Dep Health and Human Services
PUBI RONMENTAL HEALTH SERVICE
Tasmania
File No.: HO7966

Annual Report - Drinking Water Quality of Public Water Supplies in Tasmania 1 July 2011 - 30 June 2012

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1. Introduction

This Drinking Water Quality Report for 2011-2012 is part of the overall commitment by the Director of Public Health and the Department of Health and Human Services' Public & Environmental Health Service to protect public health. This protection is achieved through various mechanisms, namely: establishing legislation that promotes best practice in drinking water quality management, regulating the implementation of the legislation by industry, providing advice to water corporations who manage public drinking water supply systems, and 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 annual drinking water quality reports by the water corporations. This report by the Director of Public Health consolidates the information furnished by the water corporations from each region in Tasmania to create a state-wide view on drinking water quality in Tasmania as supplied through public drinking water supply systems.

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 to the first guiding principle of the Australian Drinking Water Guidelines 2011, which states "the greatest risks to consumers of drinking water are pathogenic microorganisms".

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; and

Tasmanian Drinking Water Quality Guidelines 2005

The Public and Environmental Health Service (PEHS) within the Department of Health and Human Services ensures water corporations managing public water supply systems protect the public's health while meeting their regulatory obligations stated within the legislation. Additionally, PEHS provides guidance for the water corporations on legislative requirements.

The focus of this report is on the following specific requirements within the legislation:

- Bacteriological compliance
- Non-Bacteriological compliance
- Public Health Warnings; including Boil Water Alerts
- Fluoridation.

2.2. Bacteriological Compliance

2.2.1. Sampling Compliance

Water corporations must collect bacteriological 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 bacteriological samples of drinking water is to verify that 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 prior to delivery to the consumer is not intended to be used as the sole mechanism to operationally manage a drinking water supply system.

With respect to bacteriological 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 1000 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 bacteriological sampling and testing needs to be undertaken for drinking water supply systems that have treatment steps designed to remove pathogens because the sampling and corresponding results demonstrate that 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 deteriorating. In many cases the Director of Public Health only requires one bacteriological sample per month for these water supplies.

2.3.2. Compliance Assessment

Water corporations need to demonstrate that the drinking water supply systems which they manage meet the bacteriological health guideline values in the Australian Drinking Water Guidelines 2011 (ADWG). The criterion is that 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* (or thermotolerant coliforms). DHHS has adopted a 98 per cent measure for E. coli as the compliance parameter to allow for consistency of comparison over the previous year's results. The Tasmanian Drinking Water Guidelines will be updated to reflect this requirement and noted deviation from the 2011 ADWG.

E.coli and thermotolerant coliforms are indicator organisms (i.e. they themselves may not necessarily be harmful) of faecal pollution in the water. These organisms originate from the intestines of many animals and in 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.

2.4. Drinking Water Quality Management Plans

Water corporations must have a Drinking Water Quality Management Plan (DWQMP) containing the information prescribed in the Tasmanian Guidelines for each of the public drinking water supply systems they manage. In addition to bacteriological compliance, the DWQMP contains a testing schedule/program (for non microbiological parameters) which is based on risk management principles. Any chemical 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, this results in many variations of monitoring programs across the State and not all water supplies are subject to the same level of monitoring.

[1] Table 10.1 in the ADWG (2011)

2.5. 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 or temporary. 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" alert; and often correspond to non-compliances against the non-microbiological health related guideline values.

2.5.1. Boil Water Alerts (BWA)

When samples fail (i.e. *E.coli* or thermotolerant coliforms are detected), water corporations 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 can be removed or treated. At other times however, a more wide ranging investigation is required and temporary boil water alerts are issued by the water corporations (in consultation with the office of the Director of Public Health) to protect the public in the meantime. Permanent boil water alerts occur in systems that are not able 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.

2.5.2. Public Health Alerts

When samples fail (i.e. any chemical or physical parameter that has a corresponding ADWG health related guideline value), water corporations must undertake immediate investigative and corrective action to ensure that there is 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, the water corporation is required to issue a PHA to the affected customers and provide them with an alternative source of drinking water. All PHAs can be found on the DHHS website.

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

3.1. Drinking Water Supply Systems in Tasmania

There were 100 public drinking water supply systems in Tasmania including nine bulk water pipeline systems in 2011-12, which represents an increase from the 99 present in 2010-11 and the 98 present in 2009-10.

The net increase of one from the previous year has arisen owing to three systems managed by Southern Water (Dysart, Bagdad and Mangalore) previously not reported by the Department. Also during the same period, the Ben Lomond Water-managed supply of Cressy is now serviced from the Longford Water Treatment Plant whilst the small community of Linda (Cradle Mountain Water) has had its reticulated service replaced by household rainwater tanks.

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

The 100 systems are owned and managed by the regional water corporations - namely Ben Lomond Water, Cradle Mountain Water and Southern Water – which were established as part of the State's water and sewerage reform. Table 1 indicates the number of drinking water supply systems managed by each water corporation. Reporting excludes the nine bulk supply systems as they service multiple supply systems and compliance is best assessed within a reticulation network rather than a bulk supply. Hence all subsequent reporting is based on the 91 water supplies that service reticulation networks.

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 two exceptions to this. One is the Bruny Island (Adventure Bay) public water supply system managed by Southern Water. 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 utilise the water as a drinking supply.

