



Annual Report

Water Quality of Public Drinking Water Supply Systems in Tasmania

1 July 2020 - 30 June 2021

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I. Executive Summary

Overview

- A total of 60 water supply systems in Tasmania were operated by TasWater.
- 81 per cent of the Tasmanian population of 542 000¹ people receive a reticulated water supply system managed by TasWater (serviced population).

Microbiological

- 100 per cent of the serviced population received microbiologically compliant drinking water. This is the third consecutive year that this has been achieved in Tasmania.
- One water supply system was subject to a Temporary Boil Water Alert, which affected less than one per cent of the serviced population.

Non-Microbiological

- 100² per cent of the serviced population received chemically compliant drinking water.

Fluoridation

- TasWater operated 38 fluoridation systems servicing 38 of the 60 water supply systems. A total of 433 286 people received a fluoridated water supply, which equates to 99 per cent of the serviced population.
- 81 per cent of the population receiving a fluoridated supply received water with an average fluoride concentration within the required range.

¹ Australian Bureau of Statistics estimated resident population as at 31 March 2021

² Compliance determined to be 99.9 per cent and rounded to 100 per cent for reporting

2. Introduction

This Drinking Water Quality Report for 2020-21 is part of the responsibilities of the Director of Public Health and Environmental Health Services to protect public health. This protection is achieved through:

- Establishing and maintaining legislation that promotes best practice in drinking water quality management
- regulating the implementation of the legislation by industry by providing advice to TasWater who manage public drinking water supplies
- Informing the public of the status of drinking water quality in Tasmania and acting on non-compliant drinking water to protect public health.

A requirement of the *Public Health Act 1997* and its subsidiary legislation, the *Tasmanian Drinking Water Quality Guidelines* (2015) is the submission of an Annual Drinking Water Quality Report by TasWater. A copy of this Report can be located at www.taswater.com.au/about-us/annual-reports.

This report by the Director of Public Health consolidates the information furnished by TasWater from each drinking water supply system in Tasmania to create a state-wide summary of public health and drinking water quality.

This is the eighth year that TasWater has been responsible for the provision of drinking water after the previous Regional Water Corporations amalgamated in July 2013.

This report focuses on the microbiological, non-microbiological and fluoridation quality of drinking water in Tasmania. The microbiological quality of drinking water represents the greatest risk to public health and therefore the fundamental requirement for drinking water to be free of microbiological contamination establishes the foundation for provision of safe drinking water and is aligned with the first guiding principle of the *Australian Drinking Water Guidelines*, which states “the greatest risks to consumers of drinking water are pathogenic microorganisms”.

This report has been prepared by the Environmental Health Unit (EHU), part of Public Health Services (PHS) within the Department of Health (DoH).

When compliance data is presented, it has been rounded to the nearest whole number; unless the number is less than one, in which case it has been rounded to the nearest one decimal place. This may result in percentages not adding up to 100 per cent and/or in some instances rounded numbers differing slightly to what has been reported in other documents.

3. Drinking Water Quality Regulatory Framework

3.1. Regulatory Framework

Tasmania's regulatory framework to ensure safe drinking water comprises of the following pieces of legislation:

- *Public Health Act 1997*
- *Tasmanian Drinking Water Quality Guidelines 2015 (the Tasmanian Guidelines)*
- *Australian Drinking Water Guidelines (the ADWG)*
- *Fluoridation Act 1968*
- *Fluoridation Regulations 2019*
- *Tasmanian Code of Practice for the Fluoridation of Public Water Supplies (2018).*

PHS within the DoH ensures TasWater manages public water supply systems to protect the public's health while meeting their regulatory obligations within the legislation.

This report focuses on the following specific requirements within the legislation:

- Microbiological compliance
- Non-microbiological compliance
- Public Health Warnings: including Boil Water Alerts and Public Health Alerts
- Fluoridation.

3.2. Drinking Water Supply Systems

There were 61 drinking water supply systems managed by TasWater at the end of 2020-21. A public drinking water supply system consists of the water supply network, from the treatment to the customer's connection. In some instances, a supply system can service multiple communities or geographic locations; largely originating from a series of pipelines to facilitate the delivery of treated water around the networks. Whilst TasWater undertakes compliance testing across the state, the requirement to take samples is determined by both the risk and the geographical layout (known as a monitoring zone or water supply) of a water supply system. There are several systems that comprise numerous monitoring zones to ensure that the water supplied to customers is subject to a high level of compliance testing. Where this is the case, an aggregation of all the available data from these monitoring zones has been undertaken prior to the assessment of compliance of that drinking water supply system.

