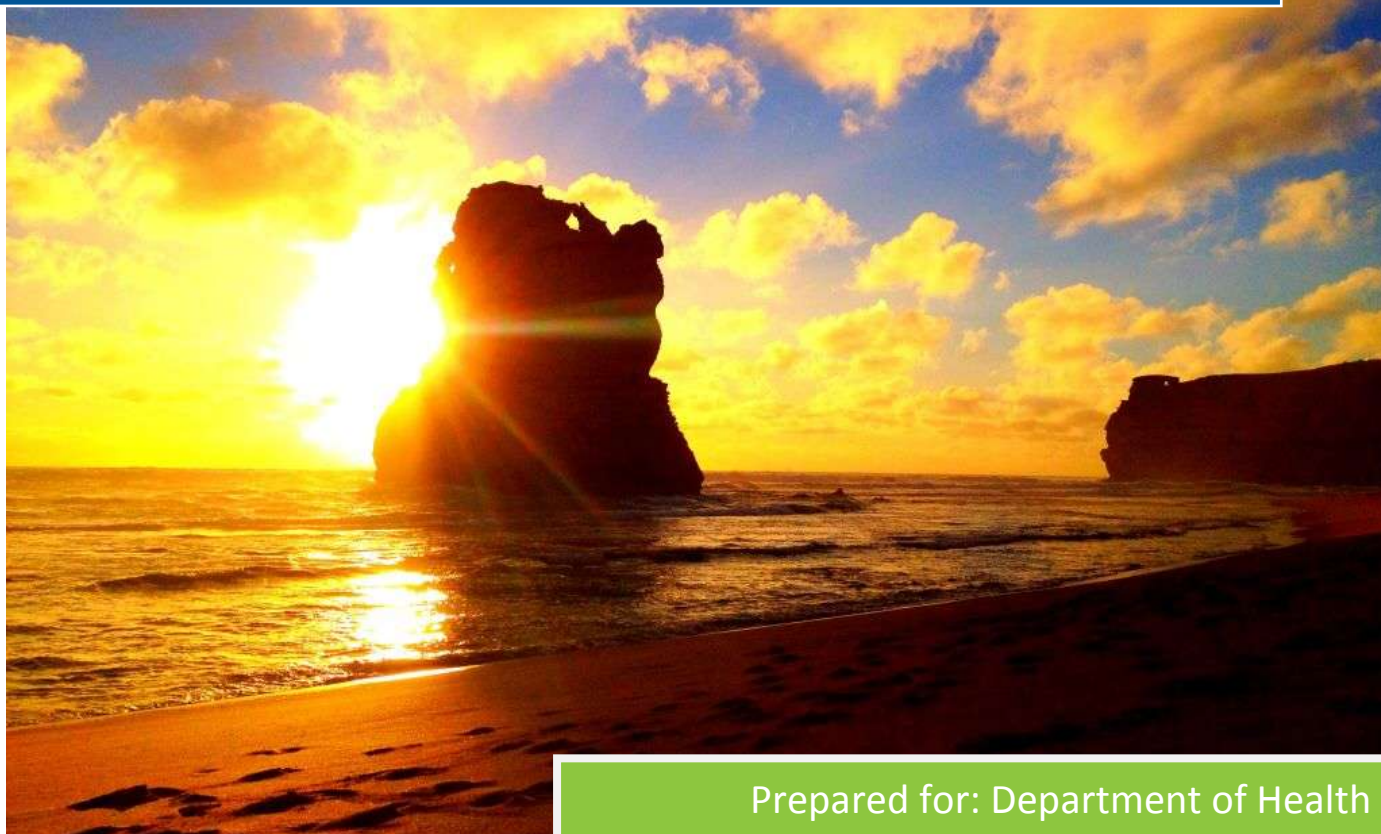


2011/12

Water Quality ANNUAL REPORT



Prepared for: Department of Health
(Water Program)

Dated: October 2012



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I. INTRODUCTION

Wannon Water is committed to providing safe, reliable drinking water to South-west Victoria. Wannon Water provides water and water reclamation services to a population of approximately 80,000 people (100,000 during peak season) in South-west Victoria. The area serviced extends from the South Australian border in the west, to Balmoral in the north, to Lismore in the east and the lower Gellibrand River catchment on the coast.

Wannon Water has aligned its drinking water quality management system with the Australian Drinking Water Guidelines 2011 (ADWG) and Hazard Analysis and Critical Control Point (HACCP) risk management principles. Wannon Water will continue to improve its drinking water quality management program to ensure that water is delivered to our customers within the limits of the Safe Drinking Water Act 2003 and associated Regulations. In March 2012 Wannon Water issued a reviewed Drinking Water Quality Policy. The revised policy is available on Wannon Water's website at [Policies](#).

This 2011/12 Drinking Water Quality annual report has been developed in accordance with the requirements of the *Safe Drinking Water Act 2003*. The report highlights the programs and initiatives Wannon Water has in place to provide safe drinking water to the 80,000 people living in Wannon Water's water supply localities.

Wannon Water has a comprehensive water quality monitoring program extending across the 24,500 square kilometres of the region. Samples are collected from: the raw water source; the water entry points; water storages and at specific points in the reticulation representing the "customers tap". All samples collected are analysed by an independent laboratory certified by the National Association of Testing Authorities (NATA).

During 2011/12, Wannon Water continued to achieve a high level of compliance against the requirements of the *Safe Drinking Water Act 2003*.

The high standard of drinking water provided is reflected in customers' continued satisfaction with Wannon Water's performance. The 2011 customer satisfaction survey

showed that 91% of business customers and 93% of domestic customers were satisfied or very satisfied with the performance of Wannon Water.

Defining Drinking Water

The *Safe Drinking Water Act 2003* defines three types of water quality categories.

Drinking Water – Water that is intended for human consumption or for purposes connected with human consumption, such as the preparation of food or the making of ice for consumption or for the preservation of unpackaged food, whether or not the water is used for other purposes.

Regulated Water – This is water that is not intended for human consumption, but could be mistaken as drinking water. If there is a potential for the supply to be mistaken as drinking water exists, then the Minister for Health will declare the water as Regulated Water.

Non Potable Water – This is water that is not intended for human consumption and cannot be mistaken as drinking water. This water falls outside the *Safe Drinking Water Act 2003* and *Safe Drinking Water Regulations 2005*.

Sources of Water

During 2011/12, Wannon Water supplied drinking water to residential, rural, commercial and industrial customers. The water is harvested from a variety of sources and supplied through approximately 1,877 kilometres of water mains.

Wannon Water harvested approximately 11,800 megalitres (ML) of water to supply its customers. This water comes from an array of sources; namely, protected catchment areas, agricultural land, groundwater and, in two instances, supply from another regional water corporation. This water is supplied to customers with varying degrees of treatment dependent on the characteristics of the quality.

Table I-1 specifies: the water sampling locality; the source of supply; how it is stored subsequent to treatment and the treatment facility. Figure 4 illustrates the localities and where the water is sourced from.

Table I-1 - Source water and treatment systems summary

Water Sampling Locality	Source Water	Raw Water Storage	Treatment Plant	Number of customers ¹
Allansford (via Warrnambool Water Treatment Plant)	Arkins Creeks (3)	Gellibrand Tank	Warrnambool Water Treatment Plant,	349
	Gellibrand River,	South Otway Tank	Allansford Disinfection Plant	
	Carlisle Bores (2)	Ewen's Hill Reservoir		
	– via North Otway Pipeline	Plantation Rd Storage		
		Tank Hill Reservoir		
	Gellibrand River – South Otway Pipeline	Warrnambool Storage East		
		Warrnambool Storage West		
	Albert Park Bores (3)	Brierly Basin		
	Roof water	Albert Park Raw Water Storage		
Balmoral	Rocklands Reservoir (Grampians Wimmera Mallee Water)	Balmoral Service Basin	Balmoral Water Treatment Plant	151
Camperdown (Rural)	Arkins Creeks (3)	Gellibrand Tank	Camperdown Water Treatment Plant	385
	Gellibrand River,	Donald's Hill Reservoir		
	Carlisle Bores (2)			
	– via North Otway Pipeline			
Camperdown (Urban)	Arkins Creeks (3)	Gellibrand Tank	Camperdown Water Treatment Plant	1781
	Gellibrand River,	Donald's Hill Reservoir		
	Carlisle Bores (2)			
	– via North Otway Pipeline			
Caramut	Caramut Bores (2)	Caramut Service Basin	Caramut Disinfection Plant	76
	Caramut Tank (Raw Water)			
Casterton	Tullich Bores (4)	N/A	Casterton Water Treatment Plant	982
Cavendish	Grampians National Park	Cavendish Service Basin	Cavendish Disinfection Plant	90
	7 streams on the western slopes of the Victoria Range and drought relief bores (2)			
Cobden	Arkins Creeks (3)	Gellibrand Tank	Cobden Water Treatment Plant	882
	Gellibrand River,	Cobden Service Basin		
	Carlisle Bores (2)			
	– via North Otway Pipeline			
Coleraine (via Casterton Water Treatment Plant)	Tullich Bores (4)		Casterton Water Treatment Plant	619
			Coleraine Disinfection Plant	
Darlington (Regulated Supply)	Darlington Bore (1)	Darlington Elevated Tank	Nil Treatment	22
Dartmoor	Dartmoor Bore (1)	N/A	Dartmoor Disinfection Plant	136
Derrinallum (via Camperdown Water Treatment Plant)	Arkins Creeks (3)	Gellibrand Tank	Camperdown Water Treatment Plant	242 ²
	Gellibrand River,	Donald's Hill Reservoir	Ettrick's Springs Disinfection Plant	
	Carlisle Bores (2)		Lismore/Derrinallum Tank Disinfection Plant	
	– via North Otway Pipeline			
Dunkeld (via Hamilton Water Treatment Plant)	Grampians National Park	Hayes Reservoir	Hamilton Water Treatment Plant,	362
	7 streams on the western slopes of the Victoria Range and	Cruckoor Reservoir	Dunkeld Disinfection Plant	
		Hartwichs Reservoir		

Water Sampling Locality	Source Water	Raw Water Storage	Treatment Plant	Number of customers ¹
	drought relief bores (2).	Hamilton Service Basins 1 & 2.		
Glenthompson	Yuppeckiar Creek Catchment and	Glenthompson Reservoir	Glenthompson Water Treatment Plant	128
	Grampians Wimmera Mallee Water (32ML supplementary purchase from Willaura Catchment)	Railway Reservoir		
Hamilton	Grampians National Park 7 streams on the western slopes of the Victoria Range and drought relief bores (2)	Hayes Reservoir	Hamilton Water Treatment Plant	5352
		Cruckoor Reservoir		
		Hartwicks Reservoir		
		Hamilton Service Basins 1 & 2		
Heywood	Heywood Bores (2)	N/A	Heywood Water Treatment Plant	751
Koroit (via Warrnambool Water Treatment Plant)	Arkins Creeks (3)	Gellibrand Tank	Warrnambool Water Treatment Plant	701
	Gellibrand River,	South Otway Tank	Illowa (Koroit) Disinfection Plant	
	Carlisle Bores (2)	Ewen’s Hill Reservoir		
	– via North Otway Pipeline	Plantation Rd Storage		
		Tank Hill Reservoir		
	Gellibrand River – South Otway Pipeline	Warrnambool Storage East		
		Warrnambool Storage West		
	Albert Park Bores (3)	Brierly Basin		
	Roof water	Albert Park Raw Water Storage		
Lismore (via Camperdown Water Treatment Plant)	Arkins Creeks (3)	Gellibrand Tank	Camperdown Water Treatment Plant	242 ²
	Gellibrand River,	Donald’s Hill Reservoir	Ettrick’s Springs Disinfection Plant	
	Carlisle Bores (2)		Lismore/Derrinallum Tank Disinfection Plant	
	– via North Otway Pipeline			
Macarthur	Macarthur Bore	N/A	Macarthur Water Treatment Plant	178
Merino (via Casterton Water Treatment Plant)	Tullich Bores - Bore Field (4)		Casterton Water Treatment Plant	167
			Merino Disinfection Plant	
Mortlake (via Terang Water Treatment Plant)	Arkins Creeks (3)	Gellibrand Tank	Terang Water Treatment Plant	686
	Gellibrand River,	Ewen’s Hill Reservoir	Mortlake Disinfection Plant	
	Carlisle Bores (2)	Absolom’s Bore Balance Tank		
	– via North Otway Pipeline			
	and Absolom’s Bore (2)			
Noorat/Glenormiston (via Terang Water Treatment Plant)	Arkins Creeks (3)	Gellibrand Tank	Terang Water Treatment Plant	251
	Gellibrand River,	Ewen’s Hill Reservoir		
	Carlisle Bores (2)			
	– via North Otway Pipeline			
Paaratte (via Port Campbell Water Treatment Plant)	Port Campbell Bore (1)	N/A	Port Campbell Water Treatment Plant	30
Penshurst	Penshurst Bore (1)	N/A	Penshurst Disinfection Plant	312

Water Sampling Locality	Source Water	Raw Water Storage	Treatment Plant	Number of customers ¹
Peterborough (via Port Campbell Water Treatment Plant)	Port Campbell Bore (1)	N/A	Port Campbell Water Treatment Plant	311
Port Campbell	Port Campbell Bore (1)	N/A	Port Campbell Water Treatment Plant	289
Port Fairy	Port Fairy Bores (2)	N/A	Port Fairy Water Treatment Plant	2206
Portland	Wyatt Street Bore (1)	N/A	Portland Wyatt Street Water Treatment Plant	5706
	Bald Hill Bores (2)		Portland Bald Hill Water Treatment Plant	
Purnim	Arkins Creeks (3)	Gellibrand Tank	Purnim Disinfection Plant	86
	Gellibrand River,	Ewen’s Hill Reservoir		
	Carlisle Bores (2)	Tank Hill Reservoir		
	– via North Otway Pipeline	Purnim Raw Water Tank		
Sandford (via Casterton Water Treatment Plant)	Tullich Bores - (4)	N/A	Casterton Water Treatment Plant	90
Simpson	Arkins Creeks (3)	Gellibrand Tank	Simpson Water Treatment Plant	107
	Gellibrand River,	Simpson Service Basin		
	Carlisle Bores (2)			
	– via North Otway Pipeline			
Tarrington (via Hamilton Water Treatment Plant)	Grampians National Park	Hayes Reservoir	Hamilton Water Treatment Plant	144
	7 streams on the western slopes of the Victoria Range and drought relief bores (2).	Cruckoor Reservoir		
		Hartwicks Reservoir		
Terang	Arkins Creeks (3)	Gellibrand Tank	Terang Water Treatment Plant	1091
	Gellibrand River,	Ewen’s Hill Reservoir		
	Carlisle Bores (2)			
	– via North Otway Pipeline			
Timboon (via Port Campbell Water Treatment Plant)	Port Campbell Bore (1)	N/A	Port Campbell Water Treatment Plant	590
Warrnambool	Arkins Creeks (3)	Gellibrand Tank	Warrnambool Water Treatment Plant	15112
	Gellibrand River,	South Otway Tank		
	Carlisle Bores (2)	Ewen’s Hill Reservoir		
	– via North Otway Pipeline	Plantation Rd Storage		
		Tank Hill Reservoir		
	Gellibrand River – South Otway Pipeline	Warrnambool Storage East		
		Warrnambool Storage West		
	Albert Park Bores (3)	Brierly Basin		
	Roof water	Albert Park Raw Water Storage		

N/A not applicable

¹ The figure used is the number of connections² Assumption (Lismore and Derrinallum customers 485)

2. MANAGING WATER QUALITY

Wannon Water bases its water quality compliance on the ADWG as governed by the *Safe Drinking Water Act 2003* and associated Regulations. These guidelines are used for establishing microbiological, physical and chemical monitoring programs, which provide the basis for assessing drinking water quality.

Water Quality Standards

The Safe Drinking Water Regulations 2005 specify the water quality standards and the frequency at which they will be sampled. A brief explanation of the required water quality standards is given below.