The other exception is Southern Water's bulk water system which supplies the reticulated systems in the Greater Hobart area from four 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 nine pipeline systems as they each contain water unique in quality and properties. The consumers directly connected to these bulk water pipelines are known as "wayside" customers and have agreements with the respective water corporation outlining 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.

3.2. Population

The Australian Bureau of Statistics (ABS) has released Australian Demographic Statistics for 30 June 2012 showing that the estimated population of Tasmania was 512,019[2] people. The ABS has estimated that the occupancy projection rate was on average 2.46[3] people per household for this same period of time. The Water Corporations provide connection (or tenement) data to the DHHS, which are used to estimate the population serviced by reticulated water by normalising them through the occupancy projection rates. Using this methodology it is estimated that approximately 477,700 or 93[4] per cent of people living in Tasmania receive a reticulated water supply. Due to the highly dispersed population, many of the public drinking water supply systems are servicing very small populations.

During the writing of this Report, the DHHS revised 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 Victorian Department of Health and Victorian Water Authorities when estimating populations from connection data. This has resulted in some changes to the data from previous reporting periods; but is believed to be more accurate.

Table 1 shows the number of drinking water systems supplying various population ranges in each region. Of most interest is that 49 per cent of the total numbers of drinking water supply systems (excluding the bulk water pipeline systems) in the State are supplying communities of less than 500 consumers. The majority of these very small systems are within the northern and southern regions, managed by Ben Lomond Water and Southern Water respectively.

Water Corporation	Population range				
	Greater than 5000	5000 – 1000	1000 – 500	Less than 500	Total
Ben Lomond Water	5	7	1	21	34
Cradle Mountain Water	4	6	3	5	18
Southern Water	6	7	7	19	39
TOTAL (%)	**15 (17%)**	**20 (22%)**	**11 (12%)**	**45 (49%)**	**91**

Table 1: Number and percentage of drinking water systems managed by the water corporations supplying each population range (excludes nine bulk water pipeline systems).

Table 2 shows that although there are only relatively few large drinking water supply systems, they are in fact servicing the majority of the population (85%) receiving reticulated water in Tasmania. This is

[2] Obtained from ABS Website Publication 3101.0: Australian Demographic Statistics, June 2012. Released on 18 December 2012.

[3] Obtained from ABS Website Publication 3101.0: Australian Demographic Statistics, June 2012. Released on 18 December 2012.

[4] The published census results (ABS, 2011) indicated that the population of Tasmania was 495,352 as at 9 August 2011. Using this figure it is estimated that 96 per cent of Tasmanians receive a reticulated water supply.

compared to 61 per cent of the systems being small to very small and servicing just four per cent of the population.

Size (based on population serviced)	Percentage of the total number of drinking water supply systems	Percentage of the population receiving reticulated water[5]
Large (greater than 5000)	17%	85%
Medium (5000 – 1000)	22%	11%
Small (<1000)	12%	2%
Very small (less than 500)	49%	2%

Table 2: Percentage of the total number of drinking water supply systems and the total population receiving reticulated water (excludes nine bulk water pipeline systems).

3.3. Water Treatment

A range of water treatment processes are utilised in Tasmania's drinking water supply systems. Figure 1 indicates that only 52 per cent of systems have full treatment[6]; whilst 25 per cent and 23 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 that chlorination can become ineffective if the source water becomes turbid (which commonly occurs during rain events and/or drought conditions).

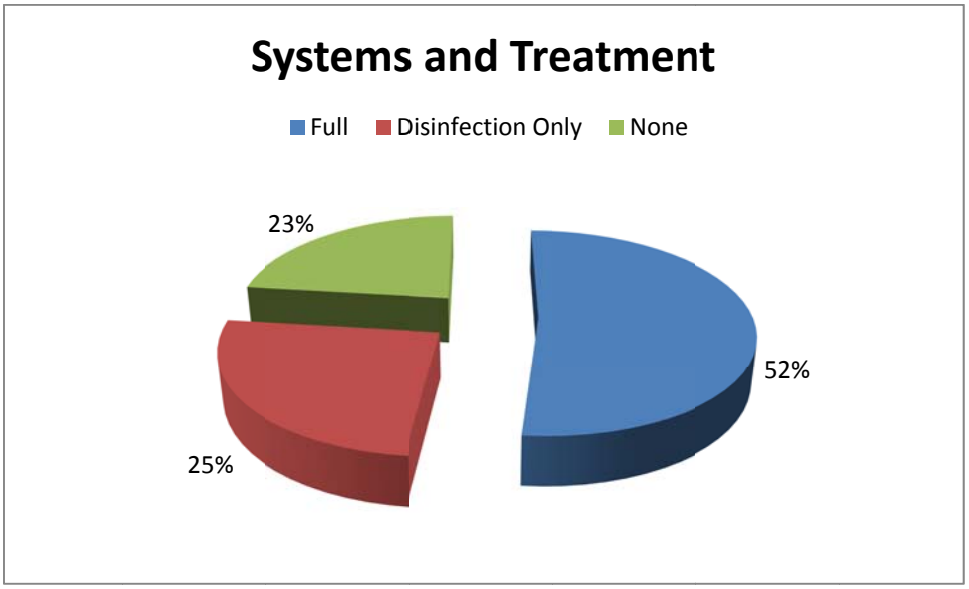

Figure 1: Percentage of drinking water supply systems and their respective water treatment (excludes nine bulk water pipeline systems).

An assessment of the percentage of population receiving the different types of water supplies is presented in Figure 2 indicating that 94 per cent of the population receiving a water supply receive a fully treated drinking water.