3.3. Drinking Water Quality Management Plans

TasWater must have a Drinking Water Quality Management Plan (DWQMP) containing the information prescribed in the *Tasmanian Guidelines* and the ADWG for each of the public drinking water supply systems they manage.

In addition to microbiological compliance, the DWQMP contains a compliance testing schedule/program for non-microbiological parameters down to a water supply system level, based on risk management principles. Any non-microbiological contaminants detected while implementing the testing schedule/program must be at or below the relevant health-based values in the ADWG, for the drinking water to be considered compliant.

As the development of the monitoring program is risk-based and considers historical results, it means that many variations of monitoring programs across the state exists; not all water supply systems are subject to the same monitoring parameters or frequency. Assessment of the non-microbiological compliance is undertaken against the monitoring results obtained through the compliance sampling program for each water supply system individually.

The DWQMP is subject to biennial third-party external audit to ensure it meets the regulatory and legislative requirements during its implementation. Audits have been undertaken in December 2017 and November 2019, with no significant risks to public health identified. TasWater maintained and implemented their DWQMP during 2020-21. The next external audit is due to be undertaken during November 2021.

3.4. Compliance Assessment Framework

3.4.1. Sampling Compliance

TasWater must collect samples and test drinking water from their drinking water supply systems in accordance with the sampling requirements prescribed in the ADWG, the *Tasmanian Guidelines* and their Drinking Water Quality Management Plan (DWQMP).

The correct number of samples and frequency is vital to demonstrate the monitoring is sufficiently representative of all water from the supply system throughout the year. The purpose of taking samples of drinking water is to verify the treatment barriers within the water supply systems are effective in removing any substance that would pose a risk to public health.

Sampling of the water at the end of its “production” and just before delivery to the consumer is not intended to be used as the sole mechanism to operationally manage a drinking water supply system; TasWater undertakes additional operational, investigative, and event-based monitoring, which is outside the scope of this report.

3.4.1.1. Microbiological Sampling Compliance

The *Tasmanian Guidelines* require that a drinking water supply system must be sampled and tested at an accredited laboratory for *Escherichia coli* (*E. coli*) in accordance with the frequency outlined in the ADWG. The population serviced by a water supply system dictates the number of samples required to verify the safety of the water. Supply systems servicing under 1 000 people require a minimum of one sample per week, whereas populations greater than 1 000 require more than one as specified in the ADWG.

Adequate microbiological sampling and testing needs to be undertaken for drinking water supply systems that have treatment barriers designed to remove pathogens as the sampling and corresponding results demonstrate whether such barriers used against pathogens have been effective or not.

Section 5 outlines the microbiological sampling compliance for 2020-21.

3.4.1.2. Non-Microbiological Sampling Compliance

The *Tasmanian Guidelines* require that a drinking water supply system must be sampled and tested at an accredited laboratory in accordance with the compliance monitoring program set out in TasWater’s DWQMP or at such other frequency required by the Director of Public Health. The DWQMP adopts a risk-based approach to the management of drinking water and as such the sampling frequency and parameters tested will vary between water supply systems.

Section 6 outlines the non-microbiological sampling compliance for 2020-21.

3.4.2. Compliance Assessment

TasWater must demonstrate the drinking water supply systems they manage do not pose a threat to public health. The determination of compliance is consistent with the framework outlined in the ADWG; that only the results of routine compliance samples are used and results from resamples, and investigations are excluded from the assessment data.

3.4.2.1. Microbiological Compliance Assessment

The criterion in the current version of ADWG is that *E. coli* should not be detected in a minimum 100 mL sample of drinking water. This was a shift from the 2004 version of the ADWG which specified that 98 per cent of all drinking water samples collected from a drinking water supply system should not contain any *E. coli*. DoH has retained the 98 per cent measure for *E. coli* as the compliance measure and the *Tasmanian Guidelines* have been updated to reflect this requirement and noted deviation from the ADWG. Often microbiological samples may become contaminated during the collection and/or transportation and a positive result may not be reflective of the actual quality of water provided to consumers. Clearly, complete absence of *E. coli* remains an operational objective.

