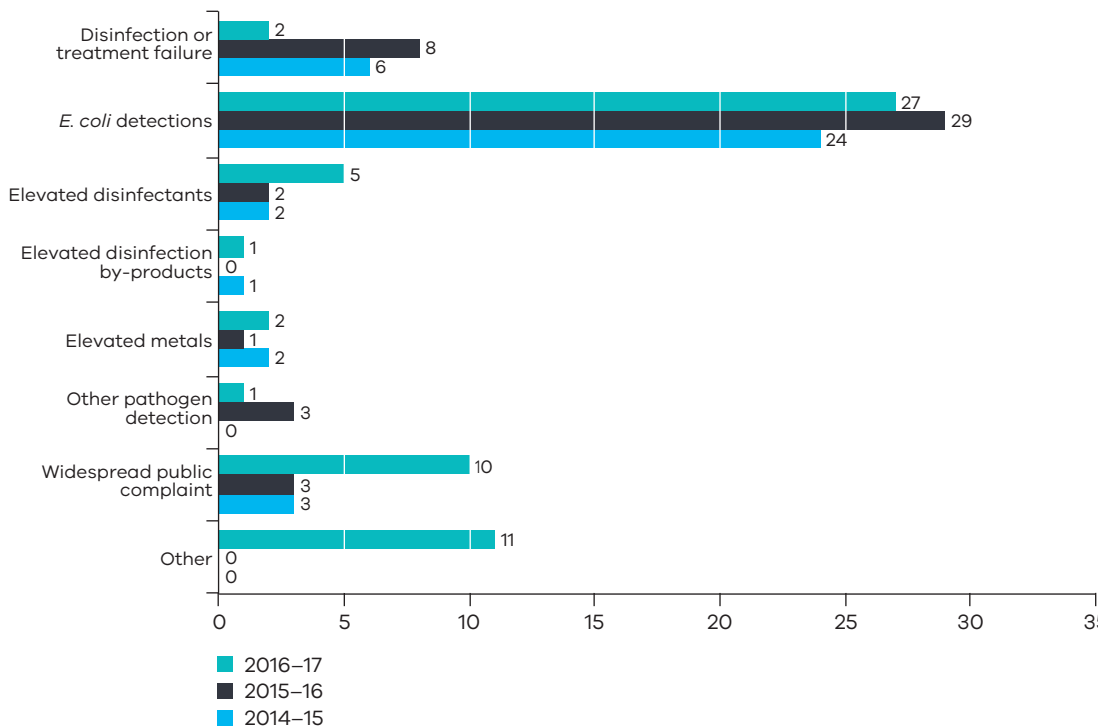


Figure 6: Categories of reports made under section 22 of the Safe Drinking Water Act, 2014–15 to 2016–17



Escherichia coli detections

In this reporting period there were 27 reports to the department of *E. coli* detected in drinking water, with the majority associated with drinking water samples taken from water storage tanks or basins. Following any *E. coli* detection, water agencies are required to undertake a thorough investigation in accordance with the department's guidelines due to the vulnerabilities associated with sampling. The purpose of this investigation is to determine: whether all controls were in place to prevent the *E. coli* detection; whether the *E. coli* detection is representative of the water supplied; and whether it meets or does not meet the water quality standard. The intent is to create a consistent and thorough approach to *E. coli* investigations across Victoria to identify failures and to avoid contamination of drinking water supplies. This investigation does not replace or delay immediate response or corrective actions.

Of the 27 *E. coli* investigations conducted, 19 were deemed to have met the water quality standard and that the initial *E. coli* detection was not representative of the drinking water supplied. Eight of the investigations determined that the *E. coli* water quality standard had not been met, resulting in further corrective actions being implemented to minimise risk to public health, along with preventive actions to reduce the likelihood of the issue reoccurring.

Widespread public complaint

A range of factors can result in drinking water tasting, smelling and appearing unpleasant. Although these aesthetic water quality issues are undesirable, they do not represent a risk to public health.

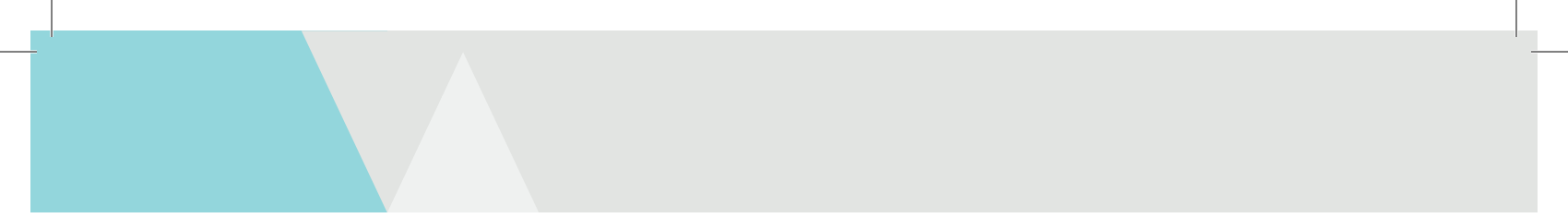
Ten reports of widespread public complaint were made to the department in 2016–17, as required under s. 22 of the Act. These reports can involve relatively minor issues in which several related complaints are received by a water agency, or issues that result in a significant number of dissatisfied customers. Seven of these issues were associated with undesirable colour of the water due to issues such as mains maintenance leading to water appearing 'dirty', resuspension of sediment in the distribution system, and elevated levels of manganese resulting in coloured water. A further two reports related to taste and odour issues due to the presence of compounds associated with blue-green algae in source water, and a weather event. A single issue concerned customer complaints regarding loss of water supply.