Escherichia coli (E. coli) - is a bacterial species belonging to the Coliforms group. It is only found naturally in the digestive tract of warm blooded animals. The presence of *E. coli* is indicative that faecal contamination may have occurred. The water quality standard for *E. coli* is zero organisms per 100mL in 98% of samples collected within the locality in any 12 month period.

Chlorine Based Disinfection By-Product Chemicals - are compounds which form when chlorine reacts with naturally-occurring organic matter in the water supply. The most significant disinfection by-products are trihalomethanes (THMs), chloroacetic acid, dichloroacetic acid and trichloroacetic acid. The standard limits for THMs, chloroacetic acid, dichloroacetic acid and trichloroacetic acid are 0.25 mg/L, 0.15 mg/L, 0.10 mg/L and 0.10 mg/L, respectively.

Aluminium - may be present naturally in waters through leaching from soil and rocks. It may also be present through the addition of aluminium-based coagulants used for water treatment, such as aluminium sulphate. The standard limit for aluminium is 0.2 mg/L (acid soluble).

Turbidity - is a measure of particulate and suspended matter in water (cloudiness). Turbidity is caused by the presence of fine suspended matter such as clay, silt, colloidal particles and micro-organisms. Turbidity is measured in Nephelometric Turbidity Units (NTU). Based on aesthetic considerations, the standard is defined as the 95% upper confidence limit of the mean of samples of drinking water collected in a 12 month period must be less than or equal to 5.0 NTU.

Wannon Water also monitors for additional algal, microbiological, chemical, physical and radiological parameters. Results from the monitoring of the parameters that have a potential health or aesthetic impact on customers are presented in Section 6.

Undertakings under Section 30 of The Act

Should drinking water continually not meet the quality criterion then the Corporation is required to commit to an undertaking with the Department of Health to remediate the problem. Wannon Water did not apply for any undertakings in 2011/12.

Variation to Aesthetic Standards

No variations under section 19 or 21 of the Act were sought.

Exemptions from water quality standards

In accordance with the *Safe Drinking Water Act 2003* a water supplier may apply to the Minister for Health, and, if satisfied will be exempt from a water quality standard as it applies to drinking water supplied by the water supplier. Approved exemptions release water suppliers from the requirement to meet a specified quality standard for a period of time, but do not release them from the obligation to minimise any risk to the public.

Wannon Water has submitted an application for the locality of Cavendish to be exempt from aluminium (acid soluble), as it is naturally occurring and not a result of treatment process. The Cavendish community has been consulted and supports the application.

Regulated Water

The Minister for Health has declared the following systems as regulated water:

- Darlington was declared a regulated water supply on 7 September 2006 (Gazette number G36). Darlington's water is sourced from a bore at Darlington. The number of properties connected to this system is 22.
- North Otway Pipeline was declared a regulated water supply on 26 June 2008 (Gazette number S168). The North Otway Pipeline is sourced from Arkins Creek Catchment and Gellibrand River Catchment and is supplemented in the drier months from the Carlisle River Borefield. The number of properties connected to the system is 446.

Macarthur was omitted as a regulated water supply (it became drinking water) in the Victoria Government Gazette (S152 Wednesday 18 May 2011), taking effect on 1 July 2011.

In accordance with section 7 of the *Safe Drinking Water Act 2003* Wannon Water has a regulated water risk management plan that covers the two regulated water localities.

Non-potable supplies

Nine of the 34 systems contain customers that are supplied with non-potable water.

All these customers are known as non-drinking water 'supply-by-agreement' customers. They have each signed a contract with Wannon Water that indicates that the water is not fit for human consumption. These customers receive water from the system prior to disinfection.

3. ENSURING SAFE DRINKING WATER

Water Quality Management System

Wannon Water maintains a drinking water quality management system based on Hazard Analysis Critical Control Point (HACCP) and the ADWG risk management principles. Wannon Water utilises a multiple barrier approach to ensure that drinking water is safe and aesthetically pleasing. The strength of this approach is that if a barrier is compromised it is able to be compensated for by the effective operation of the remaining barriers. This approach minimises the likelihood of contaminants passing through the treatment system and potentially causing harm to consumers.

The barriers utilised are:

- Catchment management and source water protection;
- Detention in protected reservoirs or storages;
- Extraction management;
- Treatment;
- Disinfection; and
- Maintenance of the distribution system; including maintaining adequate chlorine or chloramine residuals.

Raw (source) water from surface and groundwater supplies may contain contaminants such as sediment, microorganisms and dissolved organic compounds. Such water may not be aesthetically pleasing or safe to drink. To create a safe drinking supply Wannon Water treats the water through differing processes. The treated water is then reticulated through a number of storage tanks and pipes before being delivered to customers.

Catchment Management

Wannon Water has a partnership agreement with the Corangamite Catchment Management Authority to work with landholders to implement projects which improve the water quality and health of waterways within the Gellibrand River Water Supply Catchment. Rehabilitation activities include fencing and supply of alternative stock water, willow removal and revegetation. The aim when fencing is for 100% exclusion.

During 2011/12, 5 landholders around Carlisle River, participated in rehabilitation of 7 km of the Gellibrand River (single side). Four of these are upstream of the North Otway offtake and one is located between the north and south offtakes. In addition, one other agreement was made for willow control work upstream of the south Otway pump station (that will take place in 2012/13) and there was follow-up willow control at six other properties following

previous years' works (along 15 km of waterway upstream of the North Otway pump station).

Since 2008/9, there have been 15 landholders' projects within the water supply catchments. In all, work has been undertaken on 33 km of waterway (single side). This has included 40 km of willow removal the creation of 52 ha of streamside buffer zones. These projects have occurred on the Gellibrand River, and one at Loves Creek.

Risk Management Plan Audit

A risk management plan audit was required between August 2011 and April 2012. Wannon Water conducted its audit in December 2011. The audit covered the period from December 2009 to the date of the audit and was carried out by Frank Kiss of KISS Water Quality.

The audit found that Wannon Water had complied with the obligations imposed by the *Safe Drinking Water Act 2003* (refer to certificate page 11). No non-conformances were identified in the audit, and some opportunities for improvement were identified. The opportunities for improvement are summarised in Table 3-1.

Table 3-1 - Opportunities for Improvement identified in December 2012 audit

Opportunity for Improvement	Action	Completion Date
It is suggested that monitoring for <i>Cryptosporidium</i> in the Purnim system be undertaken after severe weather events when turbidity levels may be high increasing the likelihood of <i>Cryptosporidium</i> presence. The evidence of this monitoring could then be used to justify or otherwise the current ongoing risk status and perhaps influence the prioritisation of planned improvement activities.	Monitoring for <i>Cryptosporidium</i> in the Purnim raw water system will be conducted in the future when the external laboratory becomes certified in detection of active/inactive <i>Cryptosporidium</i> .	January 2012
The checking of the currency of laboratory test kit standards/references could be included as weekly/monthly operator's duties.	Currency of laboratory test kit standards/references is now included in the Workplace Monitoring Checklist completed at monthly intervals at all treatment plants.	May 2012
It was noted that the Fluoride treatment plant at Hamilton Water Treatment Plant was not functional during the audit. This has resulted in lower than required (internal Alert limits and DHS Guidelines) Fluoride levels in reticulation networks numerous times over the past year. The Fluoride plant has been problematic since construction. Efforts are continuing to repair defects and to improve treatment reliability. Performance is logged and the numerous communications were sighted demonstrating that DH has been kept up-to-date with the issues and progress of actions. Efforts should continue to address this issue as quickly as possible.	Most operational issues at the plant have been rectified and Wannon Water will continue to address issues in a timely manner.	Ongoing until all issues are completely resolved
Internal HACCP Audits have been scheduled and generally completed in a timely manner. It was noted however, that 3 of the last 7 HACCP audits scheduled for the past 6 months were overdue.	Additional resources have been allocated to the Risk Services Unit to ensure the timeliness of scheduled audits.	June 2012
It was noted that scope of HACCP audits concentrate almost entirely on compliance with critical control points (CCPs). It is strongly recommended that the scope of HACCP audits be expanded to cover details in Operational Manuals (where present) and all associated procedures linked with the site's activities. This would give a more holistic approach to the audit process and include support program activities (e.g. maintenance, calibration, inspection, daily duties, data recording and reporting, operator awareness and skills, troubleshooting, etc.) as part of the one audit.	The scope of HACCP audits has been altered to be holistic and now include all procedures associated with individual water treatment processes. A new iPad based iAuditor tool is being trialled for use when conducting these audits.	Ongoing
Bulk chemical filling lines could be improved by capping and padlocking.	Bulk chemical filling lines have been capped and padlocked where possible.	March 2012
It was noted that in-house Raw Material Specifications have not yet been set up for Calgon, against which Certificates of Analysis (COAs)/Certificates of Compliance (COCs) can be checked.	Raw Material Specifications have been set up for Calgon, against which Certificates of Analysis (COAs)/Certificates of Compliance (COCs) are now checked.	January 2012
Several water quality and supply-related Contingency Plans have been documented, and many enacted on a regular basis. Some (including Blue-Green Algae Risk Management and Incident Response Plan), are not. A schedule could be developed using different scenarios in "mock trials" to routinely assess the effectiveness and efficiency, personnel skills and outcomes of these procedures. A summary of the performance of the exercise could be documented to identify opportunities for improvement to operational controls, timeframes and notification activities.	An exercise schedule has been established. Progress against the schedule is tracked via the Emergency Planning Coordination Committee.	May 2012
Consideration could be given to including details of jar test findings and outcome decisions in comments sections of the "Jar	Details of jar test findings and outcome decisions are now recorded in the	March 2012

Opportunity for Improvement	Action	Completion Date
Testing Forms" so that history and details of plant optimisation studies is available to all operators on site for ongoing review.	comments section of the "Jar Testing Forms".	
Extensive training plans / streams have been established for water treatment operators, however, an overall training plan/stream for personnel in associated treatment, monitoring, response and reporting activities does not seem to be as clearly defined. Consideration could be given to documenting training streams (or competencies) for these personnel also and to link these to position descriptions, professional development plans and performance reviews.	Annual training and development plans in place for all Treatment Branch employees (non-Operators) through the performance review process. All job roles (non-administrative) requiring treatment monitoring, reporting and response require formal tertiary qualifications in science or environmental engineering. Wannon Water also supports further Post Graduate studies for employees wanting to achieve higher level qualifications e.g. Masters	February 2012
Visits to a regulated water service area, Carlisle River, indicated that although Wannon Water has supplied Do Not Drink notifications, stickers/signs and letter drops, labelling and signage was not well maintained and located in the town. It is strongly recommended that Wannon Water notifies the local council authorities of the Health Departments' requirements for appropriate signage and to work with the region to ensure that especially visitors to the area are clearly notified with signs (e.g. at public sporting grounds, toilets, community halls, schools, etc.).	Wannon Water has written to the local council authorities notifying them of the Health Departments' requirements for appropriate signage and to work with the region to ensure that especially visitors to the area are clearly notified with signs (e.g. at public sporting grounds, toilets, community halls, schools, etc.).	October 2012
It was noted that the amount of routine testing currently conducted is well in excess of regulatory requirements and some opportunities exist for rationalisation of programs to reduce the amount of routine sampling. This may free up resources and funds to focus on ad hoc testing and investigations possibly increasing these, as this should proactively drive an increase in improvement programs and hence performance.	The laboratory program has been reviewed, re-risk assessed and reduced in some areas. The available budget for ad hoc investigation monitoring has increased.	June 2012
Some examples were sighted where chemical deliveries were not always received with documentation relating to truck cleaning, this was correctly annotated on the chemical receipt checklists and submitted to the office as required. It is not currently possible to clearly demonstrate that all batches received on a given day have appropriate documentation and can be linked to processing dates.	The chemical purchasing and receipt procedure was updated.	May 2012
Records of chemical strength testing of ammonia at deliveries were not currently completed as required.	Chemical strength testing is a safety issue and is not required. The chemical purchasing and receipt procedure was updated.	May 2012
Drawdown testing of some chemicals was not always conducted due to tank levels, limitations of equipment or design limitations.	Plants were upgraded where possible, to allow for drawdown testing, or alternate methods of dose calculation was used where drawn down was deemed not possible.	June 2012

KISS *Water Quality*

ABN: 97006400555

Schedule 1

Regulation 8

Safe Drinking Water Regulations 2005

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 36

Audit period: *December 2009 to December 2011*

To: *Mr Leon de Villiers,
Manager Risk Services
Wannon Region Water Corporation,
40 Gateway Road, Warrnambool, VIC., 3280*

Australian Business Number (ABN): 94 007 404 851

I, *Frank Kiss*, after conducting a risk management plan audit of the water supplied by *Wannon Region Water Corporation*, am of the opinion that—

Wannon Region Water Corporation has complied with the obligations imposed by section 8(1) of the *Safe Drinking Water Act 2003* during the audit period.



Signature of approved auditor:

Date: *22 December 2011*

4. WATER TREATMENT

Water treatment at Wannon Water varies by system ranging from no treatment in regulated water supplies, to full treatment via a water treatment plant.

Some of the processes incorporated in treating water include:

- Raw water detention - clarification via settling, microbial die-off and reducing variability in water quality.
- Oxidation - used to convert soluble contaminants to insoluble contaminants for easier removal. Sodium hypochlorite is used for oxidation.
- Coagulation - to destabilise colloidal particles (turbidity and colour) by neutralising the surface charge of the particle to allow floc formation. Coagulants used are ferric chloride, aluminium chlorohydrate (ACH) and aluminium sulphate (alum)
- Flocculation - to increase the floc size to enhance clarification and aid filtration. Flocculants used include polyelectrolyte Nalco, Magnafloc, polymer Nalclean and polymer Klaraid.
- Cooling/ aeration towers – cool water via aeration.
- Clarification - two main primary solids removal processes are utilised;
- Sedimentation for coarse removal of particles through settling under gravity;
- Dissolved Air Flotation (DAF) for coarse removal of particles through air flotation;
- Filtration - remove suspended material;
- Adsorption - remove dissolved organic matter, particles, algal toxins and compounds causing taste and odour problems. Granulated activated carbon (GAC) is used for adsorption.
- Sequestration - involves the addition of sequestering agents to keep dissolved iron and manganese from oxidising and precipitating. Calgon is used as a sequestering agent.
- Disinfection - to kill bacteria and viruses. Note all drinking water supplied by Wannon Water is disinfected (chlorination or chloramination) to ensure that microorganisms are eliminated. Chlorine gas, sodium hypochlorite and aqueous ammonia are used for disinfection.
- pH correction/ stabilisation - to adjust pH, to aid coagulation, to prevent corrosion or scaling and to optimise disinfection. Caustic soda, soda ash and hydrated lime are used for pH correction.
- Fluoridation – for dental health benefits. Fluorosilicic acid is used for fluoridation.
- Storage - to provide adequate contact time for effective disinfection.

Table 4-1 - Treatment Processes and Added Substances 2011/12

Plants		Raw Water Detention	Upstream Water Treatment Plant	Oxidation	Coagulation			Flocculation				Cooling /aeration towers	Clarification		Filtration	Adsorption	Sequestration	Disinfection			pH Adjust			Fluoridisation
					Pre-Chlorination	Sodium Hypo	Ferric Chloride	Aluminium chlorohydrate (ACH)	Aluminium Sulphate	Polyelectrolyte Nalco 3482	Magnafloc LT20 flocculant		Polymer Nalclean 8170PULN	Polymer Klaraid				Chlorine gas	Sodium hypochlorite	Aqueous ammonia	Caustic soda	Soda Ash	Hydrated Lime	
Allansford		✓	✓																					✓
Balmoral		✓					✓																	✓
Camperdown		✓						✓						✓										✓
Caramut									✓						✓									✓
Carlisle River																								✓
Casterton			✓		✓					✓					✓									✓
Cavendish		✓				✓																		✓
Cobden		✓					✓																	✓
Coleraine		✓						✓																✓
Dartmoor																								✓
Dunkeld		✓																						✓
Ewen's Hill		✓																						✓
Glenhompson		✓				✓							✓			✓								✓
Hamilton		✓					✓								✓		✓							✓
Heywood										✓												✓		✓
Koroit		✓																						✓
Ettrick Springs		✓																						✓
Lismore/Derrinalum		✓																						✓
Macarthur			✓		✓					✓					✓									✓
Merino		✓																						✓
Mortlake		✓																						✓
Penshurst																								✓
Port Campbell														✓										✓
Port Fairy																								✓
Portland Wyatt St																	✓							✓
Portland Bald Hill																								✓
Purnim																								✓
Sandford		✓																						✓
Simpson		✓						✓						✓								✓		✓
Tank Hill																								✓
Terang																								✓
Warmambool		✓								✓														✓

*Pressure filters plus iron sorption filters.