E. coli is an indicator organism of faecal contamination in the water (and may not necessarily be harmful). These organisms originate from the intestines of many animals and humans. The presence of *E. coli* in drinking water indicates the potential presence of other harmful pathogens (which also exist in faeces) that pose a high risk to public health.

Detection of any *E. coli* in a drinking water sample suggests a potentially serious fault in the effectiveness and integrity of the drinking water supply system and requires immediate investigation and intervention. The absence of these organisms in samples helps to verify that all the steps (whether a treatment process or an operational procedure) in the water supply system are being effective in producing safe drinking water.

Identification of the phylotype/phenotype of each *E. coli* detection is undertaken by TasWater to provide an indication of the source of the microbiological contamination and improve the risk management process.

Section 5.2 outlines the microbiological compliance assessment for 2020-21.

3.4.2.2. Non-Microbiological Compliance Assessment

Table 10.6 of the ADWG specifies health-related guideline values for non-microbiological parameters that may be found in drinking water. Evaluation of the results from compliance sampling against the health based value for each parameter is undertaken in order to determine compliance. For a water supply system to be classified as compliant, all samples taken across all parameters for the reporting period must be at or below the relevant health-based value. If any sample exceeds the relevant limit, then the water supply is classified as non-compliant for the reporting period.

Consistent with the principles of the ADWG, compliance of non-microbiological parameters is undertaken after rounding the reported laboratory result to the same number of significant figures that is presented in the health-based value in the ADWG. This means that there are some instances where a laboratory reported result will be higher than a health-based value, but after rounding it becomes the same and is therefore assessed as being compliant. For example, a parameter may have a health-based value of 10 µg/L (one significant figure) and a laboratory may report a concentration of 13.1 µg/L (three significant figures). Upon rounding the result becomes 10 µg/L. Conversely, a parameter may have a health-based value of 250 µg/L (two significant figures) and a laboratory may report a concentration of 234 µg/L (three significant figures). Upon rounding the result becomes 250 µg/L. A result that is reported at the health-based value or rounded to the health based value is assessed as being compliant.

Section 6.2 outlines the non-microbiological compliance assessment for 2020-21.

3.5. Public Health Warnings

Public Health Warnings (PHW) are designed to protect public health by restricting the allowable safe uses of drinking water and are issued when water quality testing indicates that there is an increased risk associated with the use of the water from a supply system. PHW can take the form of Boil Water Alerts (BWA) which may be Temporary (TBWA) for short-lived episodes. These are generally issued after non-compliances against the microbiological health-based values as boiling of the water will inactivate the pathogen. PHW can also be Public Health Alerts (PHA); which are analogous to a “do not consume” alerts and correspond to non-compliances against the non-microbiological health-based values. PHW are issued by TasWater at the direction of the Director of Public Health or a Public Health Officer.

Public Health Warnings are put in place to protect the consumer from adverse effects of using drinking water from a public water supply.

- For microbiological risks a Boil Water Alert is issued meaning that the water must be boiled prior to consumption.
- For non-microbiological risks a Public Health Alert is issued meaning that the water cannot safely be consumed.

3.5.1. Boil Water Alerts

When microbiological samples are non-compliant TasWater must undertake immediate corrective actions to ensure there is no public health risk. Most commonly, the source of the contamination is quickly identified, and the contamination is removed or treated.

At other times, however, a more wide-ranging investigation is required, and a TBWA is issued by TasWater at the direction of the Director of Public Health to protect the public. A BWA occurs in water supply systems unable to remedy the contamination, so the public are required to take ongoing action against contaminated water. A BWA may affect part of or all a water supply system depending on hydraulic separation through the network configuration.

The term TBWA is still used to indicate the short term BWAs that are imposed from time to time. If the issues giving rise to a TBWA cannot be addressed within a three-month period, the alert will move to a BWA.

All BWAs can be found on the DoH website <https://www.health.tas.gov.au/news/health-alerts/boil-water-alerts> and TasWater’s website www.taswater.com.au/News/Outages---Alerts. At the end of the 2020-21 period, there were no BWA for any water supply system in Tasmania.

3.5.2. Public Health Alerts

When non-microbiological samples are non-compliant (i.e. any parameter that has a corresponding ADWG health based value is exceeded, or a risk is identified), TasWater must undertake immediate investigative and corrective action. A resample is also required to verify the original failure and to rule out sample contamination and spurious results.