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

Other incidents

During the reporting period a number of other issues were reported.

The impact of these were localised, and significant work was undertaken by water agencies in conjunction with the department to assess any potential risks to public health. This is discussed further in this report under 'Recycled water cross-connections with drinking water supplies' on page 23.



Four reports were associated with treated water storages. Two of these were the result of trees falling onto water storage tanks due to strong winds; an audit of all tanks occurred following this to remove any trees in close proximity to water storages. One incident involved a dead rabbit found in a treated water storage basin (see 'Cann River boil water advisory'). A further incident was associated with unauthorised access at a water storage site; the tank was isolated from the water supply while an investigation was undertaken in conjunction with Victoria Police.

On two separate occasions plant assets and equipment failed, leading to a loss of positive water pressure and the potential risk of backflow into drinking water supplies. In response to these issues, disinfection residual was increased, and the supply system flushed to remove any potentially contaminated water.

One report was associated with suspected elevated fluoride concentration. Fluoride dosing ceased and the fluoridated water was stored and diluted in a large reservoir. The investigation determined that the fluoride measuring equipment was at fault, and that at no time had the fluoride concentration exceeded the relevant water quality standard.

One report was associated with failure of a septic tank within a water supply catchment; this was discovered during a routine inspection of the reservoir. As the reservoir was used as a raw water source for drinking water, this was immediately reported to the department. The water agency ceased supply from the affected reservoir and provided an alternative safe supply while water quality monitoring and repairs to the septic system were completed. The water supplier ensured that the relevant water treatment plant controls were in place to produce safe, compliant drinking water. The water agency reviewed its reservoir inspection procedures to identify improvements in catchment management.

Water quality incidents

During the 2016–17 reporting period there were several drinking water incidents that required the department's involvement. The department's role in such incidents includes providing support, advice and direction to water agencies to ensure that risks to public health are minimised and managed effectively.

Heathcote aesthetic water quality issues

The raw water source supplying the Heathcote Water Treatment Plant, which is typically Lake Eppalock or Caledonia Reservoir, was of poor quality for the period from November 2016 to January 2017. In response to the poor quality adversely affecting the taste and odour of the drinking water being supplied to Heathcote, the source water was changed to Sandhurst Reservoir in early January 2017.

However, the raw water sourced from Sandhurst Reservoir contained elevated levels of manganese resulting in discoloured water in the treated drinking water. Coliban Water flushed the distribution system to remove manganese deposits. The issue was resolved by process modification and optimisation at the Heathcote Water Treatment Plant. Coliban Water has also implemented processes to provide customers with timely advice when changes are made to source water that may affect water quality.

Cann River boil water advisory

In January 2017 East Gippsland Water notified the department that a dead rabbit had been discovered in the Cann River treated water storage reservoir during routine inspections. The treated water storage is where drinking water is stored prior to distribution to the community. East Gippsland Water immediately removed the rabbit and isolated the storage due to potential contamination from microorganisms including *Cryptosporidium cuniculus*. In consultation with the department, East Gippsland Water issued a boil water advisory to the community.

Alternative water was made available while remedial actions were taken. These actions included flushing the system, discharging half of the water from the storage reservoir and sufficiently chlorinating the drinking water to ensure disinfection of the water in the storage reservoir. Adequate disinfection of the storage reservoir, and other remedial actions, took a number of days to complete.

Sampling was conducted to determine the quality of the water. When East Gippsland Water and the department were satisfied that the water complied with all relevant drinking water quality standards, the boil water advisory was withdrawn.

Tatura boil water advisory

In May 2017 Goulburn Valley Water advised the department of two *E. coli* detections in the Tatura water supply. The detections occurred both in the treated water storage and in the reticulation. In consultation with the department, a boil water advisory was issued as a precautionary measure while the investigation into the *E. coli* detections was undertaken.

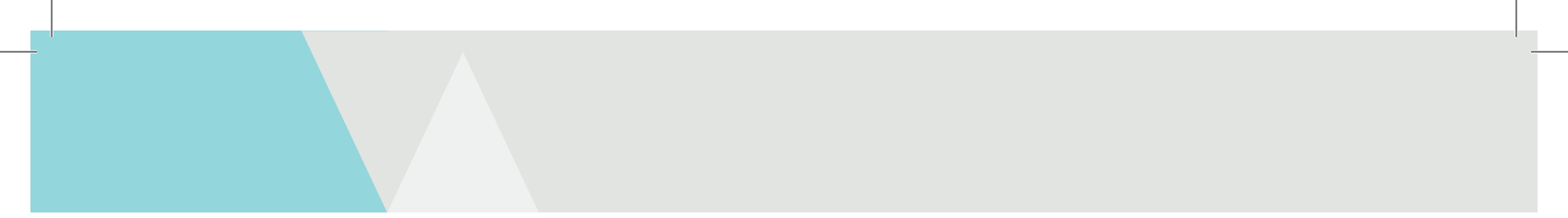
Goulburn Valley Water made alternative drinking water available to customers while the issue was investigated and remedial actions taken. The water system was flushed to remove potentially contaminated water and the chlorine residual increased as a precautionary measure. Water quality sampling results both before and after remedial works were free of microbial contamination and no issue could be identified as a likely cause. The boil water advisory was withdrawn two days later.