[5] This is based on the estimated 477,700 people receiving a reticulated water supply

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

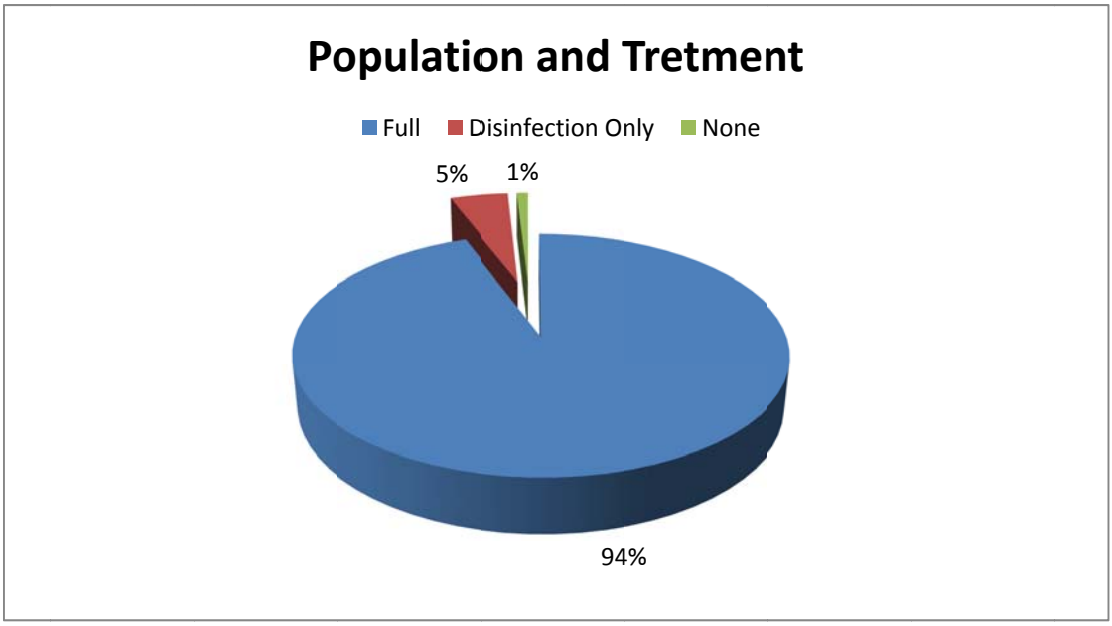

Figure 2: Percentage of population receiving different types of water supplies (excludes nine bulk water supply systems).

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 bacteriological contamination which a single water treatment process - disinfection - would generally suffice to ensure safe drinking water. If, however, 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, chemical and physical) 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 the water corporations 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 the water corporations, 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. Bacteriological Sampling Compliance

The degree of confidence that water corporations have met bacteriological compliance criteria is very dependent on the required number of samples being collected.

Table 3 indicates that of the total 69 drinking water supply systems (those systems operating with a permanent boil water alert in place have been excluded, numbering 22 in total), all but one system was adequately sampled in terms of full compliance with the bacteriological sampling frequency recommended by the ADWG and the *Tasmanian Drinking Water Guidelines*.

Ninety nine per cent of drinking water supply systems were adequately monitored for bacterial indicators. This level of monitoring compliance is a significant improvement from the previous reporting period (76%), which demonstrates the water corporations' commitment to continuous improvement in implementing their sampling programs and legislative requirements.

Water Corporation	Number of drinking water supply systems		
	Adequate sampling	Not compliant with sampling requirement	Unknown Compliance with sampling requirement
Ben Lomond Water	18 (100%)	0	0
Cradle Mountain Water	16 (94%)	0	1 (6%)
Southern Water	34 (100%)	0	0
Tasmania (%)	**68 (99%)**	**0 (0%)**	**1 (1%)**

Table 3: The number of drinking water supply systems managed by the water corporations which were compliant with required bacteriological sampling requirements (excluding those with operating with permanent boil water alerts and excluding the nine bulk water supplies)

With respect to drinking water supply systems operating with permanent boil water alerts, the intent of bacteriological sampling is not to determine compliance but rather to use the monitoring results to optimise the effectiveness of the issuing of the boil water notice. Hence drinking water supply systems with a permanent boil water alert 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 supplier 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.

3.5. Bacteriological Compliance Assessment

The determination of the bacteriological compliance of a drinking water supply system is dependent on the collection of sufficient bacteriological samples (see section above). Sufficient samples need to be collected to provide statistical confidence in the level of compliance. This Section investigates compliance of all 91 water supply systems; including those on permanent boil water alerts. Note that the nine bulk water supplies are excluded.

The bacteriological compliance criterion which is prescribed in the ADWG (2011) is that no E. coli should be detected in any sample of drinking water. As discussed in Section 2.3.2, DHHS have adopted the provision from the ADWG (2004) which states that 98 per cent of drinking water samples collected from the drinking water supply system do not contain any *E.coli* (or thermotolerant coliforms). This criterion recognises that 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 3 shows that for the reporting period (2011–2012) the level of known bacteriologically-compliant systems in Tasmania was 68 per cent. This is an increased level of compliance when compared to what was achieved in the 2010-11 and 2009-2010; which returned 60% and 61% respectively. The level of bacteriologically non-compliant drinking water supply systems has decreased to 31 per cent compared with 38% and 15 per cent in 2010-11 and 2009-2010 respectively. During the 2009-10 reporting period a large number of water supplies (24%) were classified as "compliance unknown" owing to not fulfilling their sampling requirements under the ADWG. During 2010-11 only two of the water supply systems were classified as compliance unknown. During this reporting period, all but one system was able to be classified for its compliance, which equates to one per cent of all supplies.