When there is no easily identifiable reason for the non-compliance and/or the resample also exceeds the guideline value, a PHA is usually required to be issued by TasWater at the direction of the Director of Public Health to the affected customers. TasWater must provide consumers with an alternative source of drinking water until the source of contamination can be isolated and rectified.

All PHAs can be found on the DoH website <https://www.health.tas.gov.au/news/health-alerts/do-not-consumer-water-notice> and TasWater's website www.taswater.com.au/News/Outages---Alerts. At the end of the 2020-21 period, there were no PHA for any water supply system in Tasmania.

4. Drinking Water Supply Systems in Tasmania

There were 60 public drinking water supply systems in Tasmania at the end of 2020-21.

4.1. Population

The Australian Bureau of Statistics (ABS) estimated as of 31 March 2021 that the resident population of Tasmania was 542 000³ people.

TasWater provide connection and population data to DoH, which estimates the population serviced by reticulated water supply systems. TasWater derive this data from maintained databases and utilise ABS household occupancy rates and population data from the 2016 Census.

It is estimated 438 097 or 81 per cent of people living in Tasmania receive a reticulated drinking water supply. This is referred to as the serviced population. Because of the highly dispersed Tasmanian population, many of the public drinking water supply systems are servicing very small populations.

Table 1 shows the water supply systems that service customers across different population ranges.

	Population range				Total
	Greater than 5 000	1 000 – 5 000	500 – 1 000	Less than 500	
No. water supply systems (% of total)	10 (17%)	15 (25%)	101(18%)	24 (40%)	60
Serviced Population (%)	90	8	2	1	

Table 1: Water supply systems supplying different population ranges.

- 81% of the Tasmanian population receive a reticulated drinking water supply from TasWater
- 24 of the 60 water supply systems service populations of less than 500 people which equates to 1% of the serviced population
- 10 of the 60 water supply systems service populations of greater than 5 000 people which equates to 90% of the serviced population

4.2. Water Treatment

Fifty-nine of the 60 water supply systems are fully treated supplies meaning that they have multiple barriers in place to ensure water quality safety. The exception is the disinfection only water supply system that services Adventure Bay which is operated by TasWater so that water carriers can distribute drinking water around Bruny Island residents. There is currently no reticulated drinking water infrastructure on Bruny Island.

100% of the Tasmanian serviced population receive their drinking water from a fully treated water supply system

³ Obtained from ABS Website Publication 3101.0: Australian Demographic Statistics, March 2021. Released on 16 September 2021.

A fundamental requirement for the risk-based approach to achieving safe drinking water is to correlate the amount and type of water treatment with the hazards and their respective risks to water quality in that supply system. For example, if water is sourced from a relatively pristine environment, the main hazard and risk to public health from the drinking water would be microbiological contamination which a single water treatment process – disinfection – would generally suffice to ensure safe drinking water. If water was sourced from a heavily impacted catchment, then multiple and appropriate water treatment processes would be required in the drinking water supply system to ensure all the hazards (microbiological and non-microbiological) are eliminated or reduced to a level which would not pose a risk to public health. The extent of treatment varies amongst the serviced population.

Other barriers beyond treatment are often required throughout the drinking water supply system to ensure the water is not re-contaminated. Examples of such barriers are roofs on reservoirs, re-chlorination facilities, good operational procedures to reduce recontamination during main repairs and installation of backflow prevention devices.

5. Microbiological Drinking Water Quality

5.1. Microbiological Sampling Compliance

The degree of confidence that TasWater has met the microbiological compliance criterion is dependent on the required number of samples being collected. All the 60 water supply systems were sampled in full compliance with the microbiological sampling frequency required by the ADWG and the *Tasmanian Guidelines*.

All the drinking water supply systems were compliant with their microbiological monitoring programs

5.2. Microbiological Compliance Assessment

This Section investigates compliance of the 60 water supply systems. The microbiological compliance criterion, prescribed in the ADWG, is that no *E. coli* should be detected in any sample of drinking water. As discussed in Section 3.4.2, for compliance reporting purposes DoH has retained the provision that 98 per cent of samples collected from the drinking water supply system should not contain any *E. coli*.