The investigation was conducted and reported in accordance with department guidance. It concluded that the initial samples met the false-positive criteria in accordance with the Safe Drinking Water Regulations.

Recycled water cross-connections with drinking water supplies

Recycled water cross-connections refer to when recycled water is unintentionally connected to drinking water supplies. Recycled water is treated to a range of standards ('classes') and is supplied for non-drinking purposes such as irrigation and toilet flushing. Class A recycled water is water designated for high-exposure uses such as toilet flushing and garden use including irrigation of edible crops intended for raw or unprocessed consumption, however is not suitable for drinking.

In the 2016–17 reporting period there were three recycled water cross-connection events resulting in Class A recycled water entering the drinking water supply.



In the first instance, City West Water informed the department of four residential properties in the Wyndham Vale area that had their drinking water supply incorrectly connected to the Class A recycled water supply at the water meter. A customer complaint regarding the taste of the water led to investigations that discovered the cross-connections. These cross-connections were corrected at each property immediately after identification. In cooperation with the department, City West Water maintained communication with the affected customers. City West Water undertook an investigation to review their inspection test plans, water quality processes, communications and training opportunities to avoid similar types of cross-connections in the future.

In the second instance, Western Water notified the department that Class A recycled water was connected to a drinking water supply within the private plumbing of a property in Melton South during a scheduled plumbing check. Western Water immediately isolated the water supply and provided alternative drinking water to the property owner. The drinking water supply was restored after the property was flushed and water quality test results confirmed that water quality standards had been met.

In the third instance, Yarra Valley Water notified the department of a cross-connection between the drinking water and Class A recycled water mains within the Epping water sampling locality systems. The cross-connection was installed by a contractor following pressure testing of property services. Drinking water supply system to these properties was immediately isolated and alternative drinking water provided. The recycled water network was being supplied with drinking water at the time. Water supplies were turned on once remedial actions were taken and water quality standards were met. Yarra Valley Water undertook an investigation and implemented corrective actions to prevent a reoccurrence of similar cross-connections.

Ensuring drinking water systems remain protected from cross-connections with other water sources maintains public confidence in the safety of drinking water supplies. Management of recycled water is a shared responsibility. The department is working with the Department of Environment, Land, Water and Planning and EPA Victoria to review past cross-connection incidents and identify opportunities for improvement in the management of recycled water. The Victorian Building Authority is integral to the management of recycled water through its responsibility to enforce standards and regulatory requirements for all private plumbing. The Department of Environment, Land, Water and Planning provides oversight of the Victorian Building Authority. The work also contributes to the Victorian Government's strategic plan, *Water for Victoria*, which identifies the use of diverse water sources to protect public spaces as an action required in transforming Victorian cities and towns into the most resilient and liveable in the world.¹⁰

¹⁰ *Water for Victoria* is available at: <<https://www.water.vic.gov.au/water-for-victoria>>.

Weather events affecting water quality

In this reporting period there were some significant weather events that provided challenges for water agencies.

Flooding

In September 2016 Victoria received significant rainfall, registering the second-wettest September on record.¹¹ Many locations across the state recorded their highest ever rainfall for September.¹² This led to flooding and caused significant issues for many water agencies.

Areas in the south-west of the state received more than 320 mm of rain over the month.¹³ This rainfall and runoff caused a significant increase in the amount of organic matter in source waters, providing water treatment challenges. Increased organic matter led to a higher chlorine demand, requiring water agencies to increase chlorine levels to ensure adequate disinfection and availability of chlorine residual in the reticulated supply.

On some occasions, this increased chlorine concentration led to the formation of disinfection by-products. However, an adequate disinfection residual is of higher public health priority than reducing the presence of disinfection by-products in the short term. When raw water quality improved, the disinfection by-products reduced to acceptable levels. Since the September 2016 flooding, water agencies have identified opportunities and implemented changes to reduce the potential for disinfection by-product formation. This continual improvement process contributes to the high overall quality of Victoria's drinking water.

Blackwater

In December 2016 significant rainfall in the north of the state washed leaf litter, sediment and debris into river systems, which then made its way into a raw drinking water source. This increased organic matter (containing carbon) led to a rapid depletion of dissolved oxygen in the water. This turned the water a dark colour ('blackwater'), with the low oxygen levels unable to support some aquatic life. Fish kills were reported in areas with low dissolved oxygen levels.

