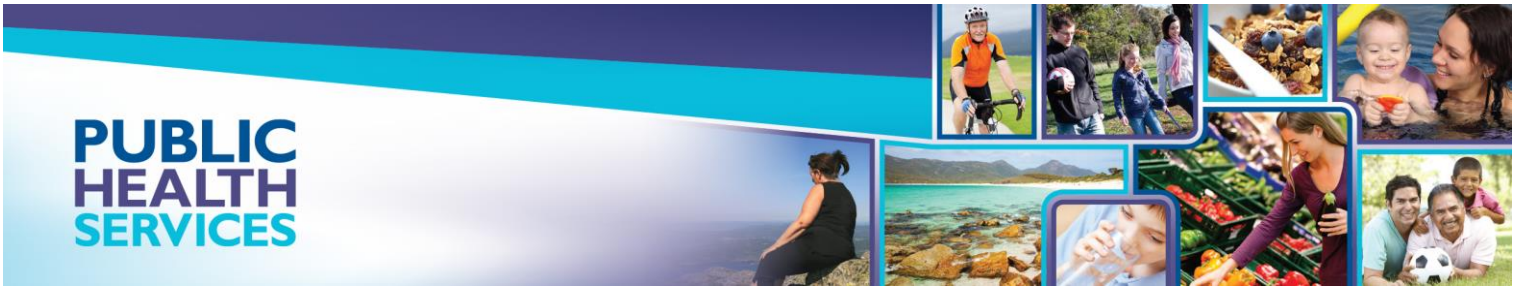

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Annual Report

Drinking Water Quality of Public Water Supplies in Tasmania

1 July 2013 - 30 June 2014

Department of Health and Human Services

Tasmanian Government

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1. Introduction

This Drinking Water Quality Report for 2013-2014 is part of the overall commitment by the Director of Public Health and Environmental Health Services to protect public health. This protection is achieved through:

- establishing legislation that promotes best practice in drinking water quality management
- regulating the implementation of the legislation by industry, providing advice to the Water Corporation who manages public drinking water supply systems
- informing the public of the status of drinking water quality in Tasmania.

A requirement of the *Public Health Act 1997* and its subsidiary legislation, the *Tasmanian Drinking Water Quality Guidelines* (2005) is the submission of an Annual Drinking Water Quality Report by the water corporation - TasWater.

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 statewide view on drinking water quality.

This is the first year that one water corporation (TasWater) has been responsible for the provision of drinking water after the previous three Regional Water Corporations (Ben Lomond Water, Cradle Mountain Water and Southern Water) amalgamated on 1 July 2013.

This report is primarily focused on the microbiological quality of drinking water, as this represents the greatest public health risk in Tasmania. 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 2011, which states "the greatest risks to consumers of drinking water are pathogenic microorganisms".

This report has been prepared by Environmental Health Services, part of Public Health Services within the Department of Health and Human Services.

2. Tasmania's Drinking Water Quality Regulatory Framework

2.1. Regulatory Framework

Tasmania's regulatory framework to ensure safe drinking water remains unchanged from the last Annual Report and comprises of the following pieces of legislation:

- *Public Health Act 1997*
- *Tasmanian Drinking Water Quality Guidelines 2005 (the Tasmanian Guidelines)*
- *Australian Drinking Water Guidelines 2011(the ADWG)*
- *Fluoridation Act 1968*
- *Fluoridation (Interim) Regulations 2009*
- *Tasmanian Code of Practice for the Fluoridation of Public Water Supplies 2007-2010*

Public Health Services within the Department of Health and Human Services (DHHS) ensures TasWater manages public water supply systems to protect the public's health while meeting their regulatory obligations stated within the legislation. Additionally, PHS provides guidance for TasWater on legislative requirements.

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.

A review of the 2005 *Tasmanian Guidelines* was completed by DHHS during the 2013-14 period, including consultation with key stakeholders. The new Tasmanian Guidelines will be reissued in 2015 after the corresponding changes to the *Public Health Act* have been approved by Parliament.

2.2. Microbiological Compliance

2.2.1. Sampling Compliance

TasWater must collect microbiological samples and test drinking water from their drinking water systems in accordance with the sampling requirements prescribed in the Australian Drinking Water Guidelines, 2011 (ADWG) and the *Tasmanian Guidelines*.

The correct sample number and frequency is vital to demonstrate the monitoring is sufficiently representative of the 'whole' of the water given to the consumer throughout the year. The purpose of taking microbiological samples of drinking water is to verify the drinking water supply system is effective in removing any harmful bacteria that would pose a risk to public health.

However, it should be noted that 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, so TasWater undertakes additional operational monitoring but this falls outside the scope of this report.

With respect to microbiological sampling, the *Tasmanian Guidelines* state "water supplied by a drinking water supply system must be sampled and tested at an accredited laboratory for *Escherichia coli* (or thermotolerant coliforms) in accordance with Table 10.2 of the ADWG[1]".

In addition, "Water supplied by a drinking water supply system which supplies less than 1 000 consumers must be sampled and tested at an accredited laboratory for *Escherichia coli* (or thermotolerant coliforms) once per week, unless it can be demonstrated that water quality management practices are such that the level of microbial risk does not represent a threat to public health in which case a lower frequency of sampling is sufficient."

Adequate microbiological sampling and testing needs to be undertaken for drinking water supply systems that have treatment barriers designed to remove pathogens because the sampling and corresponding results demonstrate whether such barriers used against pathogens have been effective or not. Drinking water supply systems without any treatment steps to remove pathogens (and thereby operate with a permanent boil water alert) do not require the same scale of sampling.

Sampling drinking water supply systems with a permanent boil water alert is not used for compliance purposes, but rather the data are gathered for longer term trend analyses that assist in determining if water quality is changing. In many cases the Director of Public Health only requires one microbiological sample per month for these water supplies.

2.2.2. Compliance Assessment

TasWater must demonstrate the drinking water supply systems they manage do not pose a threat to public health. The criterion in the 2011 ADWG is that *Escherichia coli* (*E. coli*) should not be detected in a minimum 100mL sample of drinking water.

This was a shift from the 2004 ADWG which outlined a criterion that 98 per cent of all drinking water samples collected from a drinking water supply system do not contain any *E. coli*. DHHS has retained the 98 per cent measure for *E. coli* as the compliance measure to allow for consistency of comparison over the previous year's results. The *Tasmanian Guidelines* will be updated to reflect this requirement and noted deviation from the 2011 ADWG. Clearly, however, 100 per cent absence of *E. coli* remains an operational objective.

E. coli and thermotolerant coliforms are indicator organisms (ie they themselves may not necessarily be harmful) of faecal contamination in the water. These organisms originate from the intestines of many animals and humans. The presence of *E. coli* or thermotolerant coliforms in drinking water indicates the potential presence of other harmful bacteria (which also exist in faeces) that pose a high risk to public health.

Detection of any *E. coli* or thermotolerant coliforms 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. 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.

[1] Table 9.4 in the ADWG (2011). Note the 2005 *Tasmanian Guidelines* still reference the 2004 ADWG

2.3. 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 testing schedule/program for non-microbiological parameters which is based on risk management principles. Any non-microbiological contaminants detected while implementing the testing schedule/program must be below the relevant health guideline values in the ADWG, for the drinking water to be considered compliant.

As the development of the monitoring program is risk-based, it results in many variations of monitoring programs across the State and not all water supplies are subject to the same monitoring parameters or frequency.

2.4. Public Health Warnings

The issuing of Public Health Warnings (PHW) are designed to protect public health and in this context are issued when water quality testing indicates that there is an increased risk associated with the use of the water supply. PHW can take the form of Boil Water Alerts (BWA) which can be either Permanent (PBWA) or Temporary (TBWA).

These are generally issued after non-compliances against the microbiological health related guideline values; as boiling of the water will inactivate the bacteria. PHW can also take the form of Public Health Alerts (PHA); which are analogous to a "do not consume" alerts; and correspond to non-compliances against the non-microbiological health related guideline values.

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

For microbiological non-compliances a Boil Water Alert is issued meaning that the water must be boiled prior to consumption.

For non-microbiological non-compliances a Public Health Alert is issued meaning that the water cannot safely be consumed.

2.4.1. Boil Water Alerts

When microbiological samples fail (ie *E. coli* are detected), 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 TBWA are issued by TasWater (in consultation with the Director of Public Health) to protect the public in the meantime. PBWA occur in systems unable to remedy the contamination (in Tasmania this is usually because there is no or inadequate water treatment process) so the public are required to take action against contaminated water.

All BWAs can be found on the DHHS website www.dhhs.tas.gov.au/publichealth/alerts and TasWater's website www.taswater.com.au/News/Outages---Alerts.