All the 60 water supply systems were assessed as compliant for microbiological quality. Table 2 compares the microbiological compliance of all water supply systems over the last five years.

Bacteriological compliance	2016-17	2017-18	2018-19	2019-20	2020-21
Compliant (%)	82	88	100	100	100
Non-compliant (%)	18	12	0	0	0
Unknown (%)	0	0	0	0	0

Table 2: Bacteriological compliance of all drinking water supply systems as a percentage

All the drinking water supply systems were assessed to be compliant for microbiological quality

This high level of compliance indicates that where treatment barriers are in place, TasWater are operating these in such a way that the microbiological risks are well controlled. The Deep Creek water supply systems detected *E. coli* in one sample resulting in the microbiological compliance being determined at 99.5%, which is compliant overall.

At all times, supplied drinking water should not pose a threat to public health; hence the need for short term corrective actions such as TBWA, dosing of service reservoirs with chlorine or removal of contaminated water. Boil Water Alerts are discussed in Section 7.

6. Non-Microbiological Drinking Water Quality

6.1. Non-Microbiological Sampling Compliance

During the reporting period TasWater conducted compliance monitoring programs for non-microbiological (physical and chemical) parameters as part of the implementation of their DWQMP for each water supply system. The intent of compliance monitoring programs is to gain a fuller understanding of the risks posed to water quality within each supply system and verify compliance to demonstrate risks to public health have been managed.

Through the process of a risk assessment undertaken in the development of DWQMP, TasWater identify parameters that are reasonably expected to be detected within the catchment and water treatment process(es). These parameters are subsequently included in compliance monitoring programs. Non-microbiological parameters that have corresponding health-based values in the ADWG are compared to monitoring results to determine if any risks are present to public health. The process of conducting a risk assessment to design a non-microbiological monitoring programs may result in different monitoring schedules and frequencies for each of the drinking water supply systems. The ADWG does not specify the frequency or parameters that need to be sampled within any given drinking water supply system but does provide broad guidance.

TasWater satisfied the non-microbiological monitoring requirements outlined in the ADWG by having a risk-based sampling program implemented for each drinking water supply systems. TasWater satisfied the implementation of each of these compliance monitoring programs by taking the required number of samples in all the 60 water supply systems.

A summary of the of compliance of non-microbiological compliance sampling can be seen in Table 3

Criteria	Number	Compliance (%)
Compliant with the sampling requirements	60	100
Non-compliant with the sampling requirements	0	0

Table 3: Non-microbiological sampling compliance of drinking water supply systems

6.2. Non-Microbiological Compliance Assessment

Two water supply systems (Cornwall and Coles Bay) reported non-compliances for non-microbiological parameters in samples obtained from their reticulation networks and have therefore been assessed as non-complaint. Based on the serviced population by these water supply systems, it is estimated that 0.1 per cent temporarily received water not fully compliant with non-microbiological standards during the reporting period.

Table 4 shows a summary of the non-microbiological compliance assessment and indicates that 97 per cent of all drinking water supply systems in 2020-21 were compliant against the non-microbiological performance criteria (i.e. absent of any monitoring result in exceedance of a health based value specified in the ADWG).

Assessment	Number	Compliance (%)
Compliant	58	97
Non-compliant	2	3
Unknown Compliance	0	0

Table 4: Non-microbiological compliance assessment of drinking water supply systems

- A total of 2 drinking water supply systems delivered non-compliant non-microbiological water at some stage during 2020-21
- 0.1% of the serviced population experienced water quality that was provided non-compliant water at some stage during 2020-21

An examination of the State-wide non-microbiological compliance assessment for the last five years is shown in Table 5.

	2016-17	2017-18	2018-19	2019-20	2020-21
Non-microbiological compliance (%)	82	84	95	97	97

Table 5: Non-microbiological compliance as a percentage of all water supply systems

The two water supply systems that were assessed as being non-compliant under the non-microbiological compliance assessment are detailed in Table 6; including the parameters and sampling results for each supply system.