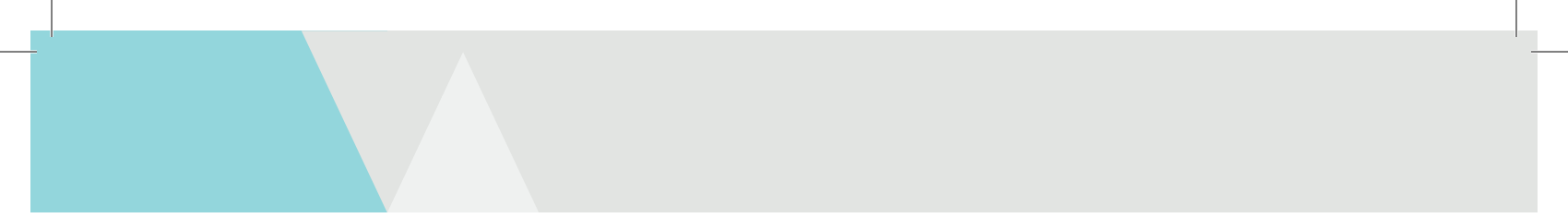
Water treatment plants were unable to treat this water to the desired aesthetic standard, with some undesirable taste and odour compounds unable to be removed. Although not a risk to health, these aesthetic water quality issues led to a rise in customer dissatisfaction.

Water agencies worked with the relevant catchment management authority to release environmental water flows to dilute the blackwater, along with issuing communications to inform customers of the aesthetic water quality issue.

11 For further information see: <<http://www.bom.gov.au/climate/current/month/vic/archive/201609.summary.shtml>>.

12 For information see: <<http://www.bom.gov.au/climate/current/month/vic/archive/201609.summary.shtml#recordsRainTtlHigh>>.

13 For information see: <<http://www.bom.gov.au/climate/current/month/vic/archive/201609.summary.shtml#extremes>>.



Blackwater events are a natural feature of many Australian river systems and are influenced by weather events and stream flows. Water agencies will need to continue to manage water quality when these events arise.

Undertakings

The system of undertakings is a legislative tool described in s. 30 of the Act that the department and water agencies use to proactively manage water quality issues as they arise to 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 how and when the water agency will rectify the contravention. It also describes what the agency will do to manage any public health risks while they are rectifying the contravention. As Victoria's drinking water quality has continually improved since the inception of the legislation, and there has been an increase in compliance, the need for undertakings has reduced significantly.

In this reporting period Coliban Water submitted a request for an undertaking in response to several instances of noncompliance with the trihalomethanes drinking water quality standard in the Bridgewater and Laanecoorie water supply systems. The raw water for the Bridgewater and Laanecoorie water treatment plants is sourced from the Loddon River, which contains high concentrations of naturally-occurring organic matter. High levels of naturally-occurring organic matter combined with long water age in the distribution system and chlorine can increase the potential for trihalomethanes formation.

The Secretary accepted this undertaking, it being valid for the period 1 June 2017 to 30 June 2018. Actions to be undertaken by Coliban Water to reduce the potential for trihalomethanes formation include:

- 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 the distribution systems with the aim of reducing the water age
- assessing the ability of both water treatment plants to remove natural organic matter from the raw water
- reviewing and upgrading of disinfection processes, including booster chlorination, to reduce disinfection by-product formation.

As part of the undertaking, Coliban Water will provide quarterly progress reports to the department to provide assurance that the agreed actions will be completed within the specified timeframe.



Managing risk together

The Water Unit works with water agencies and other regulators, such as the Department of Environment, Land, Water and Planning and EPA Victoria, to manage water-related health risks. Managing these risks together requires a thorough understanding of the issue and clarity regarding the roles and responsibilities of each agency.

Other stakeholders may at times also need to be engaged, requiring an understanding of which entities to engage and when, and clear and effective communication to ensure that potential health risks are understood by both those managing the risk and the communities affected.

Water sector liaison

Water Unit staff meet regularly with water agencies to discuss present and future regulatory issues and concerns. This fosters professional relationships and ensures that water agencies fully comprehend their regulatory obligations, assisting in regulatory compliance.

Water Unit staff also seek opportunities to see site-specific risk management issues first-hand, ensuring that staff understand the issues water agencies face, along with helping to identify risks and mitigation strategies in water agency risk management plans. These site visits also ensure that Water Unit staff remain current with advancing asset technology and its implementation within the sector. Appendix 3 contains a list of the water agency assets that Water Unit staff visited in 2016–17.

Emergency preparedness

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

Victoria's drinking water supplies can be vulnerable to extreme weather events; however, the department and water agencies work hard to identify risks, control measures and respond appropriately to extreme events such as droughts, bushfires, floods and blue-green algae blooms. The department and water agencies are quick to enact their emergency management plans when these events occur. Response measures may involve protecting key infrastructure, increasing or introducing water treatment processes, sourcing and providing alternative drinking water supplies and providing support and 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, local business, local government, Victoria Police, fire agencies and other government departments such as the Department of Environment, Land, Water and Planning and EPA Victoria.