2.4.2. Public Health Alerts

When non-microbiological samples fail (ie any parameter that has a corresponding ADWG health-related guideline value is exceeded), TasWater must undertake immediate investigative and corrective action to ensure no risk to public health. A resample is also required so as to verify the original failure and to rule out sample contamination and spurious results.

When there is no easily identifiable reason for the failure and the resample also exceeds the guideline value, TasWater must issue a PHA (in consultation with the Director of Public Health) to the affected customers and provide them with an alternative source of drinking water until the source of contamination can be isolated and rectified.

All PHAs can be found on the DHHS website www.dhhs.tas.gov.au/publichealth/alerts and TasWater's website www.taswater.com.au/News/Outages---Alerts.

3. Performance of Tasmania's Water Corporations – Drinking Water Quality

3.1. Drinking Water Supply Systems in Tasmania

There were 88 public drinking water supply systems in Tasmania in 2013-14, which represents a decrease from the 90 present in 2012-13 and the 100 present in 2011-12.

There are 88 reticulated drinking water supplies In Tasmania

The net decrease of two from the previous year has arisen from the Lilydale water supply now being supplied via pipeline from the Distillery Creek water supply and Exton water supply now being supplied via the Westbury water treatment plant.

Each year the Department refines all supply and population data and has confidence that the accuracy is increasing each reporting period.

The 88 systems are owned and managed by TasWater – which was established as part of the State's water and sewerage reform. Table 1 indicates the number of drinking water supply systems managed by TasWater across the serviced population demographics.

The majority of drinking water supply systems in Tasmania are quite linear – that is, water is collected at the source (or at the connection with the bulk water system) and flows through various infrastructure to reach the consumer without mixing with other systems. This infrastructure design has provided the basis for defining a drinking water supply system for the purpose of providing a consistent state wide perspective on drinking water.

There are three exceptions to this. One is the Bruny Island (Adventure Bay) public water supply system. In this system water is sourced from the ground, treated (ultra-violet disinfection) and stored in a small reservoir. Water is pumped from the reservoir by commercial water carriers and transported to residents' tanks on the Island. It should be noted that no population estimates for Bruny Island are made as it is not possible to know how many people actually use the water as a drinking supply.

Another exception is the bulk water system which supplies the reticulated systems in the Greater Hobart area from five catchments. Reticulation systems receiving bulk water can do so from a single catchment or a combination of several catchments. The bulk water system has been split into 10 pipeline systems as they each contain water unique in quality and properties. The third exception is the Huon Valley Water Scheme which is sourced from one catchment and treated via the Huon Valley Water Treatment Plant. This system services five drinking water supplies via a series of pipelines and reservoirs.

Consumers directly connected to these bulk water pipelines are known as "wayside" customers and have agreements with the water corporation covering off on the variable water quality and supply. Wayside customers are not considered as part of this Report as there is no way of accurately knowing how many customers there are, plus there is no requirement to monitor water quality delivered to them. Wayside customers are managed by TasWater akin to the provisions of a Boil Water Alert.

3.2. Population

The Australian Bureau of Statistics (ABS) released Australian Demographic Statistics as at 31 March 2014 showing the estimated resident population of Tasmania was 514 700[2] people. This is an increase from the estimated Tasmanian population published by ABS of 512 870 for March 2013. Estimation of the occupancy projection rate for each water supply has been sourced from the ABS 2011 Census website using the Urban Centre Locality and State Suburb Data through the "quick stats" function.

TasWater provide connection (or tenement) data to DHHS, which is used to estimate the population serviced by reticulated water by normalising them through the ABS occupancy projection rates and rounded to the nearest five. Using this methodology an estimated 447 330 or 87 per cent of people living in Tasmania receive a reticulated drinking water supply. Because of the highly dispersed population, many of the public drinking water supply systems are servicing very small populations.

- **87% of the Tasmanian population receive a reticulated drinking water supply from TasWater**
- **41 of the 88 water supplies service populations of less than 500 people which equates to 2% of the population receiving a reticulated drinking water supply**
- **15 of the 88 water supplies service populations of greater than 5000 people which equates to 85% of people receiving a reticulated drinking water supply.**

During the writing of this report, DHHS utilised the ratio of population per household based on published data from the ABS on occupancy projections as discussed above. This approach is consistent with methodologies used by the Tasmanian Department of Primary Industries, Parks, Water and the Environment, the Victorian Department of Health and several Victorian Water Authorities when estimating populations from connection data.

Table 1 shows the number of drinking water systems supplying various population ranges in each region. Of most interest is that 47 per cent of the total numbers of drinking water supply systems in the State are supplying communities of less than 500 consumers. Most of these very small systems are within the northern and southern regions of Tasmania.

	Population range				
	Greater than 5000	**1000 – 5000**	**500 – 1000**	**Less than 500**	**Total**
TOTAL (%)	15 (17%)	22 (25%)	10 (11%)	41 (47%)	**88**
Population (%)	**84.9**	**11.7**	**1.5**	**1.9**	

Table 1: Number and percentage of drinking water systems managed by TasWater supplying each population range.

It shows that although there are only relatively few large drinking water supply systems, they are servicing the majority of the population (85 per cent) receiving reticulated drinking water in Tasmania. This is compared to 58 per cent of the systems being small to very small and servicing just 3.4 per cent of the population.

[2] Obtained from ABS Website Publication 3101.0: Australian Demographic Statistics, March 2014. Released on 26 September 2014.

3.3. Water Treatment

A range of water treatment processes are used in Tasmania's reticulated drinking water supply systems. Figure 1 indicates that 60 per cent of systems have full treatment[3]; while 18 per cent and 22 per cent of systems have disinfection-only treatment or no treatment respectively.

Disinfection-only systems are drinking water supply systems that only have one treatment barrier (e.g. chlorination) against all microbiological hazards that may be present in the source water. It is important to note chlorination can become ineffective if the source water becomes turbid (commonly during rain and/or drought).

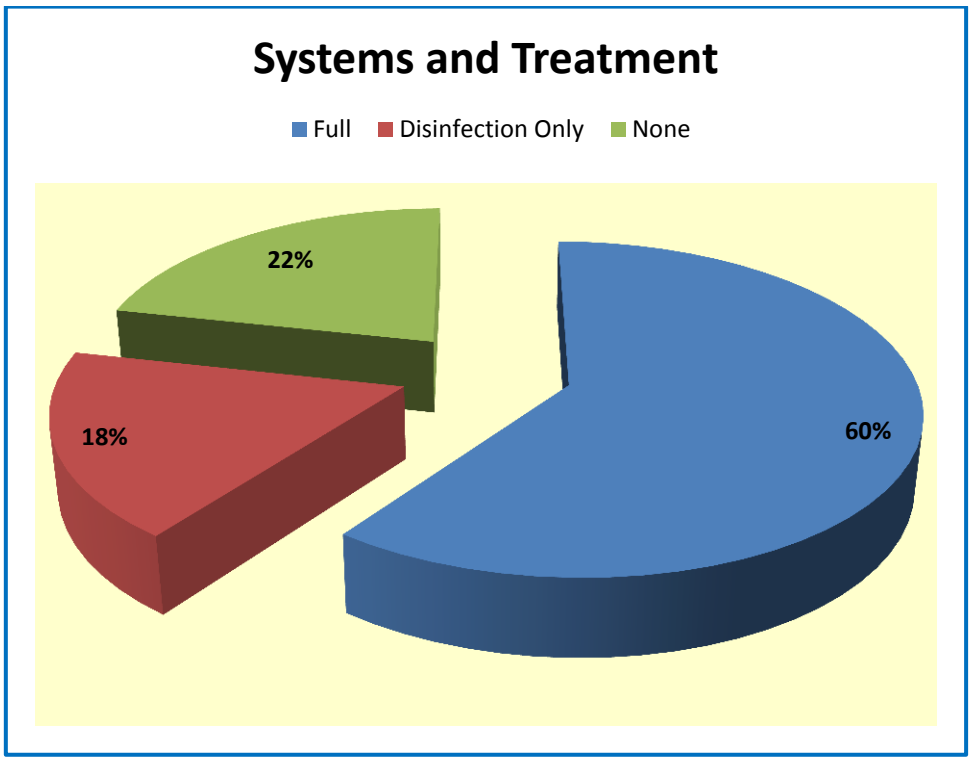

Figure 1: Percentage of drinking water supply systems and their respective water treatment (n = 88).

An assessment of the percentage of population receiving the different types of water supplies indicates that 98 per cent of the population receiving a water supply receive a fully treated drinking water.

- **98% of the Tasmanian population on a reticulated supply system receive their drinking water from a fully treated supply**

A fundamental requirement for a 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 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, however, water

[3] Full treatment has been defined to mean any system that has one or more treatment barriers in addition to disinfection.