Water supply system	Parameter	Ave ⁴ Level (ug/L)	ADWG ⁵ limit (ug/L)	# Non-Compliances	Min ⁶ Level (ug/L)	Max ⁷ Level (ug/L)	# Samples Taken	Ave ⁸ Level (ug/L)
Coles Bay	Trihalomethanes	270	250	1			12	144
Cornwall	Lead	73	10	1			4	19

Table 6: Non-compliant non-microbiological drinking water supply systems

⁴ Average concentration of reported non-compliances

⁵ Health-related guideline value as defined by the ADWG

⁶ Minimum concentration of reported non-compliances

⁷ Maximum concentration of reported non-compliances

⁸ Average concentration of all samples tested in the compliance monitoring program

The Cornwall drinking water supply system detected temporary elevated lead levels above the health-based value, which returned below the ADWG limit after intervention of flushing through fresh water and resampling by TasWater. In this case of lead, there is no evidence to indicate that this exceedance posed a health risk. It is highly likely that the one sample was not representative of the overall water quality consumed by the residents as it was suspected to have arisen from sample contamination. Taking the non-compliant result out of an average concentration determination, shows that the remaining three samples taken had an average of 0.4 µg/L – well below the ADWG health-based guideline value. Statistically, the non-compliant result could be treated as an outlier and excluded from the compliance assessment.

The Coles Bay drinking water supply system detected temporary elevated levels of trihalomethanes above the health-based guideline value. In this case of trihalomethanes, there was no evidence to indicate that this exceedance posed a risk to health. This was detected in one sample taken out of twelve for the year.

Trihalomethanes are part of the known and Disinfection By-Products (DBPs) and are formed via a reaction between naturally occurring organic matter such as humic and fluvic acids which result from the decay of vegetable and animal matter in the source water and the chlorine used in the disinfection process. Most disinfectants used to render drinking water safe from pathogenic microorganisms will produce DBPs in the disinfection process. Assessment of the risk associated with these detections indicated the public health risk was low. The ADWG states that disinfection should never be compromised to reduce DBP formation.

Many factors affect the rate and formation of DBPs. The risk to health from DBPs at the levels at which they typically occur in drinking water is extremely small compared to other risks associated with inadequate disinfection. So, it is important disinfection is not compromised in attempting to control DBPs.

The ADWG health-based values for these non-microbiological parameters are derived from the tolerable or acceptable daily intake (TDI/ADI) and represent the concentration of a contaminant that does not result in any significant risk to the health of the consumer over a lifetime of consumption. The derivation of the values makes numerous assumptions; including an adult body weight of 70 kilograms, consumption of two litres of water a day⁹; and allocation of 10 per cent of the TDI/ADI to the consumption of drinking water.

The health-based values are conservative and incorporate a range of safety factors which always err on the side of caution, and thus one-off or short-term exceedances are unlikely to result in adverse health effects.

⁹ For lead, the ADWG limit is based on a child weight of 13kg and a consumption of 1L of water per day.

7. Public Health Warnings

7.1. Boil Water Alerts

During the 2020-21 period, TasWater reported that there were no BWAs in place at the end of the reporting period. Table 7 compares the number of BWAs across the last five years.

	2016-17	2017-18	2018-19	2019-20	2020-21
Water supply systems	20	9	0	0	0

Table 7: Number of water supply systems operating on a BWA at 30 June 2021

No drinking water supply systems operated under a BWA during 2020-21

7.2. Temporary Boil Water Alerts

During 2020-21 one drinking water supply system had operated on a Temporary Boil Water Alert (TBWA) as shown in Table 8, which compares the previous five years.

	2016-17	2017-18	2018-19	2019-20	2020-21
Water supply systems	4	3	2	1	1

Table 8: Number of water supply systems that operated on a TBWA

The details and duration of these TBWA can be seen in Table 9.

Water supply system	Treatment	Population	Date On	Date Off
Adventure Bay	DO	1	5/3/21	6/3/21
			27/3/21	29/3/21
			22/6/21	9/7/21

Table 9: Water supply systems operating on a TBWA during 2020-21

The Adventure Bay water supply system was placed on a TBWA three times during 2020-21 to address risks that were identified with the chlorination and UV disinfection barriers. The water supply system has only one connection (to a shop). They were advised to boil their water during these time and assistance was given by TasWater in providing an alternate source of water. The access point was water carriers was closed off and locked off so that no water could be supplied to the island's residents during the works period.

One drinking water supply systems operated under a TBWA during 2020-21, which affected 0.1% of the serviced population

TBWA can be removed after appropriate investigation and intervention are accompanied by compliant microbiological data to demonstrate that the threat to public health has been eliminated.