Table 4-1 details the treatment processes utilised within each of Wannon Water's drinking water treatment plants.

The water treatment processes employed during 2011/12 were similar to 2010/11. Changes and improvements to the system are outlined in Section 5.

5. MAINTAINING HIGH QUALITY WATER

Staff Awareness and Training

Wannon Water has adopted the Best practice guidelines for Victorian framework for water treatment operator competencies. Wannon Water is dedicated to providing relevant employees with water industry training and awareness in via formal training and attendance at relevant conferences and information sessions. In 2011/12 this included:

- Attendance at ADWG 2011 information session
- Internal auditor training
- Certification III in Water Industry Operations
- Attendance at Water Industry Operators Association (WIOA) Conference
- Attendance at AWA Catchment Management Conference
- Attendance at Victorian Drinking Water Network meetings

Distribution System

Flushing Program

Wannon Water has a regular flushing program for drinking water localities. Frequency of flushing is risk-based and Wannon Water utilises field data and customer feedback in scheduling the program, which is reviewed as required.

Wannon Water uses flushing to remove colour or turbidity in response to reaching critical limits or when a customer complaint is received. Flushing is also used to increase chlorine residual at locations where water usage is low.

Air Scouring Program

Wannon Water utilises contractors to conduct air scouring on a regular basis. Frequency of air scouring is risk based. Localities where air scouring occurred in 2011/12 included:

- Warrnambool
- Caramut
- Penshurst
- Mortlake
- Terang
- Noorat
- Glenormiston
- Pipeline Noorat to Mortlake
- Pipeline Terang to Noorat and Glenormiston

The air scouring undertaken totalled 370 kilometres of water mains.

Mains Renewal Program

Wannon Water has an asset replacement program created and prioritised via a risk-based process using event information, condition assessments and asset modelling. In 2011/12 Wannon Water spent over \$1.5 million replacing 9.19 km of mains at Camperdown, Casterton, Cobden Coleraine, Hamilton Penshurst and Warrnambool.

Tank Cleaning Program

Wannon Water utilises contractors on a regular basis to clean tanks within the distribution system and at storages water treatment plants. In 2011/12 cleaning occurred at:

- Arundel Road basin at Casterton
- Wyatt St clear water storage Portland
- Coleraine tank
- Cavendish Basin
- Dunkeld clear water storage
- Glenthompson clear water storage
- Hamilton clear water storage
- Bald Hill cooling tower sumps Portland.

Water Treatment Plant Changes and Improvements

Isolation of storages

During 2011/12 trigger levels for Blue Green Algae were exceeded at Warrnambool Storage No 1, Warrnambool Storage No 2 and Brierly Basin Warrnambool. All storages were isolated from the system until the algal blooms subsided.

Coagulant Selection

Optimisation work at the Balmoral WTP in 2011 resulted in changing the coagulant from Polyaluminium chloride (PACL) (Megapac 23) to Aluminium chlorohydrate (ACH) for improved plant performance.

Sequestration

Calgon was added at Balmoral WTP and Port Fairy WTP in 2011/12. This resulted in a significant reduction in the number of customer contacts in relation to colour (29 colour complaints in 2011/12 down from 68 in 2010/11).

pH adjustment

Carbon dioxide was found to be ineffective at pH correction at Camperdown. This system was turned off in November 2011.

Storage

Wannon Water commissioned a new 0.2ML clear water storage at Merino.

6. DRINKING WATER QUALITY RESULTS 2011/12

Sampling Frequency

The frequency of sampling of the water quality standards (*Escherichia coli*, disinfection by-products, aluminium and turbidity) is specified in Schedule 2 of the Safe Drinking Water Regulations 2005. Wannon Water uses its risk assessment process to select an appropriate sampling frequency for additional microbiological, chemical, physical, radiological and algal monitoring.

Regulation 11 of the Safe Drinking Water Regulations 2005 (the Regulations) provides that the Secretary may, by notice published in the Government Gazette, vary the frequencies specified in Schedule 2 of the Regulations at which samples of drinking water are to be collected at a water sampling point located within a water sampling locality. On the 5 June 2009 the Secretary approved a variation to the frequency at which a sample of drinking water for *Escherichia coli* (*E.coli*) and turbidity were to be collected at:

- Port Fairy - from 1 sample per week to 2 samples per week
- Portland - from 1 sample per week to 2 samples per week
- Hamilton - from 1 sample per week to 2 samples per week
- Warrnambool - from 1 sample per week to 3 samples per week

Testing Programs

The number of samples collected and frequency of testing varies for each locality according to population and risk. The geographic location of customer sampling taps is designed to ensure representative samples are collected across the supply system. The sampling program is reviewed on a regular basis to align with changes in risk profile of each locality.

During 2011/12 Wannon Water performed over 118,500 individual tests. Approximately 33% of the tests were sampled at customer's taps within 34 localities.

With the exception of Schedule 2 parameters, where weekly samples are collected, a total number of 51 samples are collected in the reporting period as a reduced sampling program is utilised during Christmas week.

On occasion, scheduled tests will be missed for various reasons, such as human error, broken or missing sample bottles or sample point being out of action (e.g. bore not operational at time of sampling). Any missed regulatory samples are communicated to the Department of Health at the time. In 2011/12 the following regulatory samples were missed:

- Two *E.coli* and turbidity samples (refer to Tables 6-1 and 6-7)
- Two disinfection by-products samples (refer to Tables 6-2-6-5)

In 2011/12 a scheduling error for Heywood omitted the parameters lead, manganese, copper, cadmium, nickel, antimony and chromium from the customers tap. The source water was tested and all results were within the ADWG limits. The scheduling error has been rectified for 2012/13.

Wannon Water has modified procedures to avoid recurrence of missing regulatory samples and the Department of Health is satisfied with Wannon Water actions in this area.

Interpreting the results

The units of results are dependent on the parameter being analysed. The most common unit used within this report is milligrams per litre (**mg/L**). This unit is interchangeable with parts per million (ppm). Other units within this report include:

- **orgs/100ml** used for measurement of *E.coli*
- Nephelometric Turbidity Units (**NTU**) a measurement for turbidity
- **pH units** for measurement of pH
- Platinum-Cobalt (**Pt.-Co.**) units for measurement of colour. This unit is interchangeable with Hazen Units (HU)
- **mg/L as calcium carbonate (CaCO₃)** used for measuring total hardness

More than one sample collected per week - Localities where more than one sample is collected per week are marked with an asterisk (*).

Missing tests - All missing tests are marked with the hash symbol (#) within the report and due to reasons stated under Testing Programs.

Less than limit of detection - The symbol for less than (<) is used when the concentration of a parameter is less than what can be detected accurately by the instrument. The level which an instrument can accurately detect is known as the "limit of detection".

Escherichia coli (E. coli)

Standard At least 98% of all samples of drinking water collected within a locality in any 12 month period to contain no *E. coli* (SDWR).

Table 6-1 *E. coli* results by locality 2011/12**E.coli**

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	% samples with no <i>E.coli</i>	Max result (orgs/100ml)	Complying (Yes / No)
ALLANSFORD	Weekly	52	0	100.0	0	Yes
BALMORAL	Weekly	52	1	98.1	21	Yes
CAMPERDOWN (RURAL)	Weekly	52	0	100.0	0	Yes
CAMPERDOWN (URBAN)	Weekly#	51	0	100.0	0	Yes
CARAMUT	Weekly	52	0	100.0	0	Yes
CASTERTON	Weekly	52	0	100.0	0	Yes
CAVENDISH	Weekly	52	0	100.0	0	Yes
COBDEN	Weekly	52	0	100.0	0	Yes
COLERAINE	Weekly	52	0	100.0	0	Yes
DARTMOOR	Weekly	52	0	100.0	0	Yes
DERRINALLUM	Weekly	52	0	100.0	0	Yes
DUNKELD	Weekly	52	0	100.0	0	Yes
GLENTHOMPSON	Weekly	52	0	100.0	0	Yes
HAMILTON	Weekly*	104	0	100.0	0	Yes
HEYWOOD	Weekly	52	0	100.0	0	Yes
KOROIT	Weekly	52	0	100.0	0	Yes
LISMORE	Weekly	52	0	100.0	0	Yes
MACARTHUR	Weekly	52	0	100.0	0	Yes
MERINO	Weekly	52	0	100.0	0	Yes
MORTLAKE	Weekly	52	0	100.0	0	Yes
NOORAT/GLENORMISTON	Weekly	52	0	100.0	0	Yes
PAARATTE	Weekly	52	0	100.0	0	Yes
PENSHURST	Weekly	52	2	96.2	50	No
PETERBOROUGH	Weekly	52	0	100.0	0	Yes
PORT CAMPBELL	Weekly	52	0	100.0	0	Yes
PORT FAIRY	Weekly*	104	0	100.0	0	Yes
PORTLAND	Weekly* #	103	0	100.0	0	Yes
PURNIM	Weekly	52	0	100.0	0	Yes
SANDFORD	Weekly	52	0	100.0	0	Yes
SIMPSON	Weekly	52	0	100.0	0	Yes
TARRINGTON	Weekly	52	0	100.0	0	Yes
TERANG	Weekly	52	0	100.0	0	Yes
TIMBOON	Weekly	52	0	100.0	0	Yes
WARRNAMBOOL	Weekly*	156	0	100.0	0	Yes

* Weekly sampling with increases for population (ADWG, Section 9.5.2)

Two samples were missed (7/10/2011 and 4/12/2011)

Actions in Relation to Non-Compliance Regarding *E.coli*

33 localities were compliant during 2011/12. Penhurst marginally failed compliance with 96.2%. There were two *E.coli* detections within the 12 month period. Wannon Water implemented corrective actions for these events. Refer to Table 7-2 for details.

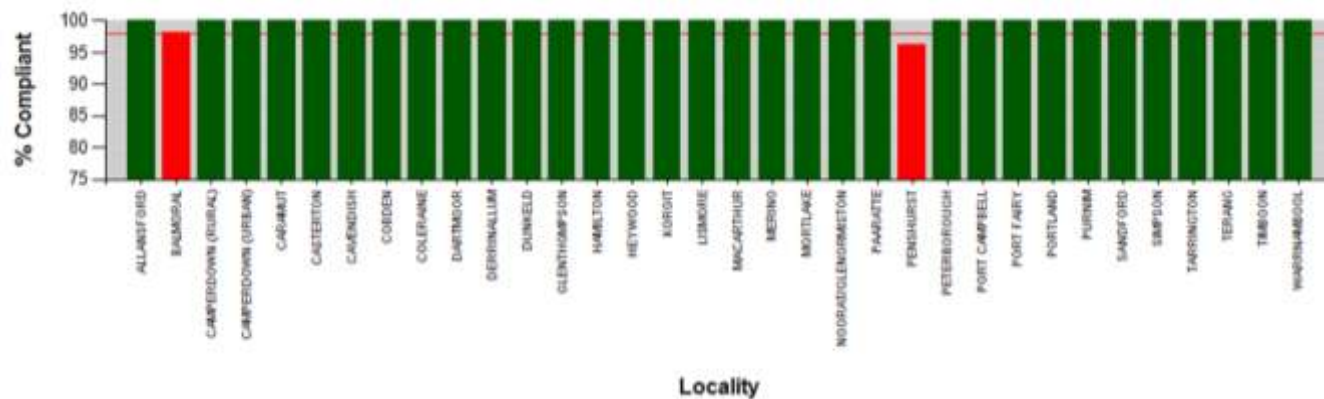


Figure 1 - *E.coli* compliance by locality

Chlorine Based Disinfection By-Product Chemicals

Compliance – Trihalomethanes Results

Standard All samples of drinking water collected within a locality in any 12 month period must not exceed 0.25 mg/L (SDWR)

Table 6-2 Trihalomethanes results by locality 2011/12

Trihalomethanes

Locality	Sampling Frequency	No. of Samples	Max result (mg/L)	No. of Non-complying samples	Compliant (Yes / No)*
ALLANSFORD	Monthly	12	0.041	0	Yes
BALMORAL	Monthly	12	0.080	0	Yes
CAMPERDOWN (RURAL)	Monthly	12	0.015	0	Yes
CAMPERDOWN (URBAN)	Monthly	12	0.008	0	Yes
CARAMUT	Monthly	12	0.035	0	Yes
CASTERTON	Monthly	12	0.180	0	Yes
CAVENDISH	Monthly	12	0.045	0	Yes
COBDEN	Monthly#	11	0.130	0	Yes
COLERAINE	Monthly	12	0.220	0	Yes
DARTMOOR	Monthly	12	0.007	0	Yes
DERRINALLUM	Monthly	12	0.150	0	Yes
DUNKELD	Monthly	12	0.082	0	Yes
GLENTHOMPSON	Monthly	12	0.074	0	Yes
HAMILTON	Monthly	12	0.020	0	Yes
HEYWOOD	Monthly	12	0.020	0	Yes
KOROIT	Monthly	12	0.020	0	Yes
LISMORE	Monthly	12	0.072	0	Yes
MACARTHUR	Monthly	12	0.094	0	Yes
MERINO	Monthly	12	0.170	0	Yes
MORTLAKE	Monthly	12	0.076	0	Yes
NOORAT/GLENORMISTON	Monthly	12	0.100	0	Yes
PAARATTE	Monthly	12	0.012	0	Yes
PENSHURST	Monthly	12	0.019	0	Yes
PETERBOROUGH	Monthly	12	0.015	0	Yes
PORT CAMPBELL	Monthly	12	0.016	0	Yes
PORT FAIRY	Monthly#	11	0.001	0	Yes
PORTLAND	Monthly	12	0.001	0	Yes
PURNIM	Monthly	12	0.110	0	Yes
SANDFORD	Monthly	12	0.210	0	Yes
SIMPSON	Monthly	12	0.063	0	Yes
TARRINGTON	Monthly	12	0.014	0	Yes
TERANG	Monthly	12	0.110	0	Yes
TIMBOON	Monthly	12	0.063	0	Yes
WARRNAMBOOL	Monthly	12	0.012	0	Yes

* For total trihalomethanes, if the maximum result is 0.255mg/L or greater, then the locality is non-compliant
 # Two samples were missed (1/8/2011 and 4/10/2011)

Compliance – Chloroacetic Acid Results

Standard All samples of drinking water collected within a locality in any 12 month period must not exceed 0.15 mg/L (SDWR)