It is noted that there has been significant improvement in bacteriological compliance achieved by Cradle Mountain Water for this reporting period (94%) when compared to the 89 per cent and 65 per cent achieved during 2010-11 and 2009-10 periods respectively. Over the same time Southern Water has increased their bacteriological compliance from 55 per cent (2009-10) to 64 per cent (2010-11) to 72% noted this year. Ben Lomond Water's bacteriological compliance had decreased from 78 per cent (2009-10) to 37 per cent (2010-11) with a significant increase to 50% noted this year. This decrease is largely attributable to supplies on permanent boil water alerts being included in the reporting for the 2010-11 period. Historically these supplies had been excluded for Ben Lomond Water, but included for the other two Water Corporations. This anomaly was corrected for last year's reporting and has been consistent in its application for this year's reporting.

Despite the increase in bacteriological compliance amongst the drinking water systems, it is critical that the water corporations ensure their systems are adequately sampled, as it allows them to gain better understanding of the level of risk which they need to manage.

Based on the population demographic being assessed against the bacteriological compliance presented in Figure 3, this equates to 2.2 per cent of Tasmania's population that receive a water supply receiving non-compliant drinking water from a water supply system. This is based on an assessment of water supplies that exhibit less than 98% compliance against the ADWG bacteriological limit. This calculation assumes that the systems whereby bacteriological compliance could not be determined were non-compliant for the period. This system (Gormanston) accounted for a population of 65 people and hence their exclusion would result in little overall change to the reported population percentage.

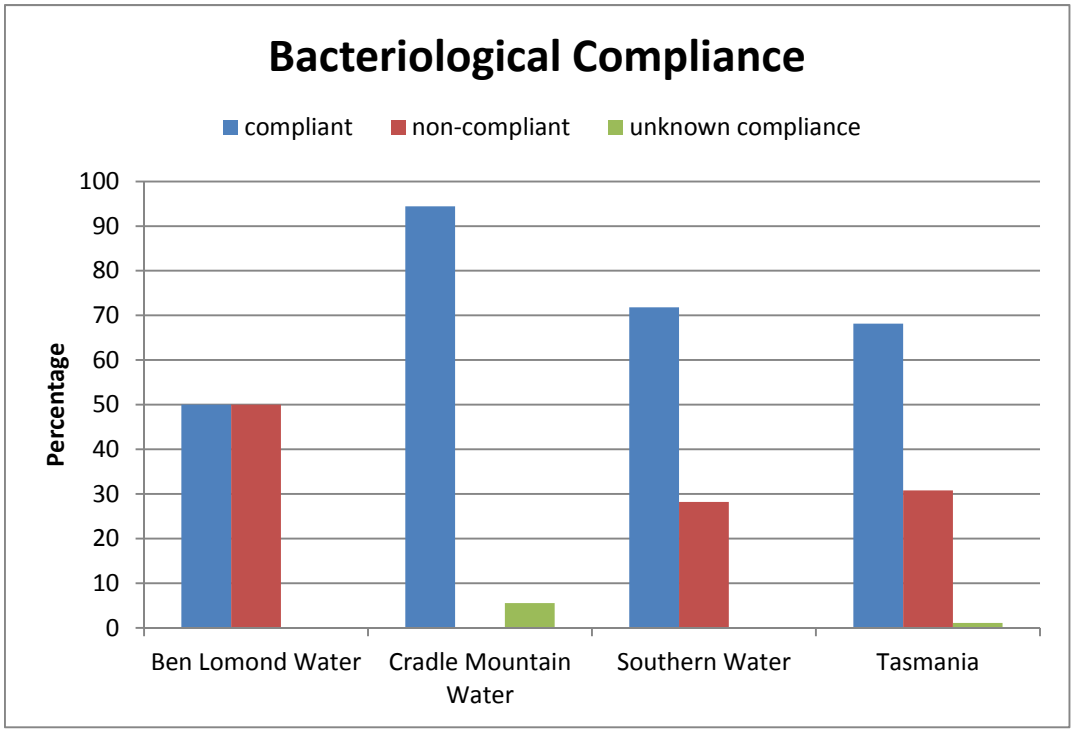

Figure 3: The percentage of bacteriological compliance of drinking water supply systems managed by the three water corporations in Tasmania (excludes nine bulk water pipeline systems) 2011-12.

Bacteriological 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 bacteriological hazards and risks, from intake to household.

When bacteriological compliance is not met, the water corporation 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 temporary boil water notices, dosing of service reservoirs with chlorine or removal of contaminated water.

3.6. Public Health Warnings

3.6.1. Permanent Boil Water Alerts

At the end of the 2011-12 reporting period, a total of 22 drinking water supply systems operated with permanent boil water alerts which are the same number that was reported for 2010-11 and a decrease from the 24 reported during 2009-10.

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

System	Water Supplier	Water treatment	Population
Branxholm	BLW	None	320
Cornwall	BLW	None	115
Derby	BLW	None	260
Ellendale	SW	None	115
Fingal	BLW	None	470
Franklin (Jackson Rd)	SW	Chlorination only	40
Gladstone	BLW	None	175
Gormanston	CMW	None	70
Gretna	SW	None	100
Herrick	BLW	None	50
Judbury	SW	None	190
Legerwood	BLW	None	185
Lady Barron	BLW	None	340
Lilydale	BLW	None	470
Mathinna	BLW	None	185
Mole Creek	BLW	None	250
Mountain River	SW	None	80
Pioneer	BLW	None	160
Ringarooma	BLW	None	370
Rossarden	BLW	None	125
Whitemark	BLW	None	455
Winnaleah	BLW	**None**	225

Table 4: Tasmanian drinking water supply systems operating with a permanent boil water alert in 2011-12.