7.3. Public Health Alerts

There were no water supply systems operating with a PHA during 2020-21.

No drinking water supply systems operated under a PHA during of 2020-21

8. Fluoridation

The DoH on 1 July 2018 issued the *Tasmanian Code of Practice for the Fluoridation of Public Water Supplies* (2018), which was developed to set a standard for fluoridation operation and service delivery consistent with the requirements of the *Fluoridation Act 1968* and *Fluoridation Regulations 2019*. The aim of the *Code of Practice* is to ensure that the addition of fluoride to public water supplies is carried out in a safe, effective, and consistent manner, aligned with best practice management. TasWater are required to comply with the *Code of Practice* as specified in Ministerial Directions from the Minister for Health to fluoridate water supplies.

Natural fluoride concentrations depend on the type of soil and rock through which water passes and typically range from <0.1 to 0.5 mg/L. In Tasmania fluoridated supplies, the operating range is 0.8 to 1.1 mg/L with a target concentration of 1 mg/L.

Community water fluoridation has been shown to prevent dental caries very effectively. The National Health and Medical Research Council (NHMRC) has extensively reviewed the health aspects of fluoride and its prevention of dental disease and released its Public Statement in 2017¹⁰. Many health authorities around the world recommend fluoridation of public water supplies as an important public health measure. DoH had supported the NHMRC in reviewing their Fluoridation Efficacy Statement of 2007, with the findings reaffirming community water fluoridation as a safe, effective and ethical way to help reduce tooth decay across the population. It concluded that there was no reliable evidence that the fluoridation of public water supplies at the current levels within Australia has any adverse health effects.

The ADWG health-based value has been set at 1.5 mg/L to protect children from the risk of dental fluorosis, which is associated with excess fluoride consumption. Dental fluorosis is a problem with the appearance of teeth and is associated with a high intake of fluoride during the time that the teeth are developing. In Australia, dental fluorosis has declined significantly over recent decades, is very mild, and does not affect the function of teeth.

Thirty-eight water supply systems across Tasmania were serviced by 38 fluoridation stations, or about 63 per cent of all water supply systems. A breakdown of the population receiving fluoridated water can be seen in Table 10. Of the Tasmanian serviced population, about 99 per cent of these people receive fluoridated water.

	Tasmania
Water supply systems fluoridated	38
Population receiving fluoridated water supply	433 286
Population receiving water supply	438 097
% Population receiving fluoridated water supply	99

Table 10: Fluoridation of drinking water supply systems 2020-21

99¹¹% of the serviced population receive fluoridated water

¹⁰ NHMRC Public Statement 2017: Water Fluoridation and Human Health in Australia (www.nhmrc.gov.au/health-advice/public-health/health-effects-water-fluoridation)

¹¹ Compliance determined to be 98.9 per cent and rounded to 99 per cent for reporting

Australia's *National Oral Health Plan 2015-24*¹² includes a key strategy to extend access to the preventative benefits of fluoride through fluoridated water to communities over 1 000 population. Tasmania, ACT and NT are the only jurisdictions to achieve this target. Tasmania has 12 fluoridated water supply systems servicing populations under 1 000 with four of those servicing populations under 500 people. Every water supply system in Tasmania servicing a population greater than 500 people is fluoridated.

All communities with a population over 500 people in Tasmania receiving reticulated water receive fluoride in their water, exceeding the target specified in that *National Oral Health Plan*.

8.1. Fluoride Compliance

The measure of compliance for fluoride is based on the performance of each fluoridated system. Monitoring data to determine fluoride concentrations is taken within the reticulation network (distribution) to assess compliance at a minimum of two sampling locations twice per month. The Waratah water supply system has only one sampling location due to its small size and serviced population (183 people).

The *Code of Practice* and the *Fluoridation Regulations 2019* specify that compliance of fluoridation systems is measured against the following three criteria:

- i. That the average of all samples taken lies within the range of 0.8 to 1.1mg/L
- ii. That at least 90% of all samples taken are equal to or below 1.1mg/L
- iii. That no single sample shall exceed 1.5mg/L

For a fluoridation system to be assessed as being compliant, that system must meet all criteria. If a system is non-compliant with one or more criteria, the overall assessment is that the fluoridation system is non-compliant with respect to fluoride performance. The second criterion is designed to highlight instances whereby higher than usual fluoride doses are undertaken to bring the average fluoride concentration with the required range.