A photograph of the Leongatha Water Treatment Plant. The image shows a large circular concrete tank with a metal walkway and railings. In the foreground, there is a metal grate walkway over a rectangular tank containing dark water. A white sensor or probe is mounted on the edge of this tank. In the background, another circular tank is visible, and beyond that, a green, hilly landscape with trees and a fence. The image is partially overlaid with a light blue geometric shape in the top right corner.

Leongatha Water
Treatment Plant



Education and promotion

In accordance with the Act, the department aims to promote industry and public awareness and understanding of drinking water quality issues. The Water Unit actively fosters partnerships with the community and with local, state and federal government stakeholders to better understand and manage the public health risks associated with water supplies. Strong relationships have been established with partners through engagement, open communication, shared goals and responsive leadership. This section highlights some of the work done in collaboration with Water Unit partners in 2016–17.

Guidance

Many schools in rural and regional Victoria are not serviced by water agencies, so these schools rely on other sources such as rainwater or groundwater (bore) sources.

In collaboration with the Department of Education and Training, the Water Unit updated *A guide to completing a water supply management plan* to assist these schools in managing risk associated with their water supplies.¹⁴

Advocacy and representation

The Water Unit plays an active role in promoting industry and public awareness and understanding about water quality issues as they relate to health. This includes communicating public health risks associated with drinking water and ways to mitigate and manage potential risks.

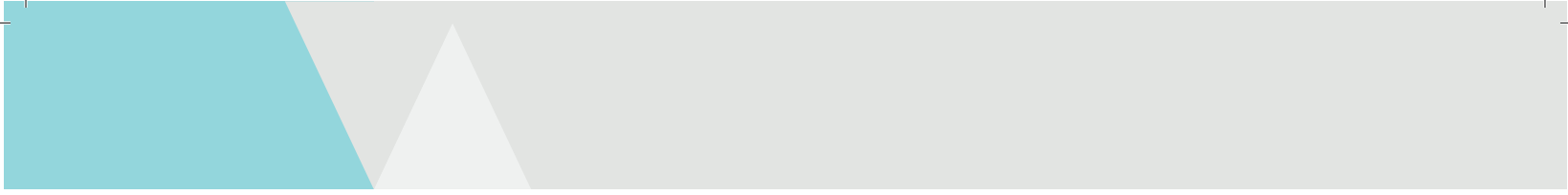
The Water Unit participates on state and national committees, presents at conferences, seminars and workshops, and supports research and policy development. Appendix 4 contains further details of the Water Unit's representation and presentation in the reporting period.

The *Australian drinking water guidelines* are designed to provide an authoritative reference to the community and the water industry on what defines safe, good-quality drinking water, how it can be achieved and how it can be assured. These guidelines are subject to rolling revision to ensure they represent the latest scientific evidence on good-quality drinking water. The Water Unit, through the department's Chief Health Officer as a member of the NHMRC, contributes regularly to proposed revisions. The department responses are carefully considered, with public health protection being the highest priority.

Health-based targets

The department has provided support to the NHMRC's proposal to include microbial health-based targets (HBTs) in the *Australian drinking water guidelines*. HBTs are a quantifiable measure of safety, or tolerable risk that is deemed to be protective of public health from microbial pathogens such as bacteria, viruses and protozoa.

¹⁴ Available from the department's website at <<http://www2.health.vic.gov.au/about/publications/policiesandguidelines/guide-to-completing-water-supply-management-plan-for-schools>>.



Applying HBTs in drinking water systems requires quantifying source water microbial risks, implementing appropriate control measures to reduce those risks, and managing ongoing verification and monitoring programs to evaluate performance.

The Regulations requires water agencies to quantify microbial hazards in source water and the efficacy of the treatment process in reducing or removing pathogens. The department has produced guidance to assist water agencies to implement these regulatory requirements to protect public health. Many water agencies have determined that their treatment systems are adequate in managing microbial risks. Some systems have been identified for upgrades; these will be progressed through regular business planning prioritisation processes.

Water fluoridation

Fluoridation of drinking water supplies continues to be a cost-effective option to prevent tooth decay and reduce rates of preventable admissions to hospital for treatment. Through the Health (Fluoridation) Act, the department continues to partner with water agencies, ensuring that the addition of fluoride to drinking water is safe and effectively delivered. Ninety per cent of Victorians have access to fluoridated drinking water, with the department's Water Unit continuing to work with water agencies to extend this initiative to non-fluoridated rural communities.

The Water Unit administers the Health (Fluoridation) Act and oversees its implementation by ensuring that all fluoride plants are designed and operated in compliance with the *Code of practice for fluoridation of drinking water supplies*. Compliance is determined through independent technical appraisals of fluoride plants to ensure that the appropriate controls are in place to achieve safe, optimal fluoride dosing. A further independent audit of fluoride plants is commissioned within 12 months of operation to ensure continued compliance.

In 2016–17 the department commissioned an independent technical appraisal for the Cobram and Maffra fluoride plants. Independent audits were conducted on the Echuca, Kilmore, Morwell, Sale, Traralgon, Warragul plants and the Victorian Desalination Plant.