Table 6-3 Chloroacetic acid results by locality 2011/12

Chloroacetic Acid

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)*
ALLANSFORD	Monthly	12	0	0.003	Yes
BALMORAL	Monthly	12	0	0.014	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.003	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.002	Yes
CARAMUT	Monthly	12	0	0.091	Yes
CASTERTON	Monthly	12	0	0.003	Yes
CAVENDISH	Monthly	12	0	0.036	Yes
COBDEN	Monthly#	11	0	0.002	Yes
COLERAINE	Monthly	12	0	0.005	Yes
DARTMOOR	Monthly	12	0	<0.002	Yes
DERRINALLUM	Monthly	12	0	0.003	Yes
DUNKELD	Monthly	12	0	0.007	Yes
GLENTHOMPSON	Monthly	12	0	0.005	Yes
HAMILTON	Monthly	12	0	0.003	Yes
HEYWOOD	Monthly	12	0	<0.002	Yes
KOROIT	Monthly	12	0	0.005	Yes
LISMORE	Monthly	12	0	0.002	Yes
MACARTHUR	Monthly	12	0	<0.002	Yes
MERINO	Monthly	12	0	0.003	Yes
MORTLAKE	Monthly	12	0	0.003	Yes
NOORAT/GLENORMISTON	Monthly	12	0	0.005	Yes
PAARATTE	Monthly	12	0	<0.002	Yes
PENSHURST	Monthly	12	0	0.016	Yes
PETERBOROUGH	Monthly	12	0	<0.002	Yes
PORT CAMPBELL	Monthly	12	0	<0.002	Yes
PORT FAIRY	Monthly#	11	0	0.002	Yes
PORTLAND	Monthly	12	0	<0.002	Yes
PURNIM	Monthly	12	0	0.003	Yes
SANDFORD	Monthly	12	0	0.004	Yes
SIMPSON	Monthly	12	0	0.002	Yes
TARRINGTON	Monthly	12	0	0.003	Yes
TERANG	Monthly	12	0	0.004	Yes
TIMBOON	Monthly	12	0	0.058	Yes
WARRNAMBOOL	Monthly	12	0	0.002	Yes

* For chloroacetic acid, if the maximum result is 0.155mg/L or greater, then the locality is non-compliant

Two samples were missed (1/8/2011 and 4/10/2011)

Compliance – Dichloroacetic Acid Results

Standard All samples of drinking water collected within a locality in any 12 month period must not exceed 0.10 mg/L (SDWR)

Table 6-4 Dichloroacetic acid results by locality 2011/12

Dichloroacetic Acid

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)*
ALLANSFORD	Monthly	12	0	0.011	Yes
BALMORAL	Monthly	12	0	0.066	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.011	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.011	Yes
CARAMUT	Monthly	12	0	0.003	Yes
CASTERTON	Monthly	12	0	0.012	Yes
CAVENDISH	Monthly	12	0	0.120	Yes
COBDEN	Monthly#	11	0	0.021	Yes
COLERAINE	Monthly	12	0	0.019	Yes
DARTMOOR	Monthly	12	0	<0.002	Yes
DERRINALLUM	Monthly	12	0	0.028	Yes
DUNKELD	Monthly	12	0	0.035	Yes
GLENTHOMPSON	Monthly	12	0	0.018	Yes
HAMILTON	Monthly	12	0	0.014	Yes
HEYWOOD	Monthly	12	0	<0.002	Yes
KOROIT	Monthly	12	0	0.010	Yes
LISMORE	Monthly	12	0	0.018	Yes
MACARTHUR	Monthly	12	0	0.005	Yes
MERINO	Monthly	12	0	0.017	Yes
MORTLAKE	Monthly	12	0	0.018	Yes
NOORAT/GLENORMISTON	Monthly	12	0	0.024	Yes
PAARATTE	Monthly	12	0	<0.002	Yes
PENSHURST	Monthly	12	0	<0.002	Yes
PETERBOROUGH	Monthly	12	0	<0.002	Yes
PORT CAMPBELL	Monthly	12	0	0.002	Yes
PORT FAIRY	Monthly#	11	0	0.002	Yes
PORTLAND	Monthly	12	0	0.002	Yes
PURNIM	Monthly	12	0	0.024	Yes
SANDFORD	Monthly	12	0	0.017	Yes
SIMPSON	Monthly	12	0	0.013	Yes
TARRINGTON	Monthly	12	0	0.012	Yes
TERANG	Monthly	12	0	0.028	Yes
TIMBOON	Monthly	12	0	<0.002	Yes
WARRNAMBOOL	Monthly	12	0	0.009	Yes

* For dichloroacetic acid, if the maximum result is 0.145mg/L or greater, then the locality is non-compliant

Two samples were missed (1/8/2011 and 4/10/2011)

Compliance – Trichloroacetic Acid Results

Standard All samples of drinking water collected within a locality in any 12 month period must not exceed 0.10 mg/L (SDWR)

Table 6-5 Trichloroacetic acid results by locality 2011/12

Trichloroacetic Acid

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)*
ALLANSFORD	Monthly	12	0	0.003	Yes
BALMORAL	Monthly	12	0	0.005	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.002	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.002	Yes
CARAMUT	Monthly	12	0	<0.002	Yes
CASTERTON	Monthly	12	0	0.008	Yes
CAVENDISH	Monthly	12	0	0.005	Yes
COBDEN	Monthly#	11	0	0.024	Yes
COLERAINE	Monthly	12	0	0.013	Yes
DARTMOOR	Monthly	12	0	<0.002	Yes
DERRINALLUM	Monthly	12	0	0.011	Yes
DUNKELD	Monthly	12	0	0.011	Yes
GLENTHOMPSON	Monthly	12	0	0.002	Yes
HAMILTON	Monthly	12	0	0.002	Yes
HEYWOOD	Monthly	12	0	<0.002	Yes
KOROIT	Monthly	12	0	0.005	Yes
LISMORE	Monthly	12	0	0.006	Yes
MACARTHUR	Monthly	12	0	0.002	Yes
MERINO	Monthly	12	0	0.011	Yes
MORTLAKE	Monthly	12	0	0.020	Yes
NOORAT/GLENORMISTON	Monthly	12	0	0.030	Yes
PAARATTE	Monthly	12	0	<0.002	Yes
PENSHURST	Monthly	12	0	<0.002	Yes
PETERBOROUGH	Monthly	12	0	<0.002	Yes
PORT CAMPBELL	Monthly	12	0	<0.002	Yes
PORT FAIRY	Monthly#	11	0	<0.002	Yes
PORTLAND	Monthly	12	0	<0.002	Yes
PURNIM	Monthly	12	0	0.039	Yes
SANDFORD	Monthly	12	0	0.011	Yes
SIMPSON	Monthly	12	0	0.010	Yes
TARRINGTON	Monthly	12	0	0.002	Yes
TERANG	Monthly	12	0	0.027	Yes
TIMBOON	Monthly	12	0	<0.002	Yes
WARRNAMBOOL	Monthly	12	0	0.003	Yes

* For trichloroacetic acid, if the maximum result is 0.145mg/L or greater, then the locality is non-compliant

Two samples were missed (1/8/2011 and 4/10/2011)

Ozone Based Disinfection By-Product Chemicals

Wannon Water does not use ozone in any treatment or disinfection plants. All the raw waters are sourced from surface and groundwater that have not been pre-treated with ozone.

The ADWG states “Bromate is a possible by-product of disinfection using ozone, otherwise unlikely to be found in drinking water”. Based on this information Wannon Water considers the risk of bromate low and did not sample for it during 2011/12.

Another disinfection by-product of ozone is formaldehyde. Formaldehyde may also enter a drinking water supply via deposition from the atmosphere or via industry spills. Wannon Water’s risk assessments have not identified any industries that utilise formaldehyde within the catchments. Wannon Water undertook base line formaldehyde monitoring in 2006/07 with all results returning less than the analytical detection limit. Based on this information Wannon Water considers the risk of formaldehyde low and did not sample for it during 2011/12.

Aluminium

Standard All samples of drinking water collected within a locality in any 12 month period must not exceed 0.2 mg/L (Acid Soluble) (SDWR)

Table 6-6 Aluminium results by locality 2011/12

Aluminium (Acid Soluble)

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)*
ALLANSFORD	Monthly	12	0	0.08	Yes
BALMORAL	Monthly	12	0	0.16	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.07	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.04	Yes
CARAMUT	-	-	-	-	-
CASTERTON	-	-	-	-	-
CAVENDISH	Monthly	12	0	0.25	No
COBDEN	Monthly	12	0	0.17	Yes
COLERAINE	-	-	-	-	-
DARTMOOR	-	-	-	-	-
DERRINALLUM	Monthly	12	0	0.05	Yes
DUNKELD	Monthly	12	0	0.14	Yes
GLENTHOMPSON	Monthly	12	0	0.15	Yes
HAMILTON	Monthly	12	0	0.08	Yes
HEYWOOD	-	-	-	-	-
KOROIT	Monthly	12	0	0.20	Yes
LISMORE	Monthly	12	0	0.08	Yes
MACARTHUR	-	-	-	-	-
MERINO	-	-	-	-	-
MORTLAKE	Monthly	12	0	0.03	Yes
NOORAT/GLENORMISTON	Monthly	12	0	0.06	Yes
PAARATTE	-	-	-	-	-
PENSHURST	-	-	-	-	-
PETERBOROUGH	-	-	-	-	-
PORT CAMPBELL	-	-	-	-	-
PORT FAIRY	-	-	-	-	-
PORTLAND	-	-	-	-	-
PUENIM	-	-	-	-	-
SANDFORD	-	-	-	-	-
SIMPSON	Monthly	12	0	0.09	Yes
TARRINGTON	Monthly	12	0	0.10	Yes
TERANG	Monthly	12	0	0.05	Yes
TIMBOON	-	-	-	-	-
WARRNAMBOOL	Monthly	12	0	0.14	Yes

- Supplies not utilising aluminium compounds in the water treatment process therefore not sampled as part of the regulatory frequency

* If the maximum result for acid-soluble aluminium is 0.25 mg/L or greater, then the locality is non-complaint.

Wannon Water's risk assessment identified that acid soluble aluminium should be monitored in all localities where an aluminium-based coagulant is used upstream.

Non-Compliance Regarding Aluminium

Cavendish

The Cavendish raw water service basin is fed from the Grampians Headworks streams, which are naturally high in aluminium and also fluctuate in turbidity. The only barrier is detention time (settling) in the Cavendish raw water service basin. Cavendish continued to experience exceedances for acid soluble aluminium in 2011/12 (Figure 5-1 and 5-2).

In 2010/11 Wannon Water applied for exemption from the Safe Drinking Water Regulations 2005 in relation to aluminium. The application was assessed by Department of Health and failed to meet the criteria for exemptions in Section 20 of the *Safe Drinking Water Act 2003*. Wannon Water continued the exemption process in 2011/12 and undertook comprehensive consultation with the Cavendish community.

Maximum result for acid-soluble aluminium is 0.25 mg/L or greater (red line)

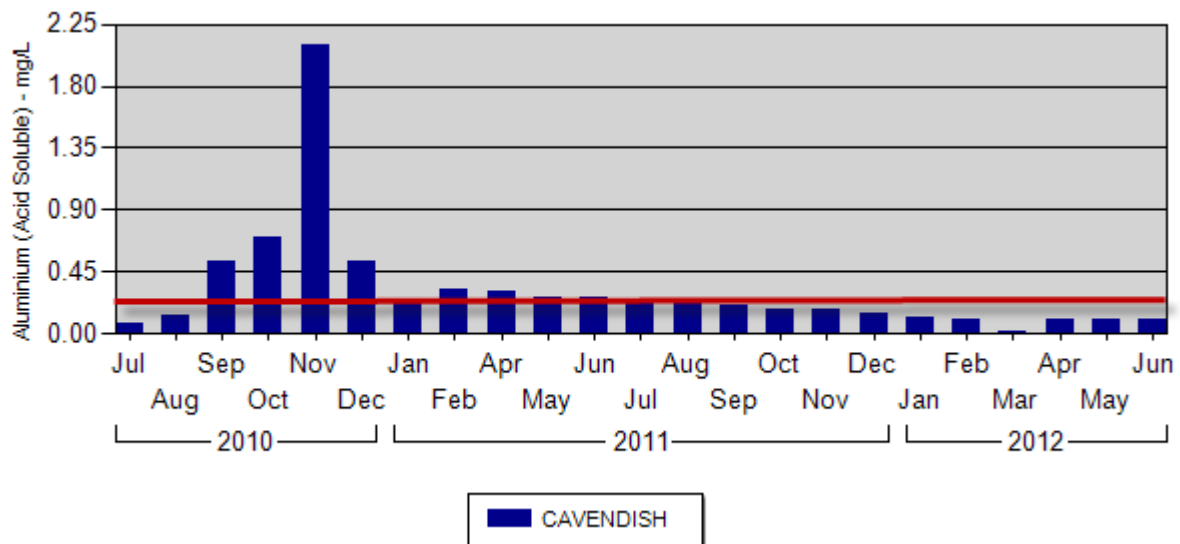


Figure 6-2 - Cavendish acid soluble aluminium 2010- 2012

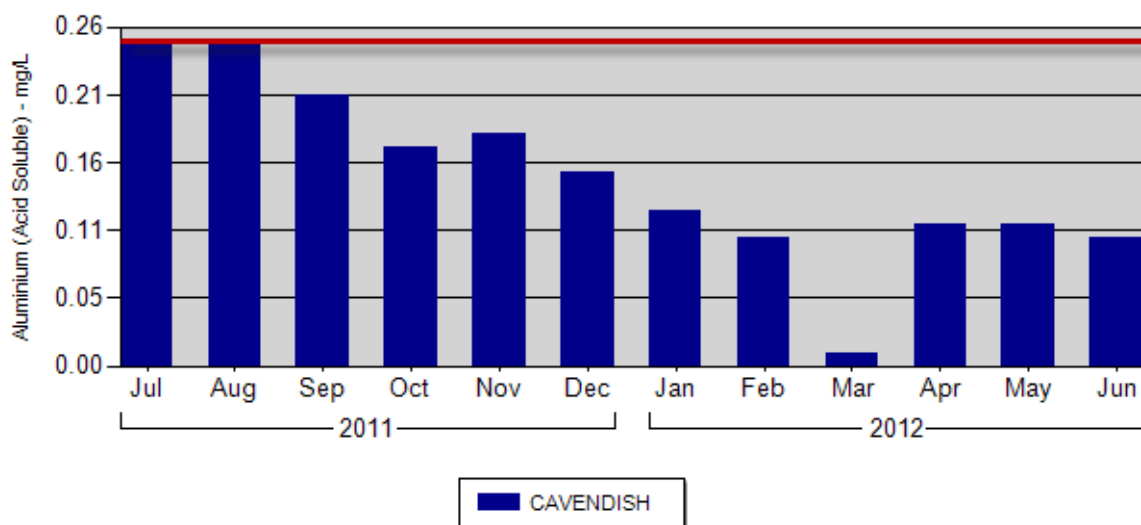


Figure 6-3 - Aluminium (acid soluble) in the Cavendish reticulation

Turbidity

Standard 95% upper confidence limit (UCL) of the mean of samples of drinking water collected in a 12 month period must be less than or equal to 5.0 NTU (SDWR)

Table 6-7 Turbidity results by locality 2011/12

Turbidity

Locality	Sampling Frequency	No. of Samples	Maximum result (NTU)	Average	95% UCL of Mean	Compliant (Yes / No)
ALLANSFORD	Weekly	52	8.8	0.5	0.9	Yes
BALMORAL	Weekly	52	0.8	0.3	0.3	Yes
CAMPERDOWN (RURAL)	Weekly	52	3.1	0.2	0.4	Yes
CAMPERDOWN (URBAN)	Weekly	51#	0.5	0.2	0.2	Yes
CARAMUT	Weekly	52	2.7	0.2	0.3	Yes
CASTERTON	Weekly	52	7.4	0.3	0.6	Yes
CAVENDISH	Weekly	52	1.8	0.8	0.9	Yes
COBDEN	Weekly	53	2.0	0.2	0.3	Yes
COLERAINE	Weekly	52	4.8	0.2	0.4	Yes
DARTMOOR	Weekly	52	0.1	0.1	<0.1	Yes
DERRINALLUM	Weekly	52	0.6	0.2	0.2	Yes
DUNKELD	Weekly	52	1.6	0.3	0.4	Yes
GLENTHOMPSON	Weekly	52	8.5	0.5	0.8	Yes
HAMILTON	Weekly*	104	0.6	0.2	0.2	Yes
HEYWOOD	Weekly	52	0.9	0.4	0.4	Yes
KOROIT	Weekly	52	1.9	0.3	0.4	Yes
LISMORE	Weekly	52	1.8	0.2	0.3	Yes
MACARTHUR	Weekly	52	1.6	0.2	0.2	Yes
MERINO	Weekly	52	1.0	0.1	0.2	Yes
MORTLAKE	Weekly	52	1.7	0.2	0.3	Yes
NOORAT/GLENORMISTON	Weekly	52	0.3	0.1	0.1	Yes
PAARATTE	Weekly	52	0.4	0.2	0.2	Yes
PENSHURST	Weekly	52	2.0	0.2	0.3	Yes
PETERBOROUGH	Weekly	52	2.3	0.2	0.3	Yes
PORT CAMPBELL	Weekly	52	0.4	0.2	0.2	Yes
PORT FAIRY	Weekly*	104	6.0	0.3	0.4	Yes
PORTLAND	Weekly*	103#	3.7	0.2	0.3	Yes
PUENIM	Weekly	52	2.6	1.4	1.6	Yes
SANDFORD	Weekly	52	1.4	0.1	0.2	Yes
SIMPSON	Weekly	52	1.8	0.4	0.6	Yes
TARRINGTON	Weekly	52	2.6	0.3	0.4	Yes
TERANG	Weekly	52	0.3	0.1	0.1	Yes
TIMBOON	Weekly	52	2.4	0.2	0.3	Yes
WARRNAMBOOL	Weekly*	156	7.2	0.3	0.4	Yes

* Weekly sampling with increases for population (ADWG, Section 9.5.2)

Two samples were missed (7/10/2011 and 4/12/2011).