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.

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

Capital and operational costs correspondingly increase with the amount and type of water treatment processes required. It continues to be the challenge for TasWater to incorporate appropriate water treatment processes to ensure safe drinking water. This challenge is particularly difficult when the appropriate water treatment is costly but the size of the community being supplied is small.

Concurrently, the other challenge for TasWater, government and multiple stakeholders is to ensure good drinking water catchment management so source waters do not continue to degrade in quality. Poor or lack of drinking water catchment management will incur increasing costs to the public as upgrades and additions to water treatment infrastructure will be required to manage the declining quality of the source water.

3.4. Microbiological Sampling Compliance

The degree of confidence that TasWater has met microbiological compliance criteria is solely dependent on the required number of samples being collected. Table 2 indicates that of the 88 drinking water supplies, all but one system was adequately sampled in terms of full compliance with the microbiological sampling frequency recommended by the ADWG and the *Tasmanian Guidelines*.

It is noted that the systems operating on a PBWA (19 in total) are only required to undertake microbiological monitoring once a month as agreed to by the Director.

Ninety nine per cent of drinking water supply systems were adequately monitored for bacterial indicators. This level of monitoring compliance is comparable with the previous reporting period (100 per cent) and 2012-13 (99 per cent) and an improvement from 2011-12 (76 per cent) which demonstrates TasWater's commitment to continuous improvement in implementing their sampling programs and legislative requirements.

- **99% of all reticulated drinking water supply systems were adequately monitored to determine microbiological compliance**

	Number of drinking water supply systems	
	Adequate sampling	Not compliant with sampling requirement
Tasmania (%)	87 (99%)	1 (1%)

Table 2: The number of drinking water supply systems managed by TasWater which were compliant with required microbiological sampling requirements

The Gormanston water supply which operates on a PBWA did not meet the requirement to take 12 *E. coli* samples in the year. Only five samples were taken, with TasWater citing that the operator was not aware of the sampling frequency requirement. Actions to address this non-compliance have been implemented by TasWater. Gormanston was reported to service approximately 80 customers

With respect to drinking water supply systems operating with a PBWA, the intent of microbiological sampling is not to determine compliance but rather to use the monitoring results to characterise the water quality. Hence drinking water supply systems with a PBWA need monitoring to detect declining quality in the water being reticulated to the consumer and communicate the increase in public health risk to the community.

For example, if the sampling results reveal higher than normal levels of *E. coli* then such information should prompt the Water Corporation to issue a reminder notice to all consumers to boil their drinking water and avoid ingesting untreated water, as the risk to public health has increased. There is an additional obligation within the *Tasmanian Guidelines* that requires TasWater to advise customers quarterly of water supplies operating under PHWs (PHAs and BWAs), that there are restrictions on the safe use of that water.

3.5. Microbiological Compliance Assessment

The determination of the microbiological compliance of a drinking water supply system is dependent on the collection of sufficient microbiological samples (see section 3.4). Sufficient samples need to be collected to provide statistical confidence in the level of compliance. Where a water supply did not meet its sampling frequency requirements as discussed in Section 3.4, the microbiological compliance of that system is reported as "compliance unknown".

This Section investigates compliance of all 88 water supply systems; which includes those on BWA and PHA. The microbiological compliance criterion which is prescribed in the 2011 ADWG is that no *E. coli* should be detected in any sample of drinking water. As discussed in Section 2.2.2, for compliance reporting purposes DHHS has adopted the provision from the 2004 ADWG that states 98 per cent of drinking water samples collected from the drinking water supply system do not contain any *E. coli*. This criterion recognises no system is fail-proof but the margin of allowable error is very small, thus establishing a high standard for compliance and assurance for the consumer.

Figure 2 shows that for the reporting period (2013–14) the level of known microbiologically compliant systems in Tasmania was 76 per cent. This is a comparable level of compliance to what was achieved in 2012-13 (76 per cent) and an improvement on 2011-12 and 2010-11; which returned 68 per cent and 60 per cent respectively.

The level of microbiologically non-compliant drinking water supply systems has decreased to 23 per cent (same level in 2012-13) compared to 31 per cent and 38 per cent in 2011-12 and 2010-11 respectively. The level of microbiologically "compliance unknown" in drinking water systems was one percent, which is a slight increase on the zero per cent reported in 2012-13.

- **Of the 88 reticulated drinking water supply systems:**
  - **76% of these were compliant with the requirements for microbiological assessment. This was the same level of compliance achieved in 2012-13**
  - **23% of these were non-compliant with the requirements for microbiological assessment. This was the same level of compliance achieved in 2012-13**
  - **1% of these were "compliance unknown" for microbiological assessment. This was a similar level of compliance achieved in 2012-13.**

A total of 21 drinking water supplies were assessed as being microbiologically non-compliant or "compliance unknown" for 2013-14, as shown in Table 3.

System	Status	No. Samples Taken	Non-compliances	Microbiological Compliance
Branxholm	PBWA	16	13	19%
Colebrook	Potable	53	2	96%
Cornwall	PBWA	14	5	64%
Derby	PBWA	14	7	50%
Fingal	PBWA	14	10	29%
Gladstone	PBWA	14	6	57%

System	Status	No. Samples Taken	Non-compliances	Microbiological Compliance
Gormanston	PBWA	5	0	Unknown
Gretna	PBWA	12	12	0%
Herrick	PBWA	14	5	64%
Jacksons Rd – Franklin	PBWA	12	7	42%
Judbury	PBWA	12	7	42%
Lake Paloona	Potable	168	3	97%
Mathinna	PBWA	14	11	21%
Mole Creek	PBWA	50	45	10%
Mountain River	PBWA	12	11	8%
Pioneer	PBWA	14	2	86%
Ringarooma	PBWA	14	12	14%
Rocky Creek	Potable	52	2	96%
Rossarden	PBWA	14	2	86%
Whitemark	PHA	13	10	23%
Winnaleah	PBWA	22	12	45%

Table 3: Microbiologically non-compliant and compliance unknown drinking water supply systems 2013-14

Based on the population demographic being assessed against the microbiological compliance presented in Figure 2, this equates to one per cent of Tasmania's population that receive a water supply receiving non-compliant or compliance unknown microbiological drinking water from a reticulated water supply system.

- **1% of the Tasmanian population that receive a reticulated drinking water supply experienced non-compliant or compliance unknown microbiological water quality during 2013-14. This is similar to the 1.1% reported in 2012-13 and a decrease on the 2.2% reported during 2012-13**

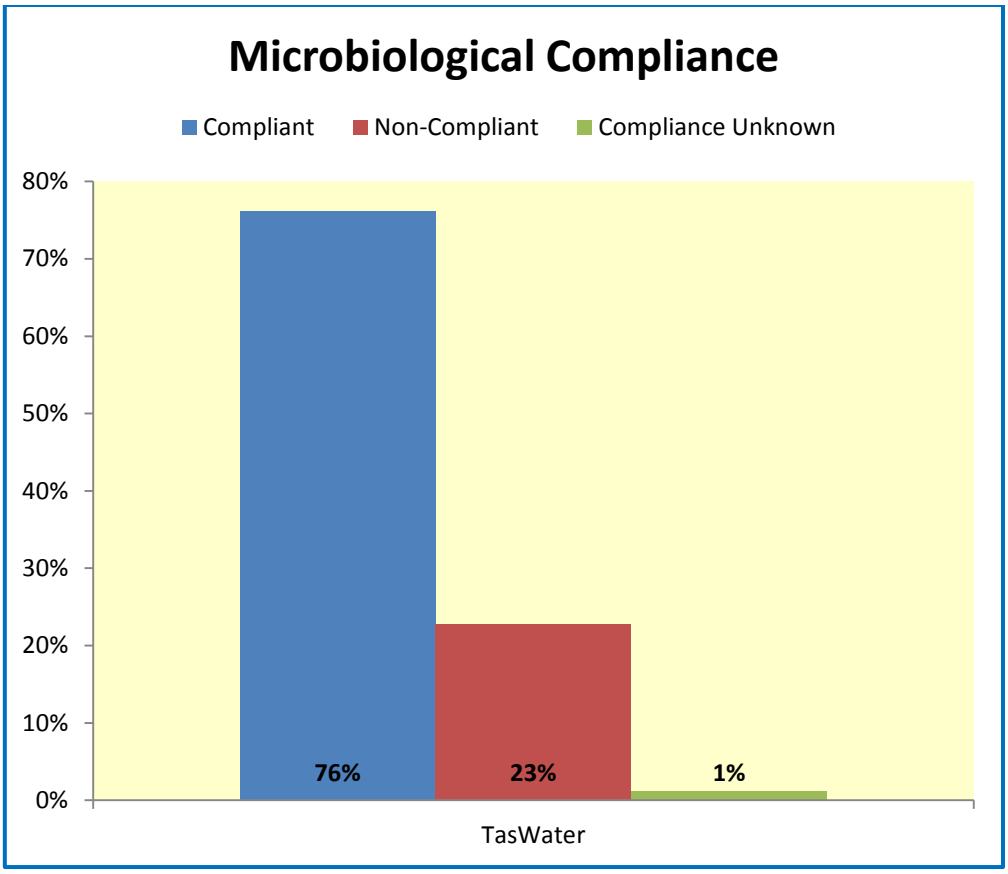

Figure 2: The percentage of microbiological compliance of drinking water supply systems managed by TasWater in Tasmania 2013-14.