3.6.2. Temporary Boil Water Alerts

In 2011-12 a total of 13 drinking water supply systems operated with one or more temporary boil water alerts, which is a slight increase from 12 from 2010-11 and an overall decrease from the 16 systems reported in the 2009-10. The details of these alerts including the time frame under which they operated can be seen in Table 5.

System	Supplier	Treatment	Population	Date On	Date Off
Avoca	BLW	Chlorination Only	225	31/3/11	30/8/11
Campbelltown/Ross	BLW	Chlorination Only	1720	23/6/10	Ongoing
Conara	BLW	Chlorination Only	95	22/1/11	Ongoing
Kempton	SW	Full	1060	16/11/11	18/11/11
Scamander	BLW	Chlorination Only	1155	13/8/09	Ongoing
Tunbridge	SW	Chlorination only	150	25/11/09	Ongoing
Colebrook	SW	Chlorination only	115	21/12/11	22/12/11
Geeveston/Kermandie	SW	Chlorination only	1185	1/2/12	3/2/12
Bruny Island	SW	Disinfection only	n/a	24/11/11	29/11/11
Campania	SW	Full	1060	16/11/11	18/11/11
				31/1/12	17/2/12
Wayatinah	SW	Chlorination only	115	31/12/11	3/1/12
				8/5/12	Ongoing
Brighton (Cove Hill)	SW	Full	29940 (part)	3/2/12	5/2/12
Cygnet – Nichols Rivulet	SW	Chlorination only	1520	1/2/12	3/2/12

Table 5: Tasmanian drinking water supply systems operating with a temporary boil water alert in 2011-12.

These alerts were undertaken as a precautionary measure by the Water Corporations 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 which are easily corrected through maintenance. Temporary boil water alerts can be removed after sufficient data is acquired to prove microbiological compliance.

3.6.3. Public Health Alerts

In 2011-12 a total of one supply operated with a PHA being issued across the supply. This was Whitemark on Flinders Island and the PHA has been in place since 11 May 2012 and remained in place until 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 necessitated the need for the PHA to be put in place to protect the public health on Flinders Island. Ben Lomond Water continues to investigate possible sources of the lead contamination and remains in constant contact with DHHS on managing notifications to the customers.

3.7. Fluoridation

The Department of Health and Human Services had issued the *Tasmanian Code of Practice for the Fluoridation of Public Water Supplies* 2007-2010, which was developed to a set a standard for fluoridation operation and service delivery. A review of the Code of Practice commenced in 2011 and will be completed by 2012-13. 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 and effective manner.

A total of 44 water supplies across Tasmania had fluoridation systems operating during the reporting period; which equates to 48 per cent of all water supplies (if the nine bulk pipeline systems are excluded). A detailed breakdown of the population receiving fluoridated water can be seen in Table 6. There are only 39 operational fluoridation systems across the 91 water supplies (excluding the nine bulk water pipeline supplies) with some of these fluoridation systems servicing more than one water supply. Of the Tasmanians provided with a water supply, approximately 97 per cent of these people receive fluoridated water.

Water Corporation	BLW	CMW	SW	Tasmania
No. Supplies Fluoridated	12	12	20	**44**
Population receiving fluoridated water supply	149,875	86,100	226,985	**462,960**
Population receiving water supply	156,175	88,595	232,930	**477,700**
% Population receiving fluoridated water supply	**96.0**	**97.2**	**97.4**	**96.9**

Table 6: Percentage of population receiving a water supply that is fluoridated.

3.8. Drinking Water Quality Management Plans

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

3.8.1. Non-bacteriological 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 the water corporations conducted monitoring programs for physical and chemical parameters as part of their implementation of the Drinking Water Quality Management Plans for each system. The intent of the monitoring program was for the water corporations to gain a fuller understanding of the risks posed to water quality within each drinking water supply system they managed. All water corporations satisfied the chemical and physical monitoring requirements outlined in the ADWG, which will enable them to undertake a more risk-based approach to water quality management in the future.

Eleven of the drinking water supply systems reported non compliances for chemical contaminants and other physical parameters. Five 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. Two water supplies detected temporary elevated fluoride above the health based guideline value. In all but one case subsequent remedial action by the Water Corporations and re-sampling of the drinking water showed that all elevated levels had returned below the respective health based guideline values. The exception was Whitemark; which was placed on a PHA as described in Section 3.6.3.

There were four water supplies that reported disinfection by-products (DBPs) above the health based guideline values. One supply detected temporary elevated total trihalomethanes (THMs) above the health based guideline value. Four water supplies detected temporary elevated trichloroacetic acid levels above the health related guideline value. Two water supplies detected temporary elevated dichloroacetic acid levels above the health based guideline value. Details of all of these non-compliant results can be seen in Table 7. Assessment of the risk associated with these detections indicated the public health threat was low.