All systems were compliant with the requirement of the regulations.

Fluoride

Standard All samples of drinking water collected within a locality not exceeding 1.5 mg/L (ADWG – Health). The *Health (Fluoridation) Act 1973* states that the annual average (mean) for fluoride on drinking water must not exceed a level of 1 mg/L.

Table 6-8 Fluoride results by locality 2011/12

Fluoride

Locality	Sampling Frequency	No. of Samples	Maximum result	Minimum Result	Average	Compliant (Yes / No)
ALLANSFORD	Weekly+	51	1.10	0.05	0.91	Yes
CAMPERDOWN (RURAL)	Yearly	4	<0.05	<0.05	<0.05	Yes
CAMPERDOWN (URBAN)	Yearly	4	<0.05	<0.05	<0.05	Yes
DERRINALLUM	Yearly	4	<0.05	<0.05	<0.05	Yes
DUNKELD*^	Weekly+	51	0.68	<0.05	0.42	Yes
HAMILTON*^	Weekly+	102	0.96	<0.05	0.37	Yes
KOROIT	Weekly+	52	1.10	<0.05	0.91	Yes
LISMORE	Yearly	4	<0.05	<0.05	<0.05	Yes
MACARTHUR	Yearly	4	0.43	0.33	0.39	Yes
PORTLAND*	Weekly	101	1.10	0.61	0.94	Yes
TARRINGTON^	Weekly+	51	0.74	0.05	0.36	Yes
WARRNAMBOOL*	Weekly+	153	1.10	0.44	0.92	Yes

+ Fluoride added to drinking water supply. Results from other localities are background levels of naturally occurring fluoride.

* More than one sample site was analysed for fluoride

^ Due to a range of operational/contractual issues, the required optimal dose of fluoride was not achieved during the reporting period in the localities of Dunkeld, Hamilton and Tarrington.

All fluoride readings during the reporting complied with the health-based guideline value in ADWG, and no locality exceeded the maximum mean value detailed in the *Health (Fluoridation) Act 1973*.

Other - May Pose A Risk To Human Health.

Manganese Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 0.5 mg/L (ADWG)

Table 6-9 Manganese results by locality 2011/12

Manganese

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Quarterly	12	0	0.019	Yes
BALMORAL	Weekly	12	0	0.067	Yes
CAMPERDOWN (RURAL)	Quarterly	12	0	0.003	Yes
CAMPERDOWN (URBAN)	Quarterly	12	0	0.009	Yes
CARAMUT	Quarterly	12	0	<0.002	Yes
CASTERTON	Weekly	51	0	0.017	Yes
CAVENDISH	Quarterly	12	0	<0.002	Yes
COBDEN	Weekly	51	0	0.059	Yes
COLERAINE	Weekly	51	0	0.027	Yes
DARTMOOR	Quarterly	12	0	<0.002	Yes
DERRINALLUM	Quarterly	12	0	0.002	Yes
DUNKELD	Quarterly	12	0	0.013	Yes
GLENTHOMPSON	Weekly	12	0	0.012	Yes
HAMILTON	Quarterly * #	23	0	0.013	Yes
HEYWOOD	#				Yes S
KOROIT	Quarterly	12	0	0.022	Yes
LISMORE	Quarterly	12	0	<0.002	Yes
MACARTHUR	Quarterly	51	0	0.010	Yes
MERINO	Weekly	51	0	0.065	Yes
MORTLAKE	Quarterly	12	0	0.014	Yes
NOORAT/GLENORMISTON	Quarterly	12	0	0.024	Yes
PAARATTE	Quarterly	12	0	<0.002	Yes
PENSHURST	Quarterly	12	0	0.007	Yes
PETERBOROUGH	Quarterly	12	0	<0.002	Yes
PORT CAMPBELL	Quarterly	51	0	<0.002	Yes
PORT FAIRY	Weekly	12	0	0.047	Yes
PORTLAND	Monthly	12	0	0.006	Yes
PURNIM	Weekly	12	0	0.013	Yes
SANDFORD	Weekly	51	0	0.032	Yes
SIMPSON	Quarterly	12	0	0.007	Yes
TARRINGTON	Quarterly	12	0	0.006	Yes
TERANG	Quarterly	12	0	0.004	Yes
TIMBOON	Quarterly A	12	0	0.260	Yes
WARRNAMBOOL	Quarterly*	36	0	0.018	Yes

- A Single exceedance of aesthetic limit.
 # Samples missed due to scheduling error.
 S Source water was compliant

Lead Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 0.01 mg/L" (ADWG)

Table 6-10 Lead results by locality 2011/12

Lead

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Monthly	12	0	<0.001	Yes
BALMORAL	Monthly	12	0	<0.001	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	<0.001	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	<0.001	Yes
CARAMUT	Monthly	12	0	<0.001	Yes
CASTERTON	Monthly	12	0	0.002	Yes
CAVENDISH	Monthly	12	0	<0.001	Yes
COBDEN	Monthly	11	0	<0.001	Yes
COLERAINE	Monthly	12	0	0.001	Yes
DARTMOOR	Monthly	12	0	0.002	Yes
DERRINALLUM	Monthly	12	0	<0.001	Yes
DUNKELD	Monthly	12	0	0.001	Yes
GLENTHOMPSON	Monthly	12	0	<0.001	Yes
HAMILTON	Monthly * #	23	0	<0.001	Yes
HEYWOOD	#	0			Yes S
KOROIT	Monthly	12	0	<0.001	Yes
LISMORE	Monthly	12	0	<0.001	Yes
MACARTHUR	Monthly	12	0	0.007	Yes
MERINO	Monthly	12	0	<0.001	Yes
MORTLAKE	Monthly	12	0	<0.001	Yes
NOORAT/GLENORMISTON	Monthly	12	0	<0.001	Yes
PAARATTE	Monthly	12	0	<0.001	Yes
PENSHURST	Monthly	12	0	<0.001	Yes
PETERBOROUGH	Monthly	12	0	<0.001	Yes
PORT CAMPBELL	Monthly	12	0	<0.001	Yes
PORT FAIRY	Monthly	12	0	0.002	Yes
PORTLAND	Monthly	12	0	<0.001	Yes
PURNIM	Monthly	12	0	0.001	Yes
SANDFORD	Monthly	12	0	<0.001	Yes
SIMPSON	Monthly	12	0	<0.001	Yes
TARRINGTON	Monthly	12	0	0.001	Yes
TERANG	Monthly	12	0	<0.001	Yes
TIMBOON	Monthly	12	0	<0.001	Yes
WARRNAMBOOL	Monthly*	36	0	0.001	Yes

* More than one sample

Sample missed due to scheduling error

S Source water was compliant

All localities recorded levels of lead less than the ADWG health-related guideline value of 0.01 mg/L during 2011/12.

Copper Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 2 mg/L (ADWG)

Table 6-11 Copper results by locality 2011/12

Copper

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Monthly	12	0	0.036	Yes
BALMORAL	Monthly	12	0	0.053	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.003	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.008	Yes
CARAMUT	Monthly	12	0	0.052	Yes
CASTERTON	Monthly	12	0	0.140	Yes
CAVENDISH	Monthly	12	0	0.008	Yes
COBDEN	Monthly#	11	0	0.011	Yes
COLERAINE	Monthly	12	0	0.260	Yes
DARTMOOR	Monthly	12	0	0.039	Yes
DERRINALLUM	Monthly	12	0	0.004	Yes
DUNKELD	Monthly	12	0	0.025	Yes
GLENTHOMPSON	Monthly	12	0	0.012	Yes
HAMILTON	Monthly * #	23	0	0.020	Yes
HEYWOOD	#				Yes S
KOROIT	Monthly	12	0	0.047	Yes
LISMORE	Monthly	12	0	0.002	Yes
MACARTHUR	Monthly	12	0	0.028	Yes
MERINO	Monthly	12	0	0.024	Yes
MORTLAKE	Monthly	12	0	0.012	Yes
NOORAT/GLENORMISTON	Monthly	12	0	0.044	Yes
PAARATTE	Monthly	12	0	0.010	Yes
PENSHURST	Monthly	12	0	0.016	Yes
PETERBOROUGH	Monthly	12	0	0.003	Yes
PORT CAMPBELL	Monthly	12	0	0.006	Yes
PORT FAIRY	Monthly	12	0	0.014	Yes
PORTLAND	Monthly	12	0	0.010	Yes
PURNIM	Monthly	12	0	0.079	Yes
SANDFORD	Monthly	12	0	0.055	Yes
SIMPSON	Monthly	12	0	0.019	Yes
TARRINGTON	Monthly	12	0	0.004	Yes
TERANG	Monthly	12	0	0.009	Yes
TIMBOON	Monthly	12	0	0.011	Yes
WARRNAMBOOL	Monthly*	36	0	0.034	Yes

* More than one sample

Sample missed due to scheduling error

S Source water was compliant

Arsenic Results

Standard All samples of drinking water collected within a locality in any 12 month period having a concentration less than 0.01 mg/L (ADWG)

Table 6-12 Arsenic results by locality 2011/12

Arsenic

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Six Monthly	2	0	<0.001	Yes
BALMORAL	Six Monthly	2	0	<0.001	Yes
CAMPERDOWN (RURAL)	Six Monthly	2	0	<0.001	Yes
CAMPERDOWN (URBAN)	Six Monthly	2	0	<0.001	Yes
CARAMUT	Six Monthly	2	0	<0.001	Yes
CASTERTON	Six Monthly	2	0	<0.001	Yes
CAVENDISH	Six Monthly	2	0	<0.001	Yes
COBDEN	Six Monthly	2	0	<0.001	Yes
COLERAINE	Six Monthly	2	0	<0.001	Yes
DARTMOOR	Six Monthly	2	0	<0.001	Yes
DERRINALLUM	Six Monthly	2	0	<0.001	Yes
DUNKELD	Six Monthly	2	0	<0.001	Yes
GLENTHOMPSON	Six Monthly	2	0	<0.001	Yes
HAMILTON	Six Monthly	2	0	<0.001	Yes
HEYWOOD	Six Monthly	2	0	<0.001	Yes
KOROIT	Six Monthly	2	0	<0.001	Yes
LISMORE	Six Monthly	2	0	<0.001	Yes
MACARTHUR	Weekly	51	2	0.031	No
MERINO	Six Monthly	2	0	<0.001	Yes
MORTLAKE	Monthly	12	0	0.001	Yes
NOORAT/GLENORMISTON	Six Monthly	2	0	<0.001	Yes
PAARATTE	Six Monthly	2	0	<0.001	Yes
PENSHURST	Six Monthly	2	0	0.002	Yes
PETERBOROUGH	Six Monthly	2	0	<0.001	Yes
PORT CAMPBELL	Six Monthly	2	0	<0.001	Yes
PORT FAIRY	Six Monthly	2	0	0.003	Yes
PORTLAND	Six Monthly	2	0	<0.001	Yes
PURNIM	Six Monthly	2	0	<0.001	Yes
SANDFORD	Six Monthly	2	0	<0.001	Yes
SIMPSON	Six Monthly	2	0	<0.001	Yes
TARRINGTON	Six Monthly	2	0	<0.001	Yes
TERANG	Six Monthly	2	0	<0.001	Yes
TIMBOON	Six Monthly	2	0	<0.001	Yes
WARRNAMBOOL	Six Monthly	2	0	<0.001	Yes

Non-Compliance Regarding Arsenic

Macarthur exceeded arsenic compliance in 2011/12. The exceedence was due to coagulant dosing (ferric chloride) being switched off. Refer to Table 7-2 for actions taken in response to the incident.

Chlorite

Wannon Water does not disinfect with chlorine dioxide therefore this parameter is not included in the testing regime.

Cadmium, Nickel, Antimony, Chromium Results

Cadmium, nickel, antimony, chromium are metals that may be associated with the corrosion of plumbing fixtures. Customer taps in all localities, with the exception of Heywood, were monitored on a monthly basis. In 2011/12 all localities recorded levels of antimony, cadmium, nickel and chromium less than the ADWG health-related guideline values.

Table 6-13 - Cadmium, nickel, antimony and chromium sampling summary

Parameter	No. of samples
Antimony	419
Cadmium	419
Chromium	419
Nickel	419

Barium, Boron, Cyanide, Mercury, Molybdenum, Selenium and Silver Results

Barium, boron, cyanide, mercury, molybdenum, selenium, and silver are heavy metals. Customer taps in all localities were monitored on a six monthly basis. In 2011/12 all localities recorded levels of barium, boron, cyanide, mercury, molybdenum, selenium and silver less than the ADWG health-related guideline value.

Table 6-14 - Barium, boron, cyanide, mercury, molybdenum, selenium and silver sampling summary

Parameter	No. of samples
Barium	68
Boron	68
Cyanide	68
Mercury	68
Molybdenum	68
Selenium	68
Silver	68

Nitrate and Nitrite Results

Nitrate and nitrite can occur naturally or via contamination from intensive farming or sewage effluent. Customer taps at all localities were monitored. The frequency of monitoring is dependent on risk and varies from weekly to monthly. The health-related guideline values in the ADWG for nitrate as N is 11 mg/L and nitrite as N

is 0.9 mg/L. In 2011/12 all systems recorded levels of nitrate and nitrite less than the ADWG health-related guideline.

Table 6-15 - Nitrate and nitrate sampling summary

Parameter	No. of samples
Nitrate	1361
Nitrite	1361

Radionuclides - Gross Beta, Gross Alpha Radioactivity Results

Wannon Water monitors its raw water for Radionuclides. The frequency is every two years for groundwater and every five years for surface water. Radionuclides were sampled in 2010/11 therefore were not scheduled for sampling in 2011/12.

Pesticide Results

Wannon Water monitored a number of pesticides in the raw waters of each locality (Table 6-16). Pesticides were monitored in all rivers/creeks, open reservoirs and bores. The frequency of sampling is dependent on the risk of pesticides being present in the raw water source. In 2011/12 all localities recorded levels of pesticides less than the ADWG health-related guideline values.