An examination of the statewide microbiological compliance since the water and sewerage reforms on 1 July 2009 can be seen in Figure 3. The continued improvement reported since then can be noted by the increasing trend of compliance. The reported figure of 76 per cent compliance for 2013-14 is a significant achievement considering 19 water supplies (or 22 per cent of all supplies) do not have any form of disinfection and the final quality of the water is beyond the control of TasWater.

Until such time that treatment is introduced to these raw water supplies, it is unlikely that this microbiological compliance figure will increase significantly.

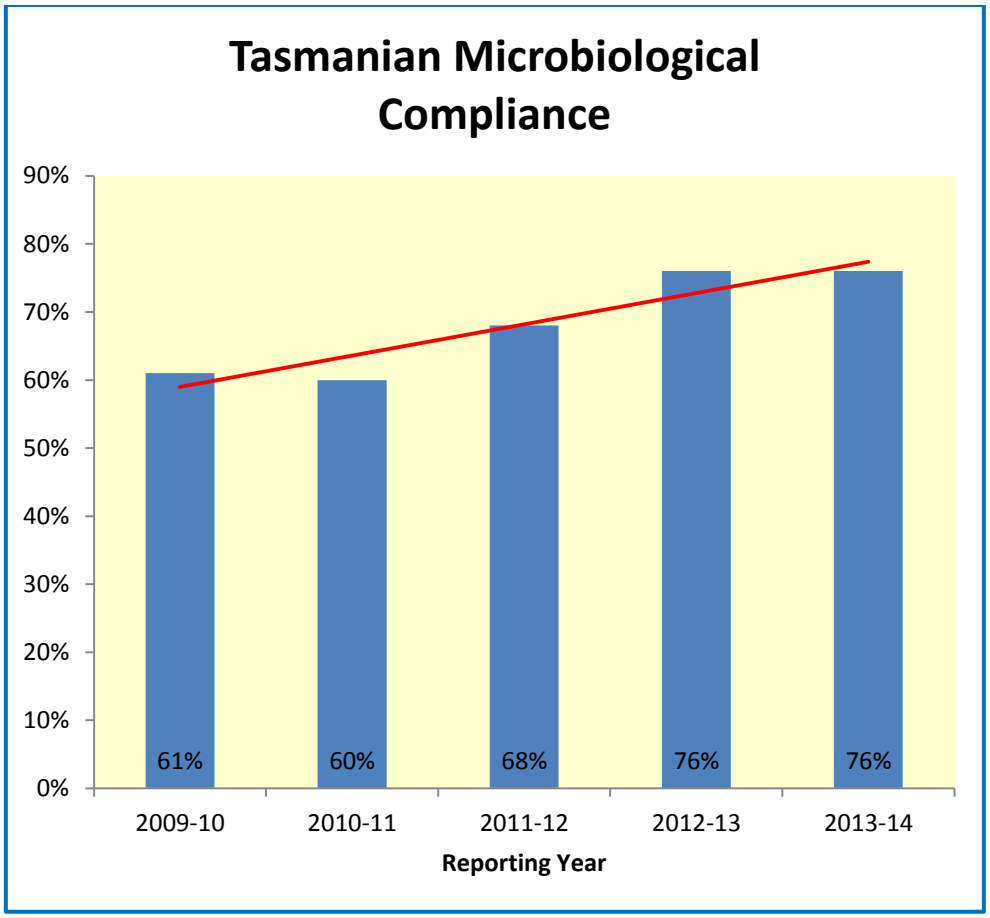

Figure 3: Historical statewide microbiological compliance under the management of TasWater[4].

As was seen in Figure 1, 60 per cent of the 88 water supplies were defined as being fully treated and 18 per cent were defined as having disinfection only. This equates to 69 of the managed water supplies having treatment barriers in place directly related to the disinfection and hence microbiological safety of the water. Examining microbiological compliance of these supplies, we see that 94 per cent of these 69 supplies were compliant for the reporting period.

The exceptions were four small supplies referred to as Colebrook, Jacksons Road Franklin, Lake Paloona and Rocky Creek. This high level of compliance indicates that where treatment barriers are in place, TasWater are running and operating these in such a way that the risks associated with microbiological impacts are significantly reduced.

Microbiological compliance is a measure of the effectiveness in the management of a drinking water supply system and to demonstrate that the system has the capability to address microbiological hazards and risks, from intake to household. When microbiological compliance is not met, TasWater needs to identify the factors contributing to the inability to meet the required standard and instigate short and long term plans to improve the system.

At all times, the drinking water supply 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.

[4] 1 July 2009 to 31 June 2013 – The management and control of drinking water supplies were administered by the Regional Water Corporations (Ben Lomond Water, Cradle Mountain Water and Southern Water)

3.6. Public Health Warnings

3.6.1. Permanent Boil Water Alerts

At the end of the 2013-14 reporting period, 19 drinking water supply systems operated with Permanent Boil Water Alerts (PBWA). This is a decrease from the 22 reported in 2012-13 and 2011-12, and the 24 reported in 2009-10.

The reduction in the total number of PBWAs is attributable to the Lilydale water supply having its PBWA lifted on 5 December 2013 when fully treated water was delivered via a pipeline from the North Esk Water Treatment Plant. The drinking water supplies of Pioneer and Whitemark have been removed from this list owing to them operating on a PHA since 6 November 2012 and 11 May 2012 respectively to mitigate for elevated and persistent levels of lead.

Of the Tasmanians receiving a drinking water supply approximately one per cent of customers are provided with drinking water from the systems operating with a PBWA listed in Table 4.

System	Water Treatment	Population
Branxholm	None	325
Cornwall	None	175
Derby	None	270
Ellendale	None	190
Fingal	None	540
Franklin (Jackson Rd)	Chlorination only	45
Gladstone	None	180
Gormanston	None	80
Gretna	None	130
Herrick	None	20
Judbury	None	65
Lady Barron	None	320
Legerwood	None	150
Mathinna	None	275
Mole Creek	None	525
Mountain River	None	110
Ringarooma	None	460
Rossarden	None	275
Winnaleah	None	230

Table 4: Tasmanian drinking water supply systems operating with a PBWA in 2013-14.

- **A total of 19 reticulated drinking water supplies operated under a Permanent Boil Water Alert during 2013-14 which is a decrease on the 22 reported in 2012-13, 2011-12 and 2010-11 and represents 1% of the Tasmanian population receiving a reticulated drinking water supply**

Examination of the historical trends associated with the number of drinking water supplies since the water and sewerage reform shows an overall reduction in numbers evidenced by the ongoing commitment of TasWater to address the issues associated with these water supplies. This can be seen in Figure 4.