Future challenges

The future supply and security of safe drinking water is of paramount importance, and with this in mind, the department is committed to continuing to work with its partners regarding future challenges. This includes promoting and strengthening risk management processes, maintaining an awareness of new and emerging risks to drinking water supplies, and working with stakeholders to secure long-term water supplies. Regulators and water agencies must continue to conduct environmental scans to maintain knowledge of these risks, ensuring the continued supply of safe, good-quality drinking water. Challenges to supplying safe and aesthetically pleasing drinking water supplies include:

- climate change and the associated impacts on the safety and quality of drinking water
- the impacts of blue-green algae and algal toxins on drinking water
- development and planning pressures on drinking water catchments and associated sources of contamination
- the increasing salinity of ground and surface water and the aesthetic nature of drinking water
- the increasing population and demands for existing water resources
- the use of alternative water supplies with less robust risk management frameworks
- emerging pathogens and chemicals that pose a risk to human health.

The department is keeping informed of Victorian, national and international developments regarding the public health impacts of these and other factors, as well as participating in Environmental Health Standing Committee (enHealth), NHMRC and research organisation initiatives to address these challenges.

Protecting source water for drinking

Protecting the quality of source water for drinking must continue to be a priority for water agencies. Contamination of water supply catchment areas has been recognised as a leading cause of illness around the world by numerous bodies including WHO.

The *Australian drinking water guidelines* states that 'prevention of contamination provides greater surety than removal of contaminants by treatment, so the most effective barrier is protection of source waters to the maximum degree practicable'.

This is consistent with Victoria's risk-based approach, which is underpinned by the preventive and multiple barrier principles where all practicable measures are undertaken to prevent the introduction of hazards to source water. Where hazards cannot be prevented, these are managed with robust and reliable barriers.

While Victorian communities value the recreational opportunities associated with waterways and catchments, the safety of drinking water is their fundamental expectation. Protecting source water quality is paramount to ensuring that current and future generations continue to enjoy safe, good-quality and affordable drinking water supplies.

In this and the previous reporting period, water agencies have undertaken significant work to quantify the microbial hazards in source waters and measure the efficacy of catchment management and treatment barriers. Protecting catchments and source waters will ensure that existing treatment barriers remain effective in safeguarding public health.

Water agencies should harness the opportunities in establishing Catchment Partnership Agreements with Catchment Management Authorities and other catchment management partners to enhance source water protection for drinking water supplies. This should include an integrated catchment management plan and statutory planning instruments for protecting water supply catchments.

One Health

One Health is an approach to achieving better public health outcomes through multiple sectors working together. It acknowledges that public health is interlinked, and collaboration between medical, veterinary and environmental disciplines is required to address public health threats at the source.

Water is essential for life, and therefore water agencies have an integral role in One Health. For example, the quantification of microbial hazards in source waters for drinking is fundamental to understanding the potential for zoonotic disease transfer in the Victorian community. The safe drinking water framework's catchment-to-tap risk-based approach will continue to underpin the protection of drinking water supplies.

The One Health approach is also relevant to combatting the issue of antimicrobial resistance; a significant global health priority. The department is working with Water Research Australia and water agencies to prioritise research into antimicrobial resistance in the water environment including exposure pathways, environmental fate and transmission from the environment to humans.



Victorian
Desalination Plant

Chemicals of potential concern

Chemical contaminants of potential health concern in water will continue to be important to regulators. Increased awareness of chemicals of potential concern may be due to:

- increasing concentrations in the environment of known chemicals to detectable concentrations
- the creation of new chemicals that can enter the environment and waterways
- advancing scientific methods for detecting and quantifying chemicals of potential concern.

Chemicals of potential concern will continue to emerge as risks to the environment and drinking water supplies, requiring robust, evidence-based risk assessments to determine the potential risk to health. On occasion, this evidence base may be lacking, such as when toxicological studies or data is non-existent regarding the chemical of potential concern. In these cases regulators take a precautionary approach to protecting public health.

Regulators must be vigilant regarding chemicals of potential concern in the environment and water. The Water Unit works with national and state stakeholders to stay at the forefront of new and emerging risks relating to chemicals of potential concern.

Nuisance and harmful algae research

In recent years algal blooms have become an increasing challenge for many water agencies. Some algae have the potential to produce toxins that may have adverse health outcomes and compromise water treatment processes.

The department has contributed funding to the Nuisance and Harmful Algae Science-Practice Partnership, a multi-party initiative between the University of New South Wales Global Water Institute, the University of Newcastle, the Walter and Eliza Hall Institute of Medical Research, Polytechnique Montréal and Melbourne Water.

This partnership aims to translate findings into practical strategies and solutions for improved management of algal blooms. This includes improving surveillance and prediction of algal blooms, improving prevention strategies through waterway and catchment management to minimise the potential of algal blooms, and improving the evidence-base on the treatment of harmful algae. The outcomes of this partnership will build water industry knowledge and capacity to respond to algal blooms in the future.