Table 6-16 Pesticide sampling summary

Scan	No. of samples
Pesticide Scan	80
Herbicide Scan 1	80
Herbicide scan 4	80
Multi-residue pesticide	80

Pesticide Scan: This scan includes 4,4-DDD, 4,4-DDE, 4,4-DDT, aldrin, BHC (alpha isomer), BHC (beta isomer), BHC (delta isomer), chlordane (total), Cis-chlordane, dieldrin, endosulphan I, endosulphan II, endosulfan sulphate, endrin, endrin aldehyde, endrin keton, hexachlorobenzene (HCB), heptachlor, heptachlor epoxide, lindane, methoxychlor, oxychlordane and trans-chlordane

Herbicide Scan 1; This scan includes 2,4,5-T, 2,4,5-TP, 2,4,6-T, 2,4-D, 2,4-DB, 2,4-DP, 2,6-D, 4-chlorophenoxy acetic acid, dicamba, MCPA, MCPB, mecoprop and trichlopyr

Herbicide Scan 4: This scan includes ametryn, atrazine, prometon, prometryn, propazine, simazine, simetryn, terbutryn and terbutylazine

Multi-residue pesticide: This scan includes chlorprifos, hexazinone, molinate, propiconazole and temephos

Table 6-17 Pesticide water supply system sampling frequencies for 2011/12

Water supply system	Raw water source	Sampling frequency
Allansford, Camperdown (Rural), Camperdown (Urban), Cobden, Derrinallum, Koroit, Lismore, Mortlake, Noorat/Glenormiston Simpson, Terang, Warrnambool	Arkins Creek East	Quarterly
	Arkins Creek West	Quarterly
	Carlisle River Bore 1	Quarterly
	Carlisle River Bore 2	Quarterly
	First Creek	Quarterly
	Gellibrand River – Carlisle	Quarterly
	Gellibrand River – upstream of Kennedy's Creek	Quarterly
Allansford, Koroit, Warrnambool	Plantation Road Storage	Quarterly
Camperdown (Rural), Camperdown (Urban), Derrinallum, Lismore	Donald's Hill Reservoir	6 Monthly
Allansford, Koroit, Mortlake, Noorat/Glenormiston, Terang, Warrnambool	Ewen's Hill Reservoir	6 Monthly
Allansford, Koroit, Warrnambool	Albert Park Bore	Quarterly
	Brierly Basin	6 Monthly
	Warrnambool Raw Water Storage	6 Monthly
	Warrnambool Storage 1	6 Monthly
	Warrnambool Storage 2	6 Monthly
Allansford, Koroit, Purnim, Warrnambool	Tank Hill	6 Monthly
Simpson	Simpson Basin	6 Monthly
Cobden	Cobden Basin	6 Monthly
Mortlake	Absolom's Bore	Quarterly
Dunkeld, Hamilton, Tarrington	Grampians National Park Victoria range streams	2 Monthly
	Hamilton Headworks Bore	2 Monthly
Dunkeld, Hamilton, Tarrington	Raw Water Hamilton WTP	6 Monthly
	Cruckoor Reservoir	6 Monthly
Cavendish	Cavendish Service Basin	6 Monthly
Balmoral	Harrow Road Basin	Quarterly
Glenthompson	Glenthompson Reservoir	Quarterly
Caramut	Caramut Bores	Quarterly
Casterton, Coleraine, Merino, Sandford	Tullich Bores	Quarterly
Penshurst	Penshurst Bores	Quarterly

Polycyclic Aromatic Hydrocarbon Results

Polycyclic aromatic hydrocarbons (PAH) were monitored at customer taps in all localities on a six monthly basis.

Table 6-18 lists the suite of polycyclic aromatic hydrocarbons monitored. All test results were below the limit of detection.

Table 6-18 PAH sampling summary

Parameter	No. of samples
Acenaphthene	70
Acenaphthylene	70
Anthracene	70
Benz(a)anthracene	70
Benzo(a)pyrene	70
Benzo(b)fluoranthene	70
Benzo(g,h,i)perylene	70
Benzo(k)fluoranthene	70
Chrysene	70
Dibenz(a,h)anthracene	70
Fluoranthene	70
Fluorene	70
Indeno(1,2,3-cd)pyrene	70
Naphthalene	70
Phenanthrene	70
Pyrene	70
Total PAH	70

Organic Chemicals Results

Organic chemicals were monitored at customer taps in all localities on a six monthly basis. Table 6-19 lists the suite of chemicals tested. The frequency of monitoring is dependent on risk and varies from monthly to annually. The majority of parameters returned a result less detection limits. All parameters were below the relevant health-related guideline value. Table 6-20 lists the organic chemicals associated with water treatment monitored during 2011/12.

Table 6-19 Organic chemical sampling summary

Scan	No. of samples
Industrial Chemicals W-VOC-U	70

This scan includes 1,1-dichloroethane, 1,1-dichloroethene, 1,1,1,2-tetrachloroethane, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloropropene, 1,2-dichloroethane, 1,2,3-trichlorobenzene, 1,2,3-trichloropropane, 1,2,4-trichlorobenzene, 1,2,4-trimethylbenzene, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, 1,2-dichlorobenzene, 1,2-dichloropropane, 1,3,5-trimethylbenzene, 1,3-dichlorobenzene, 1,3-dichloropropane, 1,4-dichlorobenzene, 2,2-dichloropropane, 2-chlorotoluene, 4-chlorotoluene, benzene, bromobenzene, bromochloromethane, carbon disulphide, carbon tetrachloride, chlorobenzene, cis-1,2-dichloroethene, cis-1,3-dichloropropene, di (2-ethylhexyl) adipate, di(2-ethylhexyl) phthalate, dibromomethane, ethylbenzene, hexachlorobutadiene, isopropylbenzene, M&P xylene, methylenechloride, N-butylbenzene, N-propylbenzene, O-xylene, P-isopropyltoluene, sec-butylbenzene, styrene, tert-butylbenzene, tetrachloroethene, toluene, total xylene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, tributyltin as Sn, trichloroethene, vinyl chloride

Table 6-20 Organic chemical summary – associated with water treatment sampling summary

Parameter	Sampling frequency
1,1,1-Trichloropropan-2-one	Annually
1,1,3-Trichloropropan-2-one	Annually
1,1-Dichloropropan-2-one	Annually
1,3-Dichloropropan-2-one	Annually
2,4,6-Trichlorophenol	Quarterly
2,4-Dichlorophenol	Quarterly
2-Chlorophenol	Quarterly
Acrylamide	Quarterly
Carbon tetrachloride	Quarterly
Chloropicrin	Quarterly
Cyanogen Chloride	Quarterly
Epichlorohydrin	Quarterly
Trichloroacetaldehyde	Quarterly/monthly

Sulphate Results

Sulphate can occur naturally or via treatment chemicals. Raw water at all localities were monitored. The frequency of monitoring is dependent on risk and varies from monthly to quarterly. The health-related guideline value in the ADWG for sulphate is 500 mg/L. In 2011/12 all systems recorded levels of sulphate less than the ADWG health-related guideline.

Table 6-21 - Sulphate sampling summary

Parameter	No. of samples
Sulphate	257

Naegleria and Mycobacteria

Wannon Water's localities that are supplied by bore water with an elevated temperature are sampled on a monthly basis for the free-living amoeboflagellate genus *Naegleria* and *Mycobacterium kansasii*, a bacterium in the Mycobacteria genus. All samples collected at customers taps had zero organisms and were compliant. The frequency of samples was reduced after a risk review was conducted during 2011/12.

Table 6-22 *Naegleria* and *M. kansasii* results by locality 2011/12

Locality	No. of samples <i>Naegleria</i>	No. of samples <i>M. kansasii</i>
Heywood	10	12
Port Campbell	9	11#
Port Fairy*	20	23#
Portland*	18	23#

* more than one sample taken

missed sample

Algae Results

During 2011/12 Wannon Water collected samples on a fortnightly basis from all raw water storages and permanent rivers that supply raw water to drinking water localities. These samples were sent to a NATA certified laboratory for algal identification and counts. The sampling frequency was increased if blue green algae were detected and the numbers were noted to be increasing. Raw water sources were isolated if possible.

The Blue-Green Algae Circular 2011 -12

(Department of Sustainability and Environment) lists the following triggers for action and notification to the Department of Health of a blue green algae (BGA) incident as:

- Total microcystins ≥ 1.3 ug/L
- ≥ 6500 cells/mL *Microcystis aeruginosa*
- Total combined biovolume of known toxic species ≥ 0.6 mm³/L
- Total combined biovolume of all cyanobacterial > 10 mm³/L OR
- Bloom may cause widespread public complaint for example through taste and odour

Aesthetic Parameters

Many aesthetic parameters are monitored in the Wannon Water systems. A summary of the results is reported below. Wannon Water has set an internal Key Performance Indicator (KPI) for aesthetic water quality compliance. This KPI is 90% of aesthetic parameters that are controllable by current treatment plants operations or field operation to be less than the aesthetic limits set within the ADWG. For 2011/12 Wannon Water achieved 90.5% and was compliant (by its own assessment) with the aesthetic KPI.

Wannon Water has invested a significant amount of work including plant upgrades, maintenance, flushing programs, optimisation, calculation tools and operator education to manage aesthetics. More details on these steps are discussed under each section below.

pH

Compliance Summary

- Refer to Table 6-23
- 90% of samples collected from sites during 2011/12 which were controllable by treatment plant operations, were less than 8.5 and greater than 6.5 pH units as recommended in the ADWG.
- 97% of all pH samples collected from sites during 2011/12 which were controllable by treatment plant operations, were less than 9.2 and greater than 6.5 pH units as recommended in the ADWG providing monitoring shows that there is no deterioration in microbiological quality.
- Balmoral, Cavendish and Glenthompson - pH increases are due to long detention times in the cement lined mains. There is a regular flushing program to reduce the detention times.
- Derrinallum and Lismore - Carbon dioxide dosing at the Camperdown Water Treatment Plant has been unable to suitably reduce the pH. There is capital expenditure in the next Water Plan to address this ongoing issue.

Hardness

Compliance Summary

- Refer to Table 6-24
- Hardness is not controllable by treatment processes at any of Wannon Water's localities.
- The Casterton supply system, Dartmoor, Macarthur and Peshurst are all sourced from groundwater. The levels of hardness are typical of these systems. All systems are between 200-500 mg/L and hence can have scaling problems.

- The Macarthur community was consulted about treatment options to reduce hardness prior to moving from a regulated water supply to a drinking water supply. The community voted against these treatment processes.
- There are no plans to implement changes in water treatment that will improve the level of hardness at any of these localities.

Iron

Compliance Summary

- Refer to Table 6-25
- 99% of samples collected from sites during 2011/12 which were controllable by treatment plant operations were less than 0.3 mg/L as recommended in the ADWG.
- All exceedances were isolated incidents, the response action is indirect, being to flush if field tests indicate turbidity or colour issues or if a customer contact is received.

Colour

Compliance Summary

- Refer to Table 6-26
- 100% of samples collected from sites during 2011/12 which were controllable by treatment plant operations were less than 15 HU as recommended in the ADWG.
- Cavendish - The colour of the Cavendish supply is derived from the raw source water of the Grampians Headworks. Surface water run-off, particularly the initial flows, tends to be high in colour. Cavendish is a disinfection-only plant and therefore there is no capacity for colour removal.
- All exceedances were isolated; the response action is to flush if field tests indicate colour issues or if a customer contact is received.

Ammonia

Compliance Summary

- Refer to Table 6-27
- 65% of samples collected from sites which were controllable by treatment plant operations, were less than 0.41 mg/L of ammonia as N as recommended in the ADWG. This is the same as 2010/11.
- The Warrnambool supply system, Balmoral, Camperdown supply system, Cavendish, Glenthompson, Hamilton supply system, Terang supply system are all chloraminated systems.
- Port Fairy and Portland have naturally occurring ammonia.

Chloride, Sodium and Total Dissolved Solids

Compliance Summary

- Refer to Tables 6-28, 6-29 and 6-30.
- Chloride, sodium and total dissolved solids are not controllable by treatment processes at any of Wannon Water's localities.
- The Casterton supply system, Heywood, Macarthur, Penshurst, Port Fairy and Portland

are all sourced from groundwater. The levels are typical of these systems.

- There are no plans to implement changes in water treatment that will improve the level of hardness at any of these localities.

Zinc

Compliance Summary

- Refer to Table 6-31
- 100% of samples collected were less than 3 mg/L as recommended by the ADWG.

pH

Guideline The guideline limit for pH is 6.5-8.5 pH units. There is no health-based guideline.

Description A pH of less than 6.5 may be corrosive; greater than pH 8 progressively decreases efficiency of chlorination, greater than 8.5 may cause scale and taste problems. New concrete tanks and cement-mortar lined pipes can significantly increase pH and a value of up to 9.2 may be tolerated provided monitoring indicates no deterioration in microbial quality.

Table 6-23 pH results by locality 2011/12

pH					
Locality	Sampling Frequency	No. of Samples	Max (pH units)	Min (pH units)	Compliant (Yes / No)
ALLANSFORD	Weekly	51	7.9	7.1	Yes
BALMORAL	Weekly	51	9.4	7.1	No
CAMPERDOWN (RURAL)	Weekly	51	8.6	6.8	Yes ^a
CAMPERDOWN (URBAN)	Weekly	51	7.3	6.6	Yes
CARAMUT	Weekly	51	8.8	7.6	Yes ^a
CASTERTON	Weekly	51	7.9	7.2	Yes
CAVENDISH	Weekly	51	9.8	7.9	No
COBDEN	Weekly	51	8.1	7.0	Yes
COLERAINE	Weekly	51	8.0	7.5	Yes
DARTMOOR	Weekly	51	7.8	7.4	Yes
DERRINALLUM	Weekly	51	10.3	7.4	No
DUNKELD	Weekly	51	7.6	6.6	Yes
GLENTHOMPSON	Weekly	51	9.3	7.5	No
HAMILTON	Weekly *	102	7.8	6.6	Yes
HEYWOOD	Weekly	51	8.6	8.2	Yes ^a
KOROIT	Weekly	51	7.6	7.0	Yes
LISMORE	Weekly	51	9.2	7.3	No
MACARTHUR	Weekly	51	8.3	7.9	Yes
MERINO	Weekly	51	7.9	7.5	Yes
MORTLAKE	Weekly	51	8.2	7.3	Yes
NOORAT/GLENORMISTON	Weekly	51	8.8	6.6	Yes ^a
PAARATTE	Weekly	51	8.3	7.7	Yes
PENSHURST	Weekly	51	8.6	7.8	Yes ^a
PETERBOROUGH	Weekly	51	8.3	7.7	Yes
PORT CAMPBELL	Weekly	51	8.2	7.6	Yes
PORT FAIRY	Weekly *	102	8.6	8.2	Yes ^a
PORTLAND	Weekly *	102	8.8	8.2	Yes ^a
PURNIM	Weekly	51	7.2	6.8	Yes
SANDFORD	Weekly	51	7.9	7.3	Yes
SIMPSON	Weekly	51	7.6	6.9	Yes
TARRINGTON	Weekly	51	7.8	6.2	No
TERANG	Weekly	51	7.7	7.1	Yes
TIMBOON	Weekly#	49	8.2	7.2	Yes
WARRNAMBOOL	Weekly * #	153	8.5	6.8	Yes ^a

* More than one sample

Sample missed

^a Considered to be compliant as there was no deterioration in microbial quality

Hardness Results

Guideline The guideline limit for hardness is 200 mg/L as calcium carbonate (CaCO₃). There is no health based guideline.

Description Caused by calcium and magnesium salts. Hard water is difficult to lather.