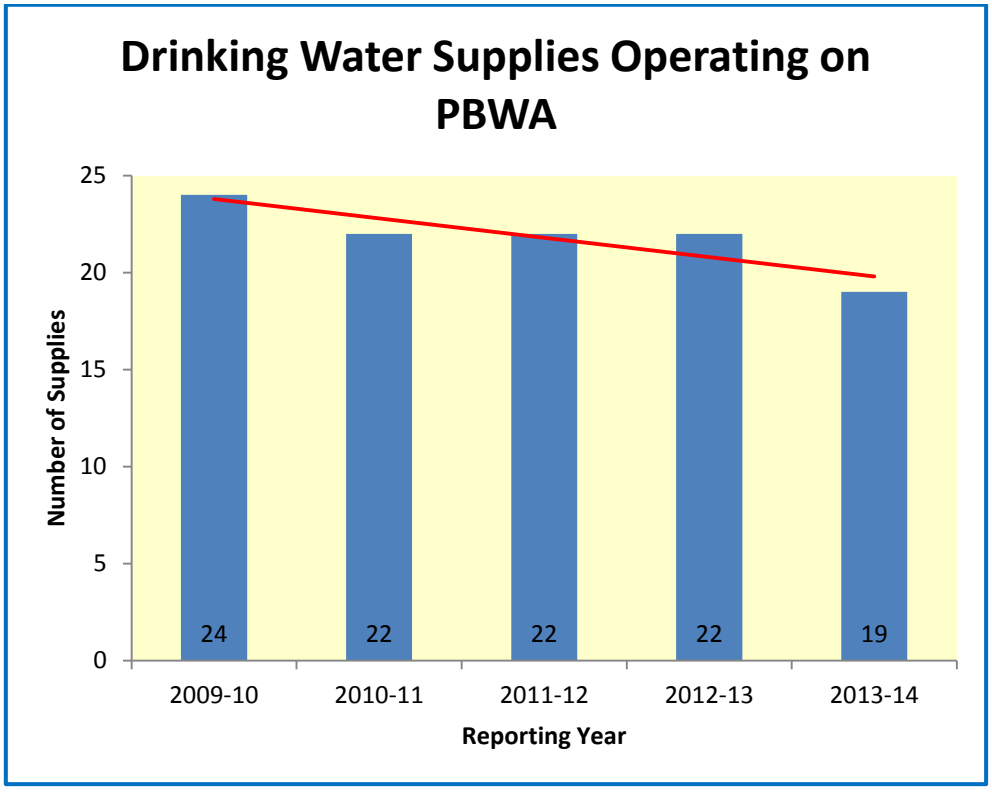

Figure 4: Historical number of drinking water supplies operating on PBWA 2009-10 to 2013-14.

3.6.2. Temporary Boil Water Alerts

At the end of 2013-14 a total of four drinking water supply systems were operating on Temporary Boil Water Alerts (TBWA) and an additional three drinking water supplies operated with one or more TBWAs at some stage during the reporting period. This figure of seven drinking water supplies is a slight increase on the six reported during 2012-13, and a significant decrease from the 13 in 2011-12 and 2010-11 and 16 in 2009-10. The details of these alerts, including the timeframe under which they operated, can be seen in Table 5.

- **Seven drinking water supplies operated under a Temporary Boil Water Alert during 2013-14, which is a slight increase on number that operated during 2012-13 and represents 1.7% of the Tasmanian population receiving a reticulated drinking water supply.**

System	Treatment	Population	Date On	Date Off
Conara	Chlorination Only	105	22/1/11	Ongoing
Scamander	Chlorination Only	1295	13/8/09	Ongoing
Tunbridge	Chlorination only	205	25/11/09	Ongoing
Wayatinah	Chlorination only	165	8/5/12	Ongoing
Cygnet – Nichols Rivulet	Chlorination only	35	22/7/13	28/7/13
Cygnet – Nichols Rivulet	Chlorination only	35	12/5/14	Ongoing
Deep Creek	Full treatment	4955	15/12/13	20/12/13
Lake Paloona	Chlorination only	800	4/5/14	12/5/14

Table 5: Tasmanian drinking water supply systems operating with a TBWA in 2013-14.

During 2012-13 the Avoca drinking water supply was on a TBWA until 8 November 2013 when the PHW status was updated to that of a PHA as a result of elevated and persistent levels of lead and cadmium in the water. For the 2013-14 reporting period, Avoca has been removed from the number of supplies operating on TBWAs and added to the list of drinking water supplies operating on PHAs.

These alerts were undertaken as a precautionary measure by TasWater in response to adverse water quality conditions. Chlorination only systems can be ineffective when the turbidity of the water gets too high; which is often the case after heavy rainfall events. Full treatment system alerts are less common and are often related to breaks in the disinfection systems or contamination easily corrected through maintenance.

A water supply is usually placed on a TBWA after successive non-compliances of microbiological results, which indicate a persistent source of contamination. TBWA can be removed after sufficient data is acquired to prove microbiological compliance and that the threat to public health has been eliminated.

3.6.3 Public Health Alerts

At the end 2013-14 a total of three supplies operated with a Public Health Alerts (PHA) being issued across the supply for the entire reporting period. The affected supplies can be seen in Table 6. A PHA is akin to a "Do Not Consume" Notice whereby customers are advised not to consume the water.

System	Contaminant	Population	Date On	Date Off
Avoca	Cadmium and Lead	250	8/11/12	Ongoing
Pioneer	Lead	130	6/11/12	Ongoing
Whitemark	Lead	400	11/5/12	Ongoing

Table 6: Tasmanian Drinking Water Systems operating on a Public Health Alert in 2013-14.

- **Three reticulated drinking water supplies operated under a Public Health Alert during 2012-13 which is a decrease on the five reported for 2012-13 and represents 0.2% of the Tasmanian population receiving a reticulated drinking water supply.**

Whitemark on Flinders Island has had a PHA has been in place since May 2012 and was still in place at the end of this reporting period. It should be noted that the issuing of the PHA arose from additional operational sampling that identified elevated lead levels over an extended period of time. This required the PHA to be put in place to protect the public health in Whitemark. TasWater continues to investigate possible sources of the lead contamination and remains in frequent contact with the DHHS on managing notifications to the customers.

Avoca was operating on a TBWA until November 2012 when elevated and persistent levels of lead and cadmium were detected through compliance sampling. This required placing this supply on a PHA. TasWater continues to investigate options for upgrading this supply with the aim of supplying compliant water.

Pioneer was operating on a PBWA until November 2011 when elevated and persistent levels of lead were detected through compliance sampling. This necessitated placing this supply on a PHA. TasWater continues to investigate options for the replacement of this water supply with individual rainwater tanks for each consumer.

In cases where a water supply operates on a PHA, there is a requirement for TasWater to provide an alternative source of water for the residents to access and use for their drinking, food preparation and teeth brushing needs. This usually takes the form of a communal rainwater tank in town that contains treated water transported in from the nearest fully treated supply.

TasWater is responsible for monitoring this water ensuring that it will not pose any risks to the population and also refilling it when levels become low. If members of the community have trouble accessing the water, TasWater assists in delivering water in vessels to these households. In all instances of PHA during this reporting period, TasWater met and exceeded these requirements.

3.7. Fluoridation

DHHS has previously issued the *Tasmanian Code of Practice for the Fluoridation of Public Water Supplies* 2007-2010, which was developed to set a standard for fluoridation operation and service delivery. A review of the *Code of Practice* commenced in 2013 and will be completed by 2014-15. Although it is not required by legislation, the *Code of Practice* is consistent with the requirements of the *Fluoridation Act 1968* and *Fluoridation (Interim) Regulations 2009*. The aim of the *Code of Practice* is to ensure that the addition of fluoride to public water supplies in Tasmania is carried out in a safe, effective and consistent manner.

Natural fluoride concentrations depend on the type of soil and rock through which water drains and typically range from <0.1 to 0.5 mg/L (<100 to 500 µg/L). In fluoridated supplies, the Tasmanian target fluoride concentration is 1 mg/L with consideration given to the ADWG health based guideline value, which is set at 1.5 mg/L (1500 µg/L).

Fluoride 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. Many health authorities around the world recommend fluoridation of public water supplies as an important public health measure. DHHS has recently supported a recommendation from the Water Research Australia to review the 2007 NHMRC Fluoridation efficacy statement.

Concentrations of fluoride above 1.5 mg/L may disturb tooth mineralisation in children up to about six to eight years; leading to dental fluorosis - a mottling of the teeth which can occasionally occur to an unsightly degree. Skeletal fluorosis generally only occurs after prolonged exposure (several years) to much higher levels of fluoride (> 3 mg/L), particularly with high water consumption.

Skeletal fluorosis is characterised by brittle bones but is reversible if the exposure is removed the fluoride level in bones gradually declines. The ADWG health based guideline value has been set to protect children from the risk of dental fluorosis.

Forty-seven water supplies across Tasmania had fluoridation systems operating during the reporting period, or about 53 per cent of all water supplies. A detailed breakdown of the population receiving fluoridated water can be seen in Table 7. There are only 39 operational fluoridation plants across the 88 water supplies with some of these fluoridation systems servicing more than one water supply. Of the Tasmanians provided with a water supply, about 96 per cent of these people receive fluoridated water.

- **96% of Tasmanians receiving a reticulated drinking water supply receive fluoridated water**

	Tasmania
No. Supplies Fluoridated	**47**
Population receiving fluoridated water supply	**431,130**
Population receiving water supply	**447,330**
% Population receiving fluoridated water supply	**96.4**

Table 7: Population receiving a reticulated drinking water supply that is fluoridated.

On 30 July 2013, the Distillery Creek fluoridation station (servicing about 36 385 people across the townships of East Launceston, Invermay, Kings Meadows, Launceston, Mowbray, South Launceston, Summerhill and West Launceston) temporarily recorded a fluoride concentration of 1.61mg/L compared with the ADWG health limit of 1.5mg/L.