Delatite River

Appendices

Appendix 1: Contact details for water agencies

Water agency	Telephone	Website
Barwon Water	1300 656 007	www.barwonwater.vic.gov.au
Central Highlands Water	1800 061 514	www.chw.net.au
City West Water	131 691	www.citywestwater.com.au
Coliban Water	1300 363 200	www.coliban.com.au
East Gippsland Water	1800 671 841	www.egwater.vic.gov.au
Falls Creek Alpine Resort Management Board	(03) 5758 1200	www.fallscreek.com.au
Gippsland Water	1800 050 500	www.gippswater.com.au
Goulburn-Murray Water	1800 013 357	www.g-mwater.com.au
Goulburn Valley Water	(03) 5832 4800	www.gvwater.vic.gov.au
Grampians Wimmera Mallee Water	1300 659 961	www.gwmwater.org.au
Lower Murray Water	(03) 5051 3400	www.lmw.vic.gov.au
Melbourne Water	131 722	www.melbournewater.com.au
Mount Buller and Mount Stirling Alpine Resort Management Board	(03) 5777 6077	www.mtbuller.com.au
Mount Hotham Alpine Resort Management Board	(03) 5759 3550	www.mthotham.com.au
North East Water	1300 361 622	www.newater.com.au
Parks Victoria	131 963	www.parkweb.vic.gov.au
South East Water	131 694	www.southeastwater.com.au
South Gippsland Water	1300 851 636	www.sgwater.com.au
Southern Alpine Resort Management Board	(03) 5957 7222	www.southernalpine.vic.gov.au
Southern Rural Water	1300 139 510	www.srw.com.au
Wannon Water	1300 926 666	www.wannonwater.com.au
Western Water	1300 650 422	www.westernwater.com.au
Westernport Water	1300 720 711	www.westernportwater.com.au
Yarra Valley Water	1300 304 688	www.yvw.com.au

Appendix 2: Regulated water supplies at 30 June 2017

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, Yaapeet 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 3: Water agency assets visited by Water Unit staff in 2016–17

Water agency	Asset
Coliban Water	Bendigo Water Factory
	Heathcote Water Treatment Plant
East Gippsland Water	Woodglen Water Treatment Plant
Falls Creek Alpine Resort Management Board	Falls Creek Water Treatment Plant
Gippsland Water	Gippsland Water Factory
	Sale Water Treatment Plant
Goulburn Valley Water	Cobram Water Treatment Plant
	Dookie Water Treatment Plant
	Nagambie Water Treatment Plant
	Tatura Water Treatment Plant
Lower Murray Water	Mildura 7th Street Water Treatment Plant
	Mildura West Water Treatment Plant
	Red Cliffs Water Treatment Plant
Melbourne Water	Cardinia Fluoridation Plant
	Victorian Desalination Plant
North East Water	Bright Water Treatment Plant, Ovens River offtake and Freeburgh storage
	Harrietville Water Treatment Plant
	Myrtleford Water Treatment Plant
	Wangaratta Water Treatment Plant
South Gippsland Water	Lance Creek Water Treatment Plant
	Leongatha Water Treatment Plant and source water
Westernport Water	San Remo drinking water refill station

Appendix 4: Water Unit presentations and representation during 2016–17

Presentations

- 5th National Cyanobacteria Workshop – Blooming algae: managing the risk
- Australian Water Association – Catchment management for water quality
- Australian Water Association Ozwater'17 – Modernising drinking water regulations
- Centre for Aquatic Pollution Identification and Management (CAPIM) Research Summit
- Department of Environment, Land, Water and Planning regional information session – Cyanobacteria
- Department of Health and Human Services – Water industry forums
- Environmental Health Professionals Association – Water supplies at events
- Goulburn Valley Water Community Consultation Reference Group
- Melbourne University School of Population and Global Health – Partnerships and collaboration for water fluoridation
- National Water Week – The benefits of choosing tap water
- Our Catchments, Our Communities – From the source to the glass – it's a shared responsibility
- Safe Drinking Water Act risk management plan auditor debrief
- VicWater Managing Directors Forum – Partners in public health and wellbeing
- Water Industry Operators Association of Australia (WIOA) – 2016 Victorian Conference
- Water Quality Manager Network meeting
- Water Sector Resilience Network – Provision of safe drinking water supplies
- WIOA Network Operator Development Program
- WIOA Victorian Water Industry Day – Health benefits flow from choosing tap
- World Congress on Public Health – Water fluoridation in Victoria

Representation

- Department of Environment, Land, Water and Planning Riparian Forum
- Environmental Health Standing Committee (enHealth) Water Quality Working Group
- Environment Protection Authority Water Industry Reference Group
- Goulburn Broken Regional Water Quality Programs
- Goulburn Broken Water Quality Coordination Group
- International Water Regulators Forum
- Melbourne Sewerage Strategy – Regulatory Reference Panel
- National Health and Medical Research Council – Fluoride Reference Group
- National Recycled Water Regulators Forum
- North Central Catchment Partners Forum
- North East Catchment Regional Water Quality Group
- State Environment Protection Policy working groups
- Victorian Carp Control Group
- Victorian Desalination Plant Connected Water Authority Working Group
- Victorian Fluoride Stakeholder Reference Group
- Water Research Australia Fluorosilicic Acid Workshop
- WaterVal Validation Protocol Development Group