System	Supplier	Parameter	Level (ugL^{-1})	ADWG limit (ugL^{-1})[7]	Date
Pioneer	BLW	Lead	13	10	8/2/11
Whitemark	BLW	Lead	12.3	10	28/8/11
			16.7		24/11/11
Scottsdale	BLW	Fluoride	1,730	1,500	9/5/12
Avoca	BLW	Cadmium	3.9	2	8/9/11
		Lead	10.6	10	8/9/11
Fingal	BLW	Lead	18.8	10	16/8/11
Colebrook	SW	Trihalomethanes	280	250	27/9/11
			300		25/10/11
			260		6/12/11
			330		3/1/12
			250		13/3/12
		Trichloroacetic acid	110	100	16/8/11
			140		11/10/11
			100		25/10/11
			130		27/3/12
Ouse	SW	Dichloroacetic acid	222	100	11/7/11
			135		3/10/11
		Trichloroacetic acid	237	100	11/7/11
			110		1/8/11

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

System	Supplier	Parameter	Level (ugL-1)	ADWG limit (ugL-1)[7]	Date
			119		8/8/11
			106		5/9/11
			175		3/10/11
			121		5/12/11
			150		23/4/12
			110		14/5/12
			140		28/5/12
Hamilton	SW	Dichloroacetic acid	126	100	11/7/11
			116		3/10/11
		Trichloroacetic acid	118	100	11/7/11
			126		5/9/11
			181		3/1/11
			130		14/5/12
Wayatinah	SW	Trichloroacetic acid	142	100	3/10/11
			117		5/12/11
			130		26/3/12
			130		14/5/12
Gormanston	CMW	Lead	10.2	10	19/10/11
			12.7		19/10/11
			12.8		15/11/11
			10.3		30/11/11
Zeehan	CMW	Fluoride	1590	1500	11/1/12

Table 7: Non-compliant chemical results obtained during the 2011-12 reporting period (excluding the nine bulk pipeline systems).

DBPs are the products of reactions between disinfectants, particularly chlorine, and naturally occurring organic matter such as humic and fluvic acids; which result from the decay of vegetable and animal matter. Trihalomethanes, dichloroacetic acid and trichloroacetic acid are examples of DBPs produced when using chlorine as a disinfectant. Most disinfectants used to render drinking water safe from pathogenic microorganisms will produce DBPs in the disinfection process. There are many factors that 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. Thus, it is important that disinfection is not compromised in attempting to control DBPs.

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.

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 ug/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. The two water supplies that detected temporary elevated fluoride concentrations were as a result of too much fluoridating agent being added to the water supply. In both instances fluoride levels had returned to below the health based guideline value within 24 hours once the Water Corporations were made aware of the non-compliances.

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 fluoride of public water supplies as an important public health measure. DHHS has recently supported a recommendation from the Water Quality Research Association (WQRA) to review the 2007 National Health and Medical Research Council (NHMRC) Fluoridation efficacy statement.

Concentrations of fluoride above 1.5 mg/L may disturb tooth mineralisation in children up to about 6 to 8 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.

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 2 litres of water per day[8]; and allocation of 10% 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.

Based on the population serviced by these water supplies, it is estimated that 1.2 per cent of the population receiving a reticulated supply temporarily received water that was not compliant with non-bacteriological standards during the reporting period.

[8] 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 2011-2012, 68 per cent of drinking water supply systems were bacteriologically compliant while 31 per cent were not compliant (one per cent were unable to be determined owing to insufficient sampling). This resulted in 2.4 per cent of the population receiving a water supply being supplied with bacteriologically non-compliant drinking water during the year. It should be noted that this group includes those supplies that have a permanent boil water alert in place. In the previous reporting period, 60 per cent of systems were compliant with 38 per cent being non-compliant; however 2 per cent of systems were not sufficiently sampled in that year in order to make a statistical evaluation.

Significant effort has been undertaken by the water corporations during 2011-12 to better understand the level of bacteriological compliance within their systems and to manage the risks associated with non-compliant systems. It is noted that 99 per cent of the water supplies were adequately sampled for bacteriological compliance compared to the 97 per cent reported during the 2010-11 period. A range of capital projects have commenced or are planned to deliver lasting improvements to the bacteriological quality of the supplies. It is anticipated that key projects will address many of the reasons behind currently non-compliant systems, and will improve the level of compliance within the State.

The number of permanent boil water alerts in the State (22) at the end of the reporting period are imposed generally on systems servicing only very low numbers of consumers (one per cent of the population receiving a water supply compared to 1.1% in 2010-11). However DHHS continues to encourage progression towards removal of a permanent boil water alert by a water corporation particularly in communities that could increase in population and/or are frequented by tourists.

As part of the compliance plans, the corporations implemented the Drinking Water Quality Management Plans for their water supplies which included chemical and physical monitoring programs. It is anticipated that the data and information from these programs will greatly increase the knowledge of the systems and thereby assist the water corporations in managing their supply systems.

A total of 11water supply systems detected non-compliance s against the non-bacteriological sampling results above the ADWG health based guideline values; which affected 1.2% of the population receiving a water supply. One of those supplies (Whitemark) was placed on a Public Health Alert owing to persistent elevated lead levels that were deemed to be a risk to public health.

From a public health risk perspective, DHHS has requested that water corporations provide lasting solutions to address compliance issues in systems with significant bacteriological 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. They should monitor their systems to meet compliance requirements and to operate their systems using the best possible risk management practices available.

This report encompasses the third reporting year for the water corporations since inception of the water and sewerage reform in July 2009. As shown in this report, the improvements to water quality are a continuous improvement exercise with the water corporations demonstrating due diligence in managing their supplies. However, the inherent determination, sole focus and expertise within these water corporations are fundamental to addressing the drinking water quality issues within the State and ultimately providing safe drinking water for Tasmanians.