This was as a result of too much fluoridating agent being added to the water supply and this temporary elevated level of fluoride returned to below the health based guideline value once corrective action was undertaken by TasWater. In this case fluoride levels were exceeded for less than 24 hours.

The north-west operating region of TasWater has worked through a process of upgrading and re-commissioning their fluoridation stations that were shut down in December 2012 owing to OH&S, environmental and public health risks. Since this time TasWater have invested heavily in addressing these risks and reported that 12 of their 13 stations servicing this region were back on line at the end of this reporting period. The exception was the Howard Street fluoridation station servicing the Dalmeny Estate area of the Rosebery drinking water supply system.

The *Tasmanian Fluoridation Code of Practice* and the *Fluoridation (Interim) Regulations* specify that compliance of fluoridation stations are measured against the requirement to have greater than 90 per cent of all routine fluoride samples fall within the fluoride concentration operating range of 0.8-1.2mg/L. Based on this requirement, TasWater were compliant with 22 of the 39 fluoridation stations. There were 15 non-compliant fluoridation stations and two that were not operational during the 2013-14 period and could therefore not be assessed for compliance. A summary of this can be seen in Table 8 with specific details on the non-compliant systems in Table 9.

Another measure of operational performance is the non-regulatory metric that examines the average fluoride concentration taken over all water samples. This gives an indication of the population's exposure to fluoride through the public drinking water supplies. The regulatory measure discussed above is designed around the performance of the fluoridation station whereas the non-regulatory measure examines the public health benefits of fluoride exposure. TasWater were compliant with 34 of the 39 fluoridation stations. There were three non-compliant fluoridation stations and two that were not operational during the 2013-14 period and therefore could not be assessed for compliance. A summary of this data can be found in Table 8 with detailed reporting on non-compliant stations in Table 10.

Metric	Compliant	Non-Compliant	Non-operational
90% of all [F] samples fall within the 0.8-1.2 mg/L range	22	15	2
Average [F] of all samples fall within the 0.8-1.2 mg/L range	34	3	2

Table 8: Compliance assessment of the operation of fluoridation stations 2013-14

Fluoridation Station	% of all [F] samples falling within the 0.8-1.2 mg/L range
Cam River	88%
Campbell Town and Ross	89.4%
Cygnet – Nichols Rivulet	84.6%
Deloraine	89.7%
Greater Hobart – Fern Tree	69.7%
Greater Hobart – Merton	81%
Greater Hobart – National Park	78.5%
Oatlands	83.4%
Pet River	88.4%
Queenstown	71.9%
Rocky Creek	80.3%
Rosebery – Howard Street (Dalmeney Estate)	Offline
Rosebery – Stirling Valley	53.1%
St Marys	52.2%
Strahan	43.8%
Westbury	Offline
Zeehan	89.7%

Table 9: Fluoridation stations not meeting the legislative requirement of having 90 per cent of all fluoride samples falling within the 0.8-1.2 mg/L range.

Fluoridation Station	Average [F] (mg/L)
Rosebery – Howard Street	Offline
Rosebery – Stirling Valley	0.78
St Marys	0.73
Strahan	0.70
Westbury	Offline

Table 10: Fluoridation stations not meeting the non-regulatory measure of the average fluoride concentration falling within the 0.8-1.2 mg/L range.

3.8. Drinking Water Quality Management Plans

The requirement for water suppliers to develop and implement Drinking Water Quality Management Plans (DWQMPs) for their drinking water systems was established in the *Tasmanian Guidelines (2005)* and follows the national water quality risk management approach prescribed in the 2011 ADWG.

DWQMPs are needed to outline the identified public health risks of each drinking water supply system and the Water Corporation's corresponding systematic and preventative measures to minimise and manage those risks. TasWater are currently in the process of updating their DWQMP to reflect organisational changes and responsibilities. TasWater have indicated that the Draft DWQMP will be submitted to the Director in December 2014 and finalised in February 2015. The DWQMP will be subject to an external audit to ensure it meets the regulatory and legislative requirements.

3.8.1. Non-microbiological monitoring and compliance

The primary focus of this report has been on the microbiological quality of drinking water as this is the most important public health risk in relation to water quality in Tasmania. However, during the reporting period TasWater conducted monitoring programs for non-microbiological (physical and chemical) parameters as part of their implementation of the DWQMP for each system. The intent of the monitoring program was for TasWater to gain a fuller understanding of the risks posed to water quality within each drinking water supply system they managed.

Through the process of a risk assessment undertaken in the development of DWQMPs, TasWater identify target parameters that are reasonably expected to be detected within the catchment and water treatment processes. These parameters are subsequently included in monitoring programs. Non-microbiological parameters that have corresponding health related guideline values in the ADWG are compared to these health values to determine if any risks are present to public health. The process of conducting risk assessments to design a non-microbiological monitoring program results in different monitoring schedules and frequencies for each of the drinking water supplies. The ADWG does not specify the frequency or parameters that need to be sampled within any given drinking water supply.

TasWater satisfied the non-microbiological monitoring requirements outlined in the ADWG by having a risk based sampling program implemented for each drinking water supply system. TasWater also satisfied the implementation of each of these monitoring programs by taking the required number of samples identified in the respective sampling programs. This will enable them to undertake a more risk-based approach to water quality management in the future through a process of continuous improvement. A summary of the monitoring requirements for non-microbiological water quality can be seen in Table 11.

Criteria	Number	% Compliance
Compliant with the sampling requirements	88	100%
Non-compliant with the sampling requirements	0	0%
Compliant drinking water systems	74	84%
Non-compliant drinking water systems	14	16%

Table 11: Summary of compliance of non-microbiological monitoring.

Fourteen of the drinking water supply systems reported non-compliances for non-microbiological parameters in samples obtained from the reticulation network. Each of these non-compliant supplies as assessed against the ADWG health related limits are shown in Table 12. None of the non-compliances resulted in the detection of elevated and persistent levels of contaminants requiring the issuing of a PHA.

The Avoca and Pioneer drinking water supplies were operating on PHAs prior to these detections as discussed in Section 0.

Based on the population serviced by these water supplies, it is estimated that 9.3 per cent of the population receiving a reticulated supply temporarily received water not fully compliant with non-microbiological standards during the reporting period.

System	Parameter	Ave[5] Level (ugL^{-1})	ADWG limit (ugL^{-1})[6]	# Non Compliances	Min[7] Level (ugL^{-1})	Max[8] Level (ugL^{-1})	# Samples Taken
Avoca	Cadmium	2.2	2	2	2.1	2.2	10
Colebrook	Trichloroacetic Acid	199	100	19	110	340	28
	Dichloroacetic Acid	133	100	4	100	170	28
	Total THMs	310	250	2	290	330	3
Cornwall	Lead	74	10	2	64.4	83.9	5
Currie	Trichloroacetic Acid	163	100	4	130	200	13
	Dichloroacetic Acid	115	100	2	110	120	13
Distillery Creek	Manganese	633	500	1	-	-	4
Fingal	Lead	50	10	1	-	-	5
Geeveston-Kermandie	Trichloroacetic Acid	170	100	1	-	-	4
Hamilton	Trichloroacetic Acid	163	100	4	130	200	13
	Dichloroacetic Acid	115	100	2	110	120	13
Ouse	Trichloroacetic Acid	153	100	6	130	190	12
	Dichloroacetic Acid	120	100	1	-	-	12
Pioneer	Lead	12	10	1	-	-	4
Ringarooma	Lead	14	10	1	-	-	4
Rosebery	Lead	27	10	15	10	182	334
	Trichloroacetic Acid	105	100	2	100	110	58
	Dichloroacetic Acid	150	100	4	120	180	58
Tunbridge	Total THMs	260	250	1	-	-	4

[5] Average concentration of reported non-compliances

[6] Health based guideline value as defined by the ADWG

[7] Minimum concentration of reported non-compliances

[8] Maximum concentration of reported non-compliances

System	Parameter	Ave[5] Level (ugL^{-1})	ADWG limit (ugL^{-1})[6]	# Non Compliances	Min[7] Level (ugL^{-1})	Max[8] Level (ugL^{-1})	# Samples Taken
Wayatinah	Trichloroacetic Acid	110	100	1	-	-	12

Table 12: Non-compliant non-microbiological parameter results obtained during 2013-14.

- **9.3% of the Tasmanian population receiving a reticulated drinking water supply experienced water quality that was non-compliant in at least one non-microbiological parameter at some stage during 2013-14**

Table 11 showed that the level of compliance in drinking water systems for non-microbiological performance was 84 per cent for 2013-14. An examination of the statewide non-microbiological compliance since the water and sewerage reforms on 1 July 2009 can be seen in Figure 5. Historically the focus of this annual report has been on the microbiological water quality compliance, with recent versions broadening its scope to also include the non-microbiological water quality compliance. For this reason detailed data does not exist to present a historical comparison dating back to the water and sewerage reforms and the advent of the Regional Water Corporations in 2009. The statewide presentation of data begins in the 2011-12 reporting period when the confidence in the data can be verified.