Less than 60 mg/L CaCO₃ – soft but possible corrosive

60-200 mg/L CaCO₃ – good quality

200-500 mg/L CaCO₃ – increasing scaling problems

Greater than 500 mg/L CaCO₃ – severe scaling

Table 6-24 Hardness as CaCO₃ results by locality 2011/12

Total Hardness as CaCO₃

Locality/ Water Supply System	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L CaCO ₃)	Compliant (Yes / No)
BALMORAL	Quarterly	4	0	67	Yes
CAMPERDOWN (RURAL)	Quarterly	4	0	46	Yes
CAMPERDOWN (URBAN)	Quarterly	4	0	40	Yes
CARAMUT	Quarterly	4	0	110	Yes
CASTERTON SUPPLY SYSTEM (a)	Quarterly	4	4	270	No
CAVENDISH	Quarterly	4	0	49	Yes
COBDEN	Quarterly	4	0	32	Yes
DARTMOOR	Quarterly	4	4	280	No
DERRINALLUM	Quarterly	4	0	54	Yes
GLENTHOMPSON	Quarterly	4	0	87	Yes
HAMILTON SUPPLY SYSTEM (b)	Quarterly	4	0	110	Yes
HEYWOOD	Quarterly	4	0	190	Yes
LISMORE	Quarterly	4	0	48	Yes
MACARTHUR	Quarterly	4	4	330	No
MORTLAKE	Quarterly	4	0	63	Yes
PENSHURST	Quarterly	4	4	410	No
PORT CAMPBELL SUPPLY SYSTEM (c)	Quarterly	4	0	160	Yes
PORT FAIRY	Quarterly	4	0	190	Yes
PORTLAND	Quarterly	8	0	150	Yes
PUENIM	Quarterly	4	0	26	Yes
SIMPSON	Quarterly	4	0	32	Yes
TERANG SUPPLY SYSTEM (d)	Quarterly	4	0	29	Yes
WARRNAMBOOL SUPPLY SYSTEM (e)	Quarterly	4	0	81	Yes

a Casterton supply system includes Casterton, Coleraine, Merino and Sandford

b Hamilton supply system includes Dunkeld, Hamilton and Tarrington

c Port Campbell supply system includes Paaratte, Peterborough, Port Campbell and Timboon

d Terang supply system includes Noorat/Glenormiston and Terang

e Warrnambool supply system includes Allansford, Koroit and Warrnambool

Iron Results

Guideline The guideline value for iron is 0.3 mg/L. There is no health-related guideline value.

Description Occurs naturally in water. Taste threshold is 0.3 mg/L. High concentrations stain laundry and fittings. Iron bacteria cause blockages, taste/odour and corrosion.

Table 6-25 Iron results by locality 2011 /12

Iron

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Monthly	12	2	0.330	No
BALMORAL	Monthly	12	0	0.280	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.070	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.057	Yes
CARAMUT	Monthly	12	0	0.020	Yes
CASTERTON	Weekly	51	0	0.150	Yes
CAVENDISH	Monthly	12	0	0.180	Yes
COBDEN	Weekly	51	0	0.074	Yes
COLERAINE	Weekly	51	0	0.100	Yes
DARTMOOR	Monthly	12	0	0.011	Yes
DERRINALLUM	Monthly	12	0	0.054	Yes
DUNKELD	Monthly	12	1	0.420	No
GLENTHOMPSON	Monthly	12	0	0.190	Yes
HAMILTON	Monthly*	23#	0	0.070	Yes
HEYWOOD		#			Yes S
KOROIT	Monthly	12	1	0.530	No
LISMORE	Monthly	12	0	0.078	Yes
MACARTHUR	Weekly	51	0	0.280	Yes
MERINO	Weekly	51	0	0.084	Yes
MORTLAKE	Monthly	12	1	1.300	No
NOORAT/GLENORMISTON	Monthly	12	1	0.810	No
PAARATTE	Monthly	12	0	0.044	Yes
PENSHURST	Monthly	12	0	0.130	Yes
PETERBOROUGH	Monthly	12	0	0.120	Yes
PORT CAMPBELL	Monthly	12	0	0.083	Yes
PORT FAIRY	Monthly	12	2	0.480	No
PORTLAND	Monthly	12	1	0.490	No
PURNIM	Monthly	13	1	0.400	No
SANDFORD	Weekly	51	2	1.100	No
SIMPSON	Monthly	12	0	0.043	Yes
TARRINGTON	Monthly	12	0	0.079	Yes
TERANG	Monthly	12	0	0.026	Yes
TIMBOON	Monthly	12	0	0.270	Yes
WARRNAMBOOL	Monthly *	36	0	0.180	Yes

*More than one sample taken

Sample missed

S Source water was compliant

Colour

Guideline < 15 HU. There is no health-based guideline.

Description An important aesthetic characteristic for customer acceptance. Treatment processes can be optimised to remove colour.

Table 6-26 True Colour results by locality 2011/12

True Colour

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (Pt-Co)	Compliant (Yes / No)
ALLANSFORD	Weekly	51	0	5	Yes
BALMORAL	Weekly	51	0	10	Yes
CAMPERDOWN (RURAL)	Weekly	51	0	13	Yes
CAMPERDOWN (URBAN)	Weekly	51	0	5	Yes
CARAMUT	Weekly	51	0	7	Yes
CASTERTON	Weekly	51	0	4	Yes
CAVENDISH	Weekly	51	10	27	No
COBDEN	Weekly	51	0	4	Yes
COLERAINE	Weekly	51	0	4	Yes
DARTMOOR	Weekly	51	0	4	Yes
DERRINALLUM	Weekly	51	0	4	Yes
DUNKELD	Weekly	51	0	3	Yes
GLENTHOMPSON	Weekly	51	0	11	Yes
HAMILTON	Weekly *	102	0	4	Yes
HEYWOOD	Weekly	51	0	3	Yes
KOROIT	Weekly	51	1	16	No
LISMORE	Weekly	51	0	4	Yes
MACARTHUR	Weekly	51	0	8	Yes
MERINO	Weekly	51	0	4	Yes
MORTLAKE	Weekly	51	0	8	Yes
NOORAT/GLENORMISTON	Weekly	51	0	5	Yes
PAARATTE	Weekly	51	0	3	Yes
PENSHURST	Weekly	51	0	5	Yes
PETERBOROUGH	Weekly	51	0	5	Yes
PORT CAMPBELL	Weekly	51	0	3	Yes
PORT FAIRY	Weekly *	102	1	25	No
PORTLAND	Weekly *	102	0	6	Yes
PURNIM	Weekly	51	0	10	Yes
SANDFORD	Weekly	51	0	4	Yes
SIMPSON	Weekly	51	0	4	Yes
TARRINGTON	Weekly	51	0	3	Yes
TERANG	Weekly	51	0	4	Yes
TIMBOON	Weekly	51	0	4	Yes
WARRNAMBOOL	Weekly *	153	0	6	Yes

*More than one sample taken

Ammonia

Guideline 0.5 mg/L (0.41 mg/L of ammonia as N) for Ammonia. There is no health-based guideline.

Description Ammonia is added for disinfection. High levels may corrode copper pipes and fittings.

Table 6-27 Ammonia results by locality 2011/12

Ammonia as N

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Weekly	51	4	0.580	No
BALMORAL	Weekly	51	45	1.100	No
CAMPERDOWN (RURAL)	Weekly	51	16	0.610	No
CAMPERDOWN (URBAN)	Weekly	51	2	0.450	No
CARAMUT	Monthly	12	0	0.010	Yes
CASTERTON	Monthly	12	0	0.010	Yes
CAVENDISH	Weekly	51	47	1.800	No
COBDEN	Monthly	11#	0	0.230	Yes
COLERAINE	Monthly	12	0	0.040	Yes
DARTMOOR	Monthly	12	0	0.010	Yes
DERRINALLUM	Weekly	51	0	0.120	Yes
DUNKELD	Weekly	48#	0	0.070	Yes
GLENTHOMPSON	Weekly	51	36	1.000	No
HAMILTON	Weekly*	102	68	0.750	No
HEYWOOD	Monthly	12	0	0.010	Yes
KOROIT	Weekly	51	9	0.590	No
LISMORE	Weekly	51	0	0.130	Yes
MACARTHUR	Monthly	12	0	0.030	Yes
MERINO	Monthly	12	0	0.010	Yes
MORTLAKE	Weekly	51	30	0.860	No
NOORAT/GLENORMISTON	Weekly	51	23	0.580	No
PAARATTE	Monthly	12	0	0.010	Yes
PENSHURST	Monthly	12	0	0.010	Yes
PETERBOROUGH	Monthly	12	0	0.040	Yes
PORT CAMPBELL	Monthly	12	0	0.010	Yes
PORT FAIRY	Weekly*	102	6	0.590	No
PORTLAND	Weekly*	102	30	0.730	No
PURNIM	Monthly	12	0	0.010	Yes
SANDFORD	Monthly	12	0	0.010	Yes
SIMPSON	Monthly	12	0	0.010	Yes
TARRINGTON	Weekly	51	3	0.510	No
TERANG	Weekly	51	45	0.640	No
TIMBOON	Monthly	12	0	0.020	Yes
WARRNAMBOOL	Weekly*	153	62	0.840	No

* More than one sample taken

Sample missed

Chloride

Guideline 250 mg/L. There is no health-based guideline.

Description From natural mineral salts, effluent contamination. High concentrations more common in groundwater and certain catchments.

Table 6-28 - Chloride results by locality or supply system 2011/12

Chloride

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
BALMORAL	Quarterly	4	0	160	Yes
CAMPERDOWN (RURAL)	Quarterly	4	0	51	Yes
CAMPERDOWN (URBAN)	Quarterly	4	0	52	Yes
CARAMUT	Quarterly	4	0	53	Yes
CASTERTON SUPPLY SYSTEM (a)	Quarterly	4	0	180	Yes
CAVENDISH	Quarterly	4	0	130	Yes
COBDEN	Quarterly	4	0	47	Yes
DARTMOOR	Quarterly	4	0	94	Yes
DERRINALLUM	Quarterly	4	0	61	Yes
GLENTHOMPSON	Quarterly	4	0	200	Yes
HAMILTON SUPPLY SYSTEM (b)	Quarterly	4	0	56	Yes
HEYWOOD	Quarterly	4	4	250	No
LISMORE	Quarterly	4	0	55	Yes
MACARTHUR	Quarterly	4	4	1000	No
MORTLAKE	Quarterly	4	0	180	Yes
PENSHURST	Quarterly	4	4	300	No
PORT CAMPBELL SUPPLY SYSTEM (c)	Quarterly	4	0	81	Yes
PORT FAIRY	Quarterly	4	4	350	No
PORTLAND	Quarterly*	8	0	240	Yes
PUENIM	Quarterly	4	0	57	Yes
SIMPSON	Quarterly	4	0	48	Yes
TERANG SUPPLY SYSTEM (d)	Quarterly	4	0	54	Yes
WARRNAMBOOL SUPPLY SYSTEM (e)	Quarterly	4	0	69	Yes

a Casterton supply system includes Casterton, Coleraine, Merino and Sandford

b Hamilton supply system includes Dunkeld, Hamilton and Tarrington

c Port Campbell supply system includes Paaratte, Peterborough, Port Campbell and Timboon

d Terang supply system includes Noorat/Glenormiston and Terang

e Warrnambool supply system includes Allansford, Koroit and Warrnambool

* More than one sample was taken

Sodium

Guideline 180 mg/L. There is no health-based guideline.

Description Natural component of water. Guideline value is taste threshold.

Table 6-29 - Sodium results by locality or supply system 2011/12

Sodium

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
BALMORAL	Quarterly	4	0	94	Yes
CAMPERDOWN (RURAL)	Quarterly	4	0	40	Yes
CAMPERDOWN (URBAN)	Quarterly	4	0	40	Yes
CARAMUT	Quarterly	4	0	49	Yes
CASTERTON SUPPLY SYSTEM (a)	Quarterly	4	0	110	Yes
CAVENDISH	Quarterly	4	0	84	Yes
COBDEN	Quarterly	4	0	44	Yes
DARTMOOR	Quarterly	4	0	69	Yes
DERRINALLUM	Quarterly	4	0	44	Yes
GLENTHOMPSON	Quarterly	4	0	120	Yes
HAMILTON SUPPLY SYSTEM (b)	Quarterly	4	0	53	Yes
HEYWOOD	Quarterly	4	4	220	No
LISMORE	Quarterly	4	0	42	Yes
MACARTHUR	Quarterly	4	4	440	No
MORTLAKE	Quarterly	4	0	160	Yes
PENSHURST	Quarterly	4	0	110	Yes
PORT CAMPBELL SUPPLY SYSTEM (c)	Quarterly	4	0	48	Yes
PORT FAIRY	Quarterly	4	4	430	No
PORTLAND	Quarterly*	8	4	450	No
PURNIM	Quarterly	4	0	39	Yes
SIMPSON	Quarterly	4	0	27	Yes
TERANG SUPPLY SYSTEM (d)	Quarterly	4	0	43	Yes
WARRNAMBOOL SUPPLY SYSTEM (e)	Quarterly	4	0	52	Yes

a Casterton supply system includes Casterton, Coleraine, Merino and Sandford

b Hamilton supply system includes Dunkeld, Hamilton and Tarrington

c Port Campbell supply system includes Paaratte, Peterborough, Port Campbell and Timboon

d Terang supply system includes Noorat/Glenormiston and Terang

e Warrnambool supply system includes Allansford, Koroit and Warrnambool

* More than one sample was taken

Total Dissolved Solids

Guideline 600 mg/L. There is no health-based guideline.

Description Based on taste: Less than 600 mg/L is regarded as good quality drinking water
 600-900 mg/L is regarded as fair quality
 900-1200 mg/L is regarded as poor quality
 Greater than 1200 mg/L is regarded as unacceptable

Table 6-30 - Total dissolved solids results by locality or supply system 2011/12

Total Dissolved Solids

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L CaCO ₃)	Compliant (Yes / No)
BALMORAL	Quarterly	4	0	340	Yes
CAMPERDOWN (RURAL)	Quarterly	4	0	140	Yes
CAMPERDOWN (URBAN)	Quarterly	4	0	120	Yes
CARAMUT	Quarterly	4	0	260	Yes
CASTERTON SUPPLY SYSTEM (a)	Quarterly	4	0	600	Yes
CAVENDISH	Quarterly	4	0	300	Yes
COBDEN	Quarterly	4	0	140	Yes
DARTMOOR	Quarterly	4	0	400	Yes
DERRINALLUM	Quarterly	4	0	180	Yes
GLENTHOMPSON	Quarterly	4	0	460	Yes
HAMILTON SUPPLY SYSTEM (b)	Quarterly	4	0	270	Yes
HEYWOOD	Quarterly	4	4	700	No
LISMORE	Quarterly	4	0	140	Yes
MACARTHUR	Quarterly	4	4	1200	No
MORTLAKE	Quarterly	4	0	270	Yes
PENSHURST	Quarterly	4	4	830	No
PORT CAMPBELL SUPPLY SYSTEM (c)	Quarterly	4	0	420	Yes
PORT FAIRY	Quarterly	4	4	900	No
PORTLAND	Quarterly*	8	4	860	No
PUENIM	Quarterly	4	0	120	Yes
SIMPSON	Quarterly	4	0	120	Yes
TERANG SUPPLY SYSTEM (d)	Quarterly	4	0	120	Yes
WARRNAMBOOL SUPPLY SYSTEM (e)	Quarterly	4	0	210	Yes

a Casterton supply system includes Casterton, Coleraine, Merino and Sandford

b Hamilton supply system includes Dunkeld, Hamilton and Tarrington

c Port Campbell supply system includes Paaratte, Peterborough, Port Campbell and Timboon

d Terang supply system includes Noorat/Glenormiston and Terang

e Warrnambool supply system includes Allansford, Koroit and Warrnambool

* More than one sample was taken

Zinc Results

Guideline 3 mg/L. There is no health based guideline.