Glossary

Alternative water supplies	Rainwater, stormwater, greywater, sewage and industrial water (wastewater derived from industrial sources or processes) that is used for non-drinking purposes.
Blue-green algae	Blue-green algae, or cyanobacteria, are a type of microscopic, algae-like bacteria that inhabit freshwater, coastal waters and marine waters. Blue-green algae in water bodies can potentially affect human health.
Boil water advisory	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.
Catchment	An area of land that collects rainfall and contributes to surface water (streams, rivers, wetlands) or to groundwater.
Catchment-to-tap	A risk management approach based on the principle that multiple treatment barriers minimise or mitigate identified hazards in raw water and produce water that meets drinking water quality standards.
Chloral hydrate	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
Class A recycled water	A health-based microbiological quality standard for recycled water (for non-drinking applications). Uses that require Class A recycled water will potentially not include 'barriers' between the water and direct human contact.
Coagulation	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.
Corrective actions	Actions put in place following an incident or issue to alleviate immediate concerns.
Dichloroacetic acid	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.
Disinfectant	An oxidising agent (for example, chlorine, chlorine dioxide, chloramines or ozone) added to water in any part of the treatment process or distribution system to reduce microorganisms to acceptable levels.
Disinfection	The process designed to destroy or inactivate microorganisms in water, including essentially all pathogenic (disease-causing) bacteria. There are numerous disinfection processes including chlorination, chloramination, chlorine dioxide disinfection, ozonation and ultraviolet disinfection.

Disinfection by-products	Products formed from the reaction between disinfectants, particularly chlorine and naturally occurring organic materials in water.
Distribution system	A network of pipes leading from a water treatment plant to customers' plumbing systems.
Drinking water	Water that is intended for human consumption or for purposes connected with human consumption, such as preparing food and making ice (excludes pre-packaged bottled water).
Drinking water quality standards	Drinking water quality standards specified in r. 10 of the Safe Drinking Water Regulations 2005 and regulation 12 of the Safe Drinking Water Regulations 2015 for the purposes of s. 17 of the <i>Safe Drinking Water Act 2003</i> .
Dual pipe (scheme)	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.
Escherichia coli	<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 an indicator for the presence of microbial pathogens.
Groundwater	Water contained in rocks or subsoil.
Hazard	A biological, chemical, physical or radiological agent that has the potential to cause harm. Physical and chemical hazards include heavy metals, trace organic compounds, total suspended solids and turbidity. Microbiological hazards include bacteria, viruses and protozoan parasites.
N-Nitrosodimethylamine	A by-product formed in drinking water via a reaction between chloramine and chlorine with naturally occurring organic material.
Non-potable water	Any source of water that is unsuitable for drinking.
Notification	Verbal and written communication received by the department from water suppliers under s. 18 of the <i>Safe Drinking Water Act 2003</i> when drinking water supplied to the public does not (or is not likely to) comply with drinking water quality standards.
Parameters	Parameters for drinking water quality fall under four categories: physical, chemical, microbiological and radiological. Physical parameters include colour and turbidity. Chemical parameters include metals and organic compounds. Microbiological parameters include viruses, protozoa and bacteria. Radiological parameters include beta- and gamma-emitting radionuclides.

Pathogen	Disease-causing microorganisms including types of virus, protozoa and bacteria.
Preventive actions	Actions put in place following immediate corrective actions to minimise the risk of a recurrence of an incident or issue.
Raw water	Water found in the environment – such as rainwater, groundwater, reservoir water and river water – that has not been treated.
Recycled water	Water generated from sewage or greywater and treated to a standard that is appropriate for its intended use.
Regulated water	Water that is not intended for drinking but that could reasonably be mistaken for drinking water.
Report	Verbal and written communication received by the department from water suppliers, water storage managers or council officers under s. 22 of the <i>Safe Drinking Water Act 2003</i> regarding known or suspected contamination of water.
Reticulated drinking water supply	The piped drinking water network.
Risk	The likelihood and consequence of a hazard causing harm in exposed populations in a specified timeframe.
Risk management	The systematic evaluation of the water supply system, the identification of present and potential hazards and hazardous events, the assessment of risks and the development and implementation of preventive strategies to manage those risks.
Risk management plan	A plan prepared by water agencies under the <i>Safe Drinking Water Act 2003</i> that details how risk is managed in relation to the storage or supply of drinking water and regulated water to the public.
Safe drinking water regulatory framework	The legislation used to regulate the supply of Victoria's drinking water is referred to as the safe drinking water regulatory framework. The framework consists of the <i>Safe Drinking Water Act 2003</i> and the <i>Safe Drinking Water Regulations 2015</i> . The safe drinking water regulatory framework supports the <i>Health (Fluoridation) Act 1973</i> and is consistent with the risk management approach in the <i>2011 Australian drinking water guidelines</i> .
Surface water	Water naturally open to the atmosphere, such as that in rivers, streams, lakes and reservoirs.
The Act	<i>Safe Drinking Water Act 2003</i>
The Regulations	<i>Safe Drinking Water Regulations 2015</i>
Trichloroacetic acid	A by-product formed in drinking water via a reaction between chlorine and naturally occurring organic material.

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