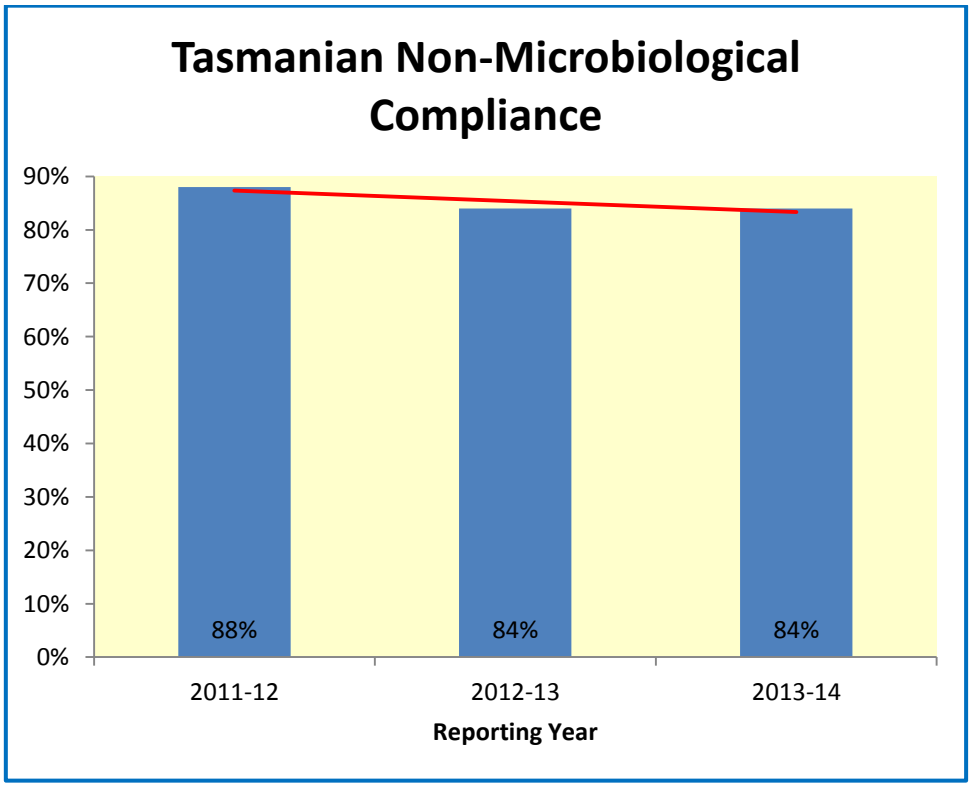

Figure 5: Historical statewide non-microbiological compliance under the management of TasWater[9].

[9] 1 July 2009 to 30 June 2013 – the management and control of drinking water supplies were administered by the Regional Water Corporations (Ben Lomond Water, Cradle Mountain Water and Southern Water).

The level of compliance across drinking water supplies has been of a comparable level since 2011-12; albeit exhibiting a slight decrease in compliance. This level of compliance is a significant achievement for TasWater considering that only 60 per cent of the 88 drinking water supplies have full treatment capabilities designed at removing non-microbiological parameters. This means these are limited to the control that TasWater has over the water quality within some sourced catchments. There has also been a significant improvement by TasWater in implementing non-microbiological monitoring programs across the drinking water supplies which has generated more data that is subject to compliance assessments. Historically not all supplies were being monitored against the requirements of the ADWG and as this is being implemented, it is not surprising that non-compliances are being identified. The efforts of TasWater in developing risk based monitoring programs and implementing them through the framework in their Drinking Water Quality Management Plan is a significant achievement in protecting public health.

Six water supplies detected temporary elevated lead above the health based guideline value. One water supply detected a temporary elevated level of cadmium above the heath based guideline value. One water supply detected temporary elevated fluoride and manganese above the health based guideline value.

For the supplies of Avoca and Pioneer, these towns were placed on PHAs in 2012-13 as discussed in Section 0, with these alerts still being in place at the end of the reporting period. Avoca also returned non-compliant levels of cadmium when assessed against the health related limit.

Ringarooma, Cornwall, Fingal and Rosebery reported non-compliances for lead, but returned below the respective health based limits after intervention and resampling.

In the Distillery Creek supply, subsequent remedial action by the Water Corporation and re-sampling of the drinking water showed all elevated levels had returned below the respective health-based guideline values.

Lead can be present in drinking water as a result of dissolution from natural sources, or from household plumbing systems containing lead. These may include lead in pipes, or in solder used to seal joints. The amount of lead dissolved in water will depend on a number of factors including pH, water hardness and the standing time of the water. Exposure to lead is associated with a wide range of health effects, including effects on neurodevelopment especially during foetal development (in pregnancy) and in early childhood.

Contamination of drinking water by cadmium may occur as a result of impurities in the zinc of galvanised pipes or in solders used in fittings, water heaters, water coolers and taps. Cadmium can also be released to the environment in waste water, through contamination of fertilisers and by metallurgical industries. Cadmium components are commonly used as pigments in plastics, in batteries and in some electrical components. Cadmium accumulates in the kidneys and has a long half-life in humans of 10 to 15 years. Long term exposure to high levels can therefore cause health problems, particularly kidney dysfunction.

Seven water supplies reported disinfection by-products (DBPs) above the health based guideline values. Two supplies detected temporary elevated total trihalomethanes (THM) concentrations above the health based guideline value.

Two water supplies detected temporary elevated trichloroacetic acid concentrations above the health related guideline value. Four water supply detected temporary elevated dichloroacetic and trichloroacetic acid concentrations above the health based guideline value, with two of these also exhibiting total trihalomethanes above the guideline value.

Assessment of the risk associated with these detections indicated the public health threat was low.

- **A total of 14 reticulated drinking water supplies delivered non-compliant non-microbiological water quality at some stage during 2013-14 which is an increase on the 13 supplies that were non-compliant during 2012-13**
- **Becoming aware of non-compliant drinking water betters allows the DHHS to assess any potential impacts to public health and issue Health Warnings as required**

DBPs are the products of reactions between disinfectants (primarily chlorine) and naturally occurring organic matter such as humic and fluvic acids; which result from the decay of vegetable and animal matter. Most disinfectants used to render drinking water safe from pathogenic microorganisms will produce DBPs in the disinfection process.

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 guideline values 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 day[10]; and allocation of 10 per cent of the TDI/ADI to the consumption of drinking water.

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

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

4. Conclusion

In 2013-14, 76 per cent of drinking water supply systems were microbiologically compliant while 23 per cent were not compliant, and predominantly these were very small supply systems. One percent of drinking water supply systems were unable to have their compliance determined owing to the sampling frequency requirements not being met.

Overall, this performance resulted in 99 per cent of the population receiving a water supply being supplied with microbiologically compliant drinking water during the year. It should be noted that the 23 per cent of supplies that were not fully microbiologically compliant includes those 19 supplies that have a PBWA in place.

In this reporting period, there has been ongoing improvement by TasWater since their formation arising from the amalgamation of the previous Regional Water Corporations.

A range of capital projects have commenced or are planned to deliver lasting improvements to the microbiological quality of the supplies. It is anticipated that key projects will address many of the reasons behind non-compliant systems, and will improve the level of compliance within the state.

The number of PBWAs in the state (19) at the end of the reporting period are imposed generally on systems servicing only very low numbers of consumers (1 per cent of the population receiving a water supply). However, DHHS continues to encourage progression towards removal of a PBWA by TasWater particularly in communities that could increase in population and/or are frequented by tourists.

At the end of this reporting period Avoca, Pioneer and Whitemark remain on Public Health Alerts, and as such have not been included in the final number of permanent boil water alert supplies.

Fourteen water supply systems detected non-compliances against the non-microbiological sampling results above the ADWG health-based guideline values. These systems supplied 9.3 per cent of the population receiving a reticulated water supply.

From a public health risk perspective, DHHS has asked TasWater to provide lasting solutions to address compliance issues in systems with significant microbiological risks. However, in the short-term they need to ensure that these systems are still operated effectively by adopting a risk-based approach to the management of their systems.

This report encompasses the fifth reporting year since inception of the water and sewerage reform in July 2009 and the first year of reporting against TasWater since the amalgamation of the Regional Water Corporations on 1 July 2013. As shown in this report, the improvements to water quality are a continuous improvement exercise with TasWater demonstrating due diligence in managing their supplies

5. Water quality summary for each drinking water supply system.

The following section contains the individual performance during 2013-14 of the public drinking water supply systems. (Note: the 2012-13 performance has been given in parenthesis to allow comparative analysis over two consecutive reporting periods).