Description Usually from corrosion of galvanised pipes/fittings and brasses. Natural concentration general less than 0.01 mg/L. Taste problems greater than 3 mg/L

Table 6-31 - Zinc results by locality 2011/12

Zinc

Locality	Sampling Frequency	No. of Samples	No. of Non-complying samples	Maximum result (mg/L)	Compliant (Yes / No)
ALLANSFORD	Monthly	12	0	0.029	Yes
BALMORAL	Monthly	12	0	0.008	Yes
CAMPERDOWN (RURAL)	Monthly	12	0	0.005	Yes
CAMPERDOWN (URBAN)	Monthly	12	0	0.005	Yes
CARAMUT	Monthly	12	0	0.019	Yes
CASTERTON	Monthly	12	0	0.013	Yes
CAVENDISH	Monthly	12	0	0.006	Yes
COBDEN	Monthly	11#	0	0.008	Yes
COLERAINE	Monthly	12	0	0.012	Yes
DARTMOOR	Monthly	12	0	0.026	Yes
DERRINALLUM	Monthly	12	0	0.003	Yes
DUNKELD	Monthly	12	0	0.015	Yes
GLENTHOMPSON	Monthly	12	0	0.009	Yes
HAMILTON	Monthly*	23#	0	0.012	Yes
KOROIT	Monthly	12	0	0.008	Yes
LISMORE	Monthly	12	0	0.003	Yes
MACARTHUR	Monthly	12	0	0.061	Yes
MERINO	Monthly	12	0	0.009	Yes
MORTLAKE	Monthly	12	0	0.068	Yes
NOORAT/GLENORMISTON	Monthly	12	0	0.009	Yes
PAARATTE	Monthly	12	0	0.008	Yes
PENSHURST	Monthly	12	0	0.017	Yes
PETERBOROUGH	Monthly	12	0	0.005	Yes
PORT FAIRY	Monthly	12	0	0.050	Yes
PORTLAND	Monthly	12	0	0.014	Yes
PURNIM	Monthly	12	0	0.022	Yes
SANDFORD	Monthly	12	0	0.009	Yes
SIMPSON	Monthly	12	0	0.010	Yes
TARRINGTON	Monthly	12	0	0.032	Yes
TERANG	Monthly	12	0	0.008	Yes
TIMBOON	Monthly	12	0	0.010	Yes
WARRNAMBOOL	Monthly*	36	0	0.006	Yes

* More than one sample taken

Sample missed

Analysis of Results

Compliance as a Percentage of Localities

Table 6-32 shows the percentage of localities compliant with each of the Safe Drinking Water Regulation 2005 (SDWR) Schedule 2 parameters, which has been relatively consistent over the past four years. There has been significant improvement in the areas of THMs and aluminium.

Table 6-32 Compliance as a Percentage of Localities

Parameter	% of Localities Receiving Compliant Water			
	2011/12	2010/11	2009/10	2008/09
<i>Escherichia coli</i>	99.85	100	100	100
Trihalomethanes	100	99.5	94	97
Chloroacetic acid	100	100	100	100
Dichloroacetic acid	100	99.5	100	100
Trichloroacetic acid	100	99.5	100	100
Aluminium (acid soluble)	99.1	92.6	85	46
Turbidity	100	100	100	100

The number of localities changed from 33 in 2010/11 to 34 in 2011/12 when Macarthur was added as a drinking water locality effective 1st July 2011.

Compliance as a Percentage of Population

The percentage of Wannon Water customers that were supplied with drinking water that complied with the SDWR Schedule 2 standards are detailed in Table 6-33. The percentage of customers receiving compliant water has remained relatively steady over the past two years for all parameters except acid soluble aluminium, where there was a significant improvement between 2009 and 2012.

Table 6-33 Compliance as a Percentage of Population

Parameter	% of Customers Receiving Compliant Water			
	2011/12	2010/11	2009/10	2008/09
<i>Escherichia coli</i>	99.3	100	100	100
Trihalomethanes	100	99.8	98.4	98.6
Chloroacetic acid	100	100	100	100
Dichloroacetic acid	100	99.7	100	100
Trichloroacetic acid	100	99.8	100	100
Aluminium (acid soluble)	99.9	72.8	72.7	32.3
Turbidity	100	100	100	100

7. EMERGENCY AND INCIDENT MANAGEMENT

Whilst every effort is made to prevent water quality incidents from occurring, there will inevitably be times when things go wrong. Such instances may be due to equipment failure, human error or unforeseen events. Wannon Water has incident management plans to manage such events to ensure the minimum possible impact on water quality. The incident management plans are a component of Wannon Water's Emergency Management Plan which uses the principles of prevention, response and recovery as outlined in the Australian Inter-Service Incidents Management System (AIIMS) structure. The objectives of the Emergency Management Plan are to ensure:

- The safety of customers, employees and the community in general;
- Continuity of operations;
- Protection of the environment; and
- Compliance with legislated and regulatory requirements

Wannon Water undertakes regular training and joint exercises in emergency simulations and emergency management with key stakeholders. These sessions are designed to put systems, processes and facilities into an environment as close as possible to a real event. The exercises provide participants with an opportunity to test communications, planning and management procedures and to include emergency management training.

Section 22 Incidents

The objective of Section 22 of the *Safe Drinking Water Act 2003* is to protect public health. Wannon Water must inform the Department of Health of any potential or actual contaminated water supplied for drinking purposes. Information relating to all Section 22 incidents during 2011/12 is listed in Table 7-2.

Other Incidents

Wannon Water communicates other water quality related incidents to the Department of Health. Information relating to incidents which occurred during 2011/12 is listed in Table 7-3.

Customer Complaints

Wannon Water is actively committed to the successful and efficient management of complaints and disputes to ensure effective customer service.

Wannon Water's Corporate Complaints Management process is a "roadmap" to complaints management allowing for a fair and detailed consideration of complaints and provides for genuine internal review if the complainant remains dissatisfied.

The collection, processing and reporting of Wannon Water's complaints is managed through a customer relationship database; allowing Wannon Water to meet its obligations under the Customer Service Code issued by the Essential Services Commission's reporting principles and is supported by Wannon Water's Customer Charter.

The number of water quality customer complaints has reduced by 50% from last year. This is attributed to:

- Specific resources trouble shooting hot spot townships identified in the 2011/2012 period.
- Increased resourcing meeting the scheduled flushing program for each of Wannon Water localities.
- Improved chemical dosing in a number of towns such as Port Fairy which has stabilized quality within the reticulation.
- Proactive approach taken by Treatment Services Branch to quality trend variances

In 2011 the Port Fairy Township was flushed just prior to Christmas to clean the pipes before the tourist season. In combination with the addition of sequestration, the number of customer complaints from this locality was significantly reduced.

A summary of the complaints received is presented in Table 7-1, with all localities recording less than 1 complaint per 100 customers.

All customer complaints are investigated to determine the cause and significance of the complaint. Operational changes or capital improvements which optimise treated water quality may be implemented in response to valid and significant customer complaints.

In response to a complaint, customers are contacted directly and a site/vicinity inspection conducted. Appropriate action is then taken. This action will vary depending on the nature of the complaint.

Multiple complaints from a single locality are monitored closely. If the number of complaints within the locality exceeds five in any 24 hour period, an incident response team is assembled and the cause investigated. Appropriate actions are then taken using AIIIMS structure and Wannon Water's Emergency Management Plan.

During 2011/12 there were no incidences where more than five water quality complaints were received within any 24 hour period, however there was one instance where more than five enquires were received for coloured water at Warrnambool. Refer to Table 7-3 for more information relating to this event.

Table 7-1 - Customer complaints 2011/12 by type

Type of complaint	No. of complaints	No. of complaints per 100 customers supplied [^]
Discoloured water	29	0.07
Taste/ odour	12	0.03
Blue Water	0	0
Air in Water	2	0.01
Alleged illness [#]	4	0.01
Other	7	0.02

[^] for the purposes of the complaints section, the term "customer" has the same meaning as that used by the Essential Services Commission, that is a customer = a connection

[#] alleged illness complaints include skin irritation.

Incidents Notified pursuant to Section 22 of SDWA

Table 7-2 - Section 22 incidents 2011/12

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
21 June 2011 (15 days) (28/06/11) 5/07/2011	Macarthur	Arsenic – 0.018 mg/L 0.031 mg/L	Macarthur system	Ferric dosing process restored. Tank drained to remove water with elevated arsenic. The reticulation was flushed. A root cause analysis was conducted. A review of the monitoring program and critical control points was conducted. Informed DH of initial and resample results and outcomes of root cause analysis.
5 July 2011 3 August 2011	Cavendish	Aluminium (Acid Soluble) 0.25 mg/L 0.25 mg/L	Cavendish system	Refer to section entitled “Exemption from Water Quality Standards”
29 October 2011 – 1 November 2011 (4 days)	Macarthur	Free chlorine - 7mg/L	Macarthur system	The high level tank was drained and flushed then refilled with correctly dosed fresh water. The reticulation system was flushed. Informed DH of initial and resample results.
3 November 2011	Penshurst	<i>E.coli</i> – 50 orgs/100mL	Penshurst system	Inspected sample site and found illegal connection from private rainwater tank. Backflow prevention installed on rainwater tank. Reticulation flushed prior to receiving result. Resamples taken at site and upstream and downstream of site. No <i>E.coli</i> detected in any samples. Informed DH of initial and resample results. Sample point has been moved to approximately 200m downstream of current site.
16 November 2011	Penshurst	<i>E.coli</i> – 1 orgs/100mL	Penshurst system	Inspection of the sample site and resample. No <i>E.coli</i> detected in the re-sample. Informed DH of initial and resample results.
23 April 2012	Allansford	<i>E.coli</i> - 10 orgs/100mL	Outlet Clear Water Storage Allansford	Inspection of the sample site and resample, no issues found. No <i>E.coli</i> detected in resample. DH notified by section 22. No issues at plant, no customer calls, no mains replacements or bursts in area.
23 May 2012	Balmoral	<i>E.coli</i> - 21 orgs/100mL	118 Coleraine Road Balmoral	Inspection of the sample site and resample, no issues found. No <i>E.coli</i> detected in resample. DH notified by section 22. No issues at plant, no customer calls, no mains replacements or bursts in area.

Other Incidents/Issues

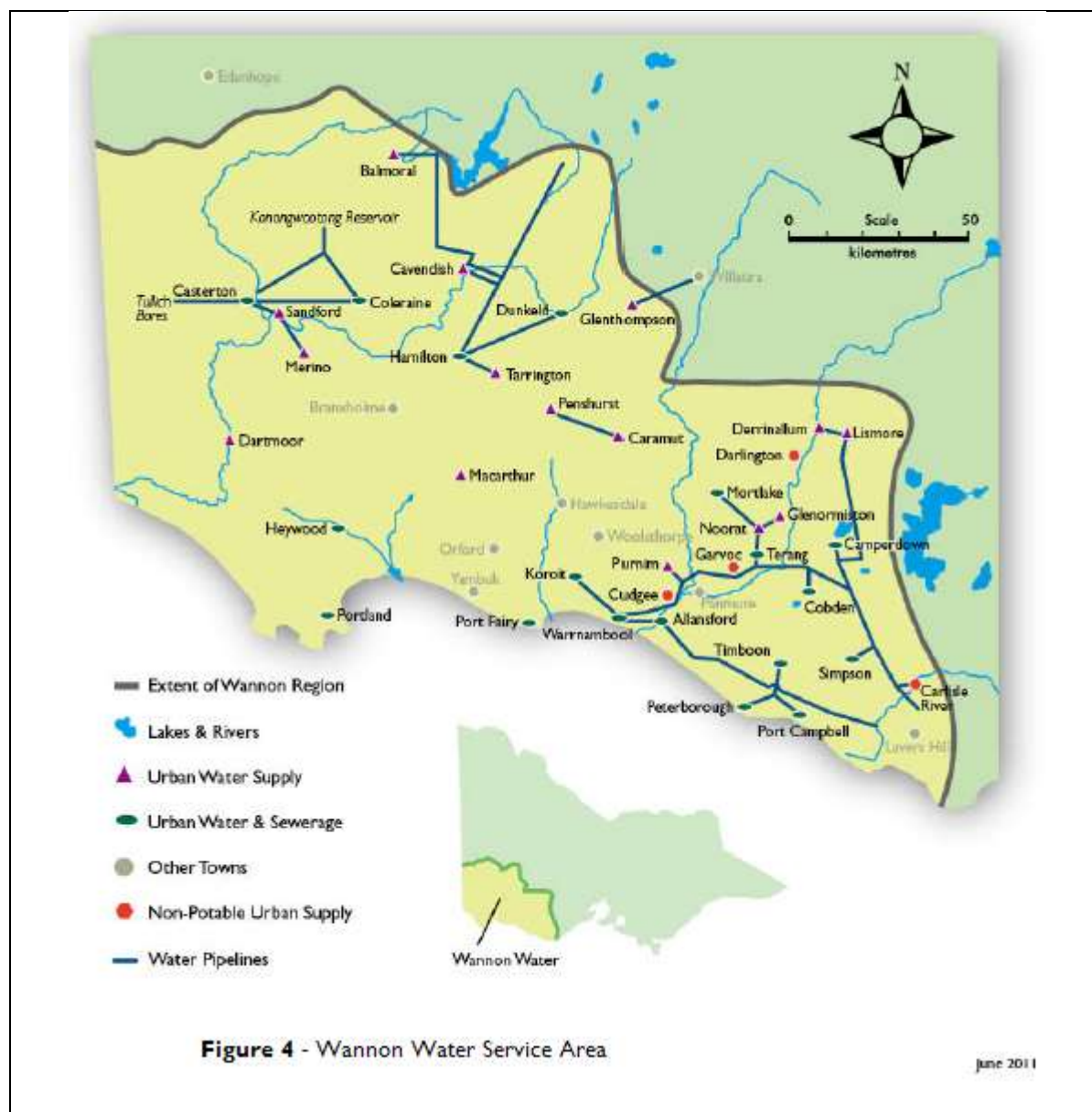
Table 7-3 - Other incidents 2011/12

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
7 April 2011 – 11 April 2011	Warrnambool	Anabaena circinalis -2500 cells/mL and Microcystis sp. – 150 cells/mL	Warrnambool, Koroit and Allansford (Warrnambool system)	Storage was isolated from system.
10 May 2012	Warrnambool	Dirty Water complaints	Central Warrnambool reticulation and CBD	Numerous contacts and 4 dirty water complaints on 10/5/2012 in central Warrnambool. This is a result of 5 valve closures for installation of a flow meter as part of the leak detection program. Customers were communicated with via radio broadcast and the reticulation was flushed at various locations, which resolved the issue.
30 May 2012	Glenthompson	8.5NTU	Uniting Church - Glenelg Highway	Not reported - flushed 2 weeks prior - good chlorine residual of 1.16mg/L when sample was taken. No issues at plant, no customer calls. Area flushed again on 01/06/2012
28 December 2011	Warrnambool	7.2 NTU Turbidity	21 Birdwood Ave	Not reported - flushed that afternoon - good chlorine residual of 1.22mg/L. No issues at plant, no customer calls, no mains replacements or bursts in area.
23 May 2012	Allansford	8.8 NTU Turbidity	5346 Great Ocean Road (Innovation WC&B)	Not reported - flushed that afternoon - good chlorine residual of 0.78mg/L. No issues at plant, no customer calls, no mains replacements or bursts in area. Area flushed 24/05/2012
All year	Hamilton	Fluoride not dosed at the required optimal concentration	Dunkeld, Hamilton and Tarrington	Due to a range of operational/contractual issues, the required optimal dose of fluoride was not achieved during the reporting period in the localities of Dunkeld, Hamilton and Tarrington.

8. GLOSSARY

ADWG	Australian Drinking Water Guidelines (2011)
AIMS	Australian Inter-Service Incidents Management System
BGA	Blue Green Algae
DH	Department of Health Victoria
CCP	Critical control point
GAC	Granulated Activated Carbon
HACCP	Hazard Analysis and Critical Control Point. A system that identifies evaluates and controls hazards.
KPI	Key Performance Indicator
n/a	Not assessed
Mean	The average of a number of numerical values.
ML	Megalitre – one million litres
NATA	National Association of Testing Authorities, Australia.
UCL	Upper Confidence Limit
Raw Water	Water that has not been treated in any way.
Risk Assessment	The overall process of risk identification, risk analysis and risk evaluation. Risk analysis the systematic process to understand the nature of and to deduce the level of risk. Risk evaluation the process of comparing the level of risk against risk criteria.
SDWA	<i>Safe Drinking Water Act 2003</i>
SDWR	Safe Drinking Water Regulations 2005
WHO	World Health Organisation

9. WANNON WATER SERVICE AREA MAP



Information regarding water treatment and the latest water quality information can be obtained from Wannon Water's web site:

www.wannonwater.com.au

Wannon Water published the results of SDWR Schedule 2 parameters for each of the localities on the website on a monthly basis.

Results for additional water quality parameters can be provided upon request from Wannon Water via:

Tel 1300 926 666

Fax 03 5565 6050

Email info@wannonwater.com.au

Address PO Box 1158 Warrnambool Vic 3280