The number of required samples is assessed to ensure that the appropriate number has been taken. Like the assessment of non-microbiological compliance, a system failing to take the required number of fluoride samples is assessed as being of unknown compliance. For 2020-21, all fluoridation systems took the required number of samples. A summary of the compliance of fluoridation systems can be seen in Table 11.

¹² Healthy Mouths Health Lives: Australia's National Oral Health Plan 2015-24. Council of Australian Governments Health Council, 2015. Australian Government. ISBN 78-0-646-94487-6.

Metric	Compliant	Non-Compliant
90% of samples are below [F] of 1.1 mg/L	38	0
Average [F] of samples within the 0.8 to 1.1 mg/L range	32	6
[F] must not exceed 1.5mg/L in any sample	38	0
Overall Compliance	32	6

Table 11: Compliance assessment of fluoridated systems

Table 12 lists the fluoridated systems that were non-compliant with the regulatory measures.

Fluoridation System	Average [F] (mg/L)
Bicheno (1 089)	0.7
Forth (37 950)	0.7
Longford (9 793)	0.7
Pet River – Burnie (26 787)	0.7
Scamander (692)	0.7
Whitehills (4 609)	0.5

Table 12: Fluoridated systems (and their serviced population) not meeting the regulatory compliance requirements

All six non-compliant fluoridated systems did not meet the requirement to have the average fluoride concentration within the range of 0.8 to 1.1 mg/L. All systems had operational issues, with many having their fluoridation storage tanks repaired or replaced. This sees periods of suspension of fluoridation, meaning that no fluoride was being provided in the supplied water for short periods of time. Upon resumption of the fluoridation, operational protocol dictates that the fluoride concentration is reintroduced slowly until the target dose of 1 mg/L is reached. This generates lower fluoride concentrations over these periods of time and hence affects the overall average concentration determination. During periods of no fluoridation, the requirement to take samples still exists and therefore the results that are generated contribute to a lower determination of the average fluoride concentration.

8.2. Population Served by Compliant Fluoridation Systems

Of the 433 286 people receiving fluoridated water, 352 366 received fluoridated water that had an average fluoride concentration within the range. This equates to 81 per cent of the population receiving water compliant with this metric. This is an increase on the 75 per cent reported last year.

81% of the population receiving a fluoridated supply receive water with an average fluoride concentration within the range of 0.8 to 1.1 mg/L

9. Conclusion

In 2020-21, 100 per cent of drinking water supply systems were compliant with the microbiological standards. TasWater were fully compliant with the microbiological sampling frequency within each of the water supply systems. Overall, this performance resulted in 100 per cent of the serviced population being supplied with microbiologically compliant drinking water during the year, which is the second consecutive year that this has been achieved.

There were no BWAs in the state at the end of the reporting period which is the second consecutive year that this has been achieved. The focus for DoH is now to encourage TasWater to optimise and continually improve the operation and reliability of all water supply systems.

At the end of this reporting period no water supply system was on Public Health Alert, which is the second consecutive year that this has been achieved.

Two water supply systems detected non-compliances against the non-microbiological health based values of the ADWG. Together this affected less than 0.1 per cent of the serviced population.

Six fluoridation systems were reported to be non-compliant recording annual averages below the optimal range of 0.8 to 1.1 mg/L. Together this affected 19 per cent of the serviced population.

This report encompasses the twelfth reporting year since inception of the water and sewerage reform in July 2009 and the eighth year of reporting against TasWater since the amalgamation of the Regional Water Corporations on 1 July 2013.

The current status of any water supply system can be sourced from the Department's website (<https://www.health.tas.gov.au>) or TasWater's website (<https://www.taswater.com.au/News/Outages---Alerts/Public-Health-Alerts---Do-Not-Consume> and <https://www.taswater.com.au/News/Outages---Alerts/Boil-Water-Alerts>).

Raw data from all the testing across each water supply system (compliance and investigative) undertaken during 2020-21 is presented in TasWater's Annual Drinking Water Quality Report, which can be downloaded at <https://www.taswater.com.au/About-Us/Publications>. The TasWater water quality portal allows users to input their address to identify the water supply system servicing them. (<https://www.taswater.com.au/Community---Environment/your-drinking-water>). Alternatively contact TasWater on 136 992 for further assistance.