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

The following section contains the individual performance of each water corporation with respect to the public drinking water supply systems which they manage. (*Note: that the 2010-11 performance has been given in parenthesis to allow comparative analysis over two consecutive reporting periods*).

The column headed "sampling program-chemical compliance" involves an assessment of the compliance with the requirements of implementing a chemical 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 "chemical contaminant compliance" is an assessment of the compliance of the 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 chemical 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 bacteriological sampling requirements" assessed the design and implementation of the sampling program with the requirements of the ADWG. The column headed "compliance with bacteriological criteria" was an assessment of the results against the compliance level outlined in the ADWG (i.e. 98% of samples taken must have no E. coli present).

Analysis of the Cradle Mountain Water Annual Report showed that only eight of the water supplies had corresponding data for the chemical monitoring program in an easily identifiable form. The remaining supplies had raw data associated with them, which included an assessment of raw, treated and reticulation water. It was not possible to determine the extent of the monitoring program and subsequent compliance and as such these supplies have been reported as "unknown' when assessed for compliance.

Appendix 1 - Ben Lomond Water

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Avoca	Chlorination only	225 (270)	Yes (Yes)	No (Yes)	Yes (Yes)	No (No)
Bracknell	Chlorination only	430 (490)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)
Branxholm	None	320 (345)	Yes (Yes)	Yes (Yes)	Yes (No)	No (No)
Bridport	Coagulation/ Flocculation, clarification, filtration, chlorination, fluoridation	2585 (2605)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Campbell Town/ Ross	Fluoridation and chlorination only	1720 (1945)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)
Conara	Chlorination only	95 (100)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)
Cornwall	None	115 (120)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Deloraine	Coagulation/ flocculation, dissolved air flotation filtration, chlorination, fluoridation	3040 (3540)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Derby	None	260 (295)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Distillery Creek (Launceston)	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	57320 (37375)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Epping	Chlorination only	40 (70)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Exton	Chlorination only	200 (160)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Fingal	None	470 (590)	Yes (Yes)	No (Yes)	Yes (Yes)	No (No)
Gladstone	None	175 (95)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Herrick	None	50 (50)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Lady Barron	None	340 (285)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Legerwood	None	185 (190)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Lilydale	None	470 (395)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Longford/ Perth/ Evandale/Cressy	Coagulation/ flocculation, dissolved air flotation filtration, pH adjustment, chlorination, fluoridation	8930 (9920)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Mathinna	None	185 (165)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Mole Creek	None	250 (490)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
North Esk - Chimney Saddle (East Tamar/ Launceston/George Town/Hillwood/Low Head)	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	34075 (37000)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Pioneer	None	160 (150)	Yes (Yes)	No (No)	Yes (Yes)	No (No)
Ringarooma	None	370 (400)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Rossarden	None	125 (290)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Scamander	Chlorination only	1155 (1035)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Scottsdale	Coagulation/ Flocculation, clarification, filtration, chlorination, fluoridation	3200 (3090)	Yes (Yes)	No (Yes)	Yes (Yes)	Yes (Yes)
St Helens	Coagulation/flocculation, powdered activated carbon, dissolved air flotation filtration, pH adjustment, chlorination, fluoridation	4920 (3090)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
St Marys	Pre-chlorination, Dynasand filtration, Calgon treatment, pH adjustment (when required), chlorination, fluoridation	985 (850)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
South Esk – Mt Leslie (Launceston/Prospect Vale/ Hadspen/ Carrick)	Coagulation/ flocculation, dissolved air flotation, filtration, pH adjustment, chlorination, fluoridation	10920 (11985)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
West Tamar – Reatta Road (West Tamar)	Coagulation/ flocculation, powdered activated carbon, filtration (with granular activated carbon), pH adjustment, chlorination, fluoridation	20170 (23020)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Westbury/Hagley	Fluoridation and chlorination only	2550 (2380)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Whitemark	None	455 (445)	Yes (Yes)	No (No)	Yes (Yes)	No (No)
Winnaleah	None	225 (240)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (No)

Table 8: Assessment of compliance of Ben Lomond Water Supplies for 2011-12 (with comparison against 2010-11).