The column headed "compliance with non-microbiological sampling requirements" involves an assessment of the compliance with the requirements of implementing a non-microbiological monitoring program consistent with the approach outlined in the ADWG. Adoption of this framework yields differing frequencies for different systems when designing a monitoring program. The assessment does not assess the sufficiency of the parameters required to be monitored as a result of the risk management process outlined in the ADWG. If an assessment could not be made of the appropriateness of the frequency; then "unknown" has been reported.

The column headed "compliance with non-microbiological criteria" is an assessment of the compliance of the non-microbiological monitoring program against health related values specified in the ADWG but it does not include an assessment of aesthetic related guideline values. If a supply was assessed as being non-compliant with the non-microbiological monitoring program then the subsequent compliance assessment was undertaken for only those parameters (including frequency) that were presented in the respective Water Corporation's Annual Reports. Those supplies which could not be determined as meeting the sampling requirements were all assessed to be of "unknown" compliance for reporting purposes owing to the lack or absence of data.

The column headed "compliance with microbiological sampling requirements" assessed the design and implementation of the sampling program with the microbiological requirements of the ADWG. The column headed "compliance with microbiological criteria" was an assessment of the results against the microbiological compliance level outlined in the ADWG (ie 98 per cent of samples taken must have no *E. coli* present).

Appendix 1 - TasWater – Water Supply Systems 2013-14 (2012-13 given as a comparison)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11][12][13][14]
Avoca	Chlorination only	250 (245)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)	PHA (PHA)
Bicheno	Full treatment	1630 (1825)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Bothwell	Full treatment	605 (525)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Bracknell	Chlorination only	450 (435)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

[11] As at 30 June 2013

[12] PHA = Public Health Alert (Do Not Consume)

[13] PBWA = Permanent Boil Water Alert

[14] TBWA = Temporary Boil Water Alert

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Branxholm	None	325 (320)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Bridport	Full and fluoridation	2560 (2495)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Bruny Island	UV disinfection	For water carriers (For water carriers)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Burnie – Pet River	Full and fluoridation	20295 (20295)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Cam River	Full and fluoridation	3500 (3500)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Campbell Town/ Ross	Full and Fluoridation	1545 (1505)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Colebrook	Chlorination only	185 (185)	Yes (Yes)	No (No)	Yes (Yes)	No (Yes)	None (None)
Coles Bay	Full treatment	530 (530)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Conara	Chlorination only	105 (100)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	TBWA (TBWA)
Cornwall	None	175 (175)	Yes (Yes)	No (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Currie	Chlorination only	860 (860)	Yes (Yes)	No (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Cygnet - Nichols Rivulet	Chlorination and fluoridation	35 (50)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)	TBWA (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Deep Creek	Full and fluoridation	4955 (4955)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	TBWA (None)
Deloraine	Full and fluoridation	2990 (2955)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Derby	None	270 (270)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Distillery Creek	Full and fluoridation	36685 (36400)	Yes (Yes)	No (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Dover	Full and fluoridation	1315 (1310)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Dowlings Creek	Full treatment	230 (230)	Yes (Yes)	Yes (No)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Ellendale	None	190 (200)	Yes (Yes)	Yes (No)	Yes (Yes)	Yes (Yes)	PBWA (PBWA)
Epping	Chlorination only	60 (50)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Fingal	None	540 (530)	Yes (Yes)	No (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Forth	Full and fluoridation	36680 (35885)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Franklin - Jackson's Road	None	45 (35)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Gawler	Full and fluoridation	14830 (14830)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Geeveston - Donnellys Road	Full and Fluoridation	50 (50)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)	None (None)
Geeveston - Kermandie	Chlorination and fluoridation	50 (50)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Gladstone	None	180 (180)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Gormanston	None	80 (80)	Yes (Yes)	Yes (Unknown)	Unknown (Yes)	Unknown (No)	PBWA (PBWA)
Grassy	Full treatment	345 (345)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart - Brighton	Bryn Estyn Treatment Plant – Full and Fluoridation	16540 (16540)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Greater Hobart - Clarence	Bryn Estyn Treatment Plant – Full and fluoridation	46080 (46080)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart – Coal Valley	Bryn Estyn Treatment Plant – Full and fluoridation	395 (395)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart - Glenorchy	Bryn Estyn Treatment Plant – Full and fluoridation OR Chlorination and fluoridation	44630 (44630)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart - Hobart	Bryn Estyn Treatment Plant – Full and fluoridation OR Chlorination and fluoridation	44365 (44365)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart - Kingborough	Bryn Estyn Treatment Plant - Full and Fluoridation OR Chlorination and fluoridation	26860 (26860)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart – National Park	Chlorination and fluoridation	270 (270)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Greater Hobart – New Norfolk	Bryn Estyn Treatment Plant - Full and fluoridation	7140 (7140)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart - Sorell	Bryn Estyn Treatment Plant – Full and fluoridation	6230 (6230)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Greater Hobart – Southern Midlands	Bryn Estyn Treatment Plant – Full and fluoridation	340 (340)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Gretna	None	130 (115)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Hamilton	Chlorination only	230 (230)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)	None (None)
Herrick	None	20 (15)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Huon Valley - Cygnet	Full and Fluoridation	1585 (1585)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Huon Valley - Franklin	Full and fluoridation	2155 (2155)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Huon Valley - Geeveston	Full and fluoridation	1015 (1010)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Huon Valley Huonville	Full and fluoridation	555 (555)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Judbury	None	65 (65)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Lady Barron	None	320 (310)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	PBWA (PBWA)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Lake Barrington	Full and fluoridation	23405 (1965)	Yes (Yes)	Yes (No)	Yes (Yes)	Yes (Yes)	None (None)
Lake Paloona	Chlorination only	800 (800)	Yes (No)	Yes (Unknown)	Yes (Yes)	No (Yes)	None (None)
Legerwood	None	150 (140)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	PBWA (PBWA)
Leven River	Full and fluoridation	4760 (4545)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Longford/ Perth/ Evandale/Cressy	Full and fluoridation	9555 (9395)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Mathinna	None	275 (280)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Maydena	Chlorination only	335 (365)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Mole Creek	None	525 (505)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Mountain River	None	110 (110)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
North Esk	Full and fluoridation	38160 (37625)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Oatlands	Full and fluoridation	865 (865)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Orford	Full and fluoridation	855 (850)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Ouse	Chlorination only	225 (225)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)	None (None)
Pioneer	None	130 (130)	Yes (Yes)	No (No)	Yes (Yes)	No (No)	PHA (PHA)
Queenstown	Full and fluoridation	3185 (2905)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Ringarooma	None	460 (450)	Yes (Yes)	No (No)	Yes (Yes)	No (No)	PBWA (PBWA)
Rocky Creek	Chlorination and fluoridation	1035 (1035)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (Yes)	None (None)
Rosebery	Full and fluoridation	1530 (525)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)	None (PHA)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Rossarden	None	275 (270)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Scamander	Full treatment	1295 (1290)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	TBWA (TBWA)
Scottsdale	Full and fluoridation	3035 (3030)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
South Esk – Mt Leslie	Full and fluoridation	12300 (11610)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
St Helens	Full and fluoridation	4160 (4200)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
St Marys	Full and fluoridation	785 (800)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Strahan	Full and fluoridation	1095 (1095)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Swansea	Full and fluoridation	1420 (1415)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Triabunna	Full and fluoridation	1420 (1430)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Tullah	Full treatment	370 (370)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Tunbridge	Chlorination only	205 (205)	Yes (Yes)	No (Yes)	Yes (Yes)	yes (No)	TBWA (TBWA)
Waratah	Full and fluoridation	260 (260)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Name of water supply system	Water Treatment	Approximate population serviced by water supply system	Compliance with non-microbiological sampling requirements	Compliance with non-microbiological criteria	Compliance with microbiological sampling requirements	Compliance with microbiological criteria	Public Health Warning[11121314]
Wayatinah	Filtration and chlorination	165 (165)	Yes (Yes)	No (No)	Yes (Yes)	Yes (No)	TBWA (TBWA)
West Tamar – Reatta Road	Full and fluoridation	24610 (24610)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Westbury/Hagley/Exton	Full and fluoridation	2400 (2085)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)
Whitemark	None	400 (380)	Yes (Yes)	Yes (No)	Yes (Yes)	No (No)	PHA (PHA)
Winnaleah	None	230 (220)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)	PBWA (PBWA)
Zeehan	Full and fluoridation	1005 (1005)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)	None (None)

Table 13: Assessment of compliance of TasWater Drinking Water Supplies for 2013-14 (with comparison against 2012-13)


Tasmanian
Government