Appendix 2 - Cradle Mountain Water

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Barrington (Sheffield/ Railton)	Coagulation/ flocculation, dissolved air flotation filtration, pH adjustment, chlorination, fluoridation	2535 (3095)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Burnie	Manganese removal (if required), coagulation/ flocculation, direct filtration, pH adjustment, chlorination, fluoridation	20295 (21450)	No (Yes)	Unknown (Yes)	Yes (Yes)	Yes (Yes)
Cam River (Somerset/ Wynyard)	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	7135 (7830)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Currie	Chlorination only	935 (1025)	Yes (No)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Deep Creek (Smithton/ Irishtown/ Stanley)	Coagulation/ flocculation, dissolved air flotation filtration, pH adjustment, chlorination, fluoridation	5270 (6000)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Dowlings Creek (Yolla)	Membrane filtration, chlorination	215 (250)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Forth (Devonport/ Forth/ Leith / Latrobe / Port Sorell)	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	26185 (28740)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Gawler (Ulverstone/ Turners Beach)	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	12300 (13000)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Gormanston	None	70 (75)	No (Unknown)	No (Unknown)	No (No)	Unknown (Unknown)
Grassy (King Island)	Powdered activated carbon/ coagulation/ flocculation, filtration, pH adjustment, chlorination, clarification	125 (125)	Yes (No)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Leven (Penguin/ Sulphur Creek/ Heybridge)	Coagulation/ flocculation, dissolved air flotation filtration, pH adjustment, chlorination, fluoridation	4920 (5200)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Paloona (Paloona/ Melrose/ Eugenana)	Chlorination only	850 (850)	No (Unknown)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Queenstown	Coagulation/flocculation, polymerisation, pH adjustment, chlorination, fluoridation, Actiflo	3585 (3645)	Yes (No)	Yes (Yes)	Yes (Yes)	Yes (Yes)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
	® process					
Rosebery (consists of two systems)	1 x Sand filtration, fluoridation and chlorination 1 x fluoridation and chlorination only	1845 (1875)	Yes (No)	Yes (Yes)	Yes (Yes)	Yeas (Yes)
Strahan	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	1155 (1175)	Yes (Unknown)	Yes (Unknown)	Yes (Yes)	Yes (Yes)
Tullah	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination	300 (300)	Yes (No)	Yes (No)	Yes (Yes)	Yes (Yes)
Waratah	Membrane filtration, chlorination and fluoridation	225 (270)	Yes (No)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Zeehan	Coagulation/ flocculation, clarification, filtration, pH adjustment, chlorination, fluoridation	650 (650)	Yes (No)	No (No)	Yes (No)	Yes (Unknown)

Table 9: Assessment of compliance of Cradle Mountain Water Supplies for 2011-12 (with comparison against 2010-11).

Appendix 3 – Southern Water

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Bagdad	Bryn Estyn Treatment Plant	995	Yes	Yes	Yes	Yes
Bicheno	Coagulation/flocculation, dissolved air flotation filtration, chlorination	1400 (1360)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Bothwell	Coagulation/flocculation, sand filtration, chlorination	425 (410)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Brighton	Bryn Estyn Treatment Plant	29940 (12170)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Bruny Island	UV disinfection	For water carriers (For water carriers)	Unknown (No)	Unknown (Unknown)	Yes (Yes)	Yes (Yes)
Campania	Bryn Estyn Treatment Plant	1060 (1250)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Clarence	Bryn Estyn Treatment Plant	44925 (43830)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Colebrook	Chlorination only	115 (135)	Yes (Yes)	No (No)	Yes (Yes)	No (No)
Coles Bay	Dissolved air flotation filtration, chlorination	535 (565)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Cygnet (Agnes Creek)	Coagulation/flocculation, filtration, chlorination	175 (200)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Cygnet (Nichols Rivulet)	Fluoridation, chlorination	1520 (1700)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Dover	Coagulation/flocculation, filtration, chlorination, fluoridation	885 (860)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Ellendale	None	115 (115)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Dysart	Bryn Estyn Treatment Plant	325	Yes	Yes	Yes	Yes
Franklin (Jackson's Road)	None	40 (35)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Geeveston (Donnellys)	Filtration, chlorination, fluoridation	440 (500)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Geeveston (Kermandie)	Chlorination, fluoridation	1185 (1395)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Glenorchy	Bryn Estyn Treatment Plant, National Park dosing station and Merton dosing station	44295 (43215)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Gretna	None	100 (75)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Hamilton	Chlorination only	170 (165)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)
Hobart	Bryn Estyn Treatment Plant, National park dosing station and Ferntree dosing station	48695 (47510)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Huon (Rocky Creek)	Chlorination, fluoridation	1060 (1250)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Huonville	Coagulation/flocculation, clarification, filtration, chlorination, fluoridation	2185 (2575)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Judbury	None	190 (225)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Kempton	Bryn Estyn Treatment Plant	1060 (1250)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Kingborough	Bryn Estyn Treatment Plant and Ferntree dosing station	32290 (38065)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Mangalore	Bryn Estyn Treatment Plant	520	Yes	Yes	Yes	Yes
Maydena	Chlorination only	325 (290)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Mountain River	None	80 (75)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
New Norfolk	Bryn Estyn Treatment Plant and Illabrook dosing station	7985 (94707)	Yes (Yes)	Yes (Yes)	Yes (yes)	Yes (Yes)
Oatlands	Coagulation/ Flocculation, filtration, chlorination, fluoridation	645 (760)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Orford	Coagulation/flocculation, filtration, chlorination, fluoridation	1530 (1615)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)
Ouse	Chlorination only	170 (165)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)
Sorell/Midway Point/Penna	Bryn Estyn Treatment Plant	4910 (4790)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Swansea	Coagulation/flocculation, filtration, Chlorination and fluoridation	1175 (1245)	Yes (Yes)	No (No)	Yes (Yes)	Yes (Yes)
Triabunna	Coagulation/flocculation, sand filtration, chlorination, fluoridation	1060 (1030)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)
Tunbridge	Chlorination only	150 (140)	Yes (Yes)	Yes (Yes)	Yes (Yes)	No (No)

Name of water supply system	Water treatment	Approximate population serviced by water supply system	Sampling program – chemical contaminants	Chemical contaminant compliance	Compliance with Bacteriological Sampling requirements	Compliance with Bacteriological criteria
Wayatinah	Filtration, chlorination	115 (115)	Yes (Yes)	No (No)	Yes (Yes)	No (No)
Westerway/National Park	Chlorination and fluoridation	140 (170)	Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes (Yes)

Table 10: Assessment of compliance of Southern Water Supplies for 2011-12 (with comparison against 2010-11).