WANNON WATER

Water Quality Annual Report

2017/18

Prepared for the

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Water Program

September 2018

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1. 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 84,000 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.

This 2017/18 Drinking Water Quality annual report has been developed in accordance with the requirements of the *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015. The report highlights the programs and initiatives Wannon Water has in place to provide safe drinking water to the people living in Wannon Water's water sampling localities.

Wannon Water has a comprehensive water quality monitoring program extending across a region of 24,500 square kilometres. Samples are collected from: raw water sources; 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).

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

The 2018 customer value survey showed that 92% of domestic customers were satisfied with the water supply from of Wannon Water, while 79% of customers were satisfied with their water quality.

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, then the Secretary to the Department of Health and Human Services – may 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 2015.

Sources of Water

During 2017/18, 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 1,901 kilometres of water mains.

Wannon Water harvested approximately 14,091 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 three supply systems are supplied/subsidised with raw water supply from another regional water corporation. Specifically Rocklands Reservoir supplies Balmoral and subsidises the Hamilton System and various source water is supplied from the Willaura pipeline to Glenthompson. The Warrnambool supply is also supplemented with an innovative roof water harvesting network collecting rainwater from rooftops in new residential subdivisions. This water is supplied to customers with varying degrees of treatment, dependent on the characteristics of the raw water quality. Wannon Water also provides water to areas outside our catchment to Parks Victoria at the 12 Apostles Visitor Centre. This drinking water supply is taken from one of three drinking water sites.

During 2017/18, Wannon Water continued sanitary surveys for its source waters in accordance with the Safe Drinking Water Regulations 2015. This has enabled catchments to be classified into a category based on the vulnerability for pathogen ingress and complete a Health Based Target (HBT) assessment for all Wannon Water supply systems

Figure 1-1 illustrates the localities and where the water is sourced from. Table 1-1 details: Wannon Water's water sampling localities; the sources of supply; how the water is stored subsequent to treatment and the treatment facilities operated by Wannon Water.

Figure 1-1 - Wannon Water Service Area

Table 1-1 - Source water and treatment systems summary

Water Sampling Locality	Population supplied	Source Water	Raw Water Storage	Treatment Plant	Treated Water Storage
Allansford - via Warrnambool Water Treatment Plant (WTP)	370	Arkins Creeks (3)	Gellibrand Tank	Warrnambool WTP	Allansford clear water storage
		Gellibrand River	South Otway Tank	Allansford Disinfection Plant (DP)	
		Carlisle Bores (2)	Ewen's Hill Reservoir		
		– via North Otway Pipeline	Plantation Rd Storage		
			Tank Hill Reservoir		
		Gellibrand River – South Otway Pipeline	Warrnambool Storage1		
			Warrnambool Storage 2		
		Albert Park Bores (3)	Brierly Basin		
		Roof water (North Warrnambool)	Albert Park Raw Water Storage		
Balmoral	150	Rocklands Reservoir (Grampians Wimmera Mallee Water)	Balmoral Service Basin	Balmoral WTP	Balmoral clear water storage
Camperdown (Rural)	400	Arkins Creeks (3)	Gellibrand Tank	Camperdown WTP	Camperdown (Rural) clear water storage
		Gellibrand River	Donald's Hill Reservoir		
		Carlisle Bores (2)			
		– via North Otway Pipeline			
Camperdown (Urban)	1840	Arkins Creeks (3)	Gellibrand Tank	Camperdown WTP	Camperdown (Urban) service basin
		Gellibrand River	Donald's Hill Reservoir		Mt Leura Tank
		Carlisle Bores (2)			Park Lane elevated storage
		– via North Otway Pipeline			
Caramut	80	Caramut Bores (2)	Caramut Service Basin	Caramut DP	Caramut clear water storage
			Caramut Tank (Raw Water)		
Casterton	990	Tullich Bores (4)	N/A	Casterton WTP	Casterton clear water storage
					Casterton Arundel Road Basin
Cavendish	100	Grampians National Park	Cavendish Service Basin	Cavendish Disinfection Plant	Cavendish clear water storage
		7 streams on the western slopes of the Victoria Range and drought relief bores (2)			
Cobden	900	Arkins Creeks (3)	Gellibrand Tank	Cobden WTP	Cobden clear water storage
		Gellibrand River	Cobden Service Basin		
		Carlisle Bores (2)			
		– via North Otway Pipeline			
Coleraine - via Casterton WTP	620	Tullich Bores (4)	N/A	Casterton WTP	Casterton clear water storage
					Casterton Arundel Road Basin
				Coleraine DP	Coleraine clear water storage
Darlington (Regulated Supply	22	Darlington Bore (1)	Darlington Elevated Tank	Nil Treatment	N/A
Dartmoor	140	Dartmoor Bore (1)	N/A	Dartmoor DP	Dartmoor clear water storage
Derrinallum - via Camperdown WTP	250[2]	Arkins Creeks (3)	Gellibrand Tank	Camperdown WTP	Camperdown (Rural) clear water storage
		Gellibrand River	Donald's Hill Reservoir	Ettrick's Springs DP	Camperdown (Urban) service basin

Water Sampling Locality	Population supplied	Source Water	Raw Water Storage	Treatment Plant	Treated Water Storage
		Carlisle Bores (2)		Lismore/Derrinallum Tank DP	Lismore Tank
		– via North Otway Pipeline			
Dunkeld - via Hamilton WTP		Grampians National Park	Hayes Reservoir	Hamilton WTP	Hamilton clear water storage
		7 streams on the western slopes of the Victoria Range and drought relief bores (2)	Cruckoor Reservoir	Dunkeld DP	
			Hartwichs Reservoir		
			Hamilton Service Basins 1 & 2		
		Rocklands Reservoir (Grampians Wimmera Mallee Water)			Dunkeld Covered Basin
Glenthompson	130	Yuppeckiar Creek Catchment and	Glenthompson Reservoir	Glenthompson WTP	Glenthompson clear water storage
		Grampians Wimmera Mallee Water (32ML supplementary purchase from Willaura Catchment)			
Hamilton	5410	Grampians National Park	Hayes Reservoir	Hamilton WTP	Hamilton clear water storage
		7 streams on the western slopes of the Victoria Range and drought relief bores (2)	Cruckoor Reservoir		
			Hartwichs Reservoir		
			Hamilton Service Basins 1 & 2		
		Rocklands Reservoir (Grampians Wimmera Mallee Water)			
Heywood	760	Heywood Bores (2)	N/A	Heywood WTP	Heywood clear water storage
Koroit - via Warrnambool WTP	790	Arkins Creeks (3)	Gellibrand Tank	Warrnambool WTP	Warrnambool clear water storage
		Gellibrand River	South Otway Tank		Harrington Road clear water storage
		Carlisle Bores (2)	Ewen's Hill Reservoir		Dennington elevated storage
		– via North Otway Pipeline	Plantation Rd Storage	Illowa (Koroit) DP	Koroit Basin
			Tank Hill Reservoir		
		Gellibrand River – South Otway Pipeline	Warrnambool Storage 1		
			Warrnambool Storage 2		
		Albert Park Bores (3)	Brierly Basin		
		Roof water (North Warrnambool)	Albert Park Raw Water Storage		
Lismore - via Camperdown WTP	250[2]	Arkins Creeks (3)	Gellibrand Tank	Camperdown WTP	Camperdown (Rural) clear water storage
		Gellibrand River	Donald's Hill Reservoir	Ettrick's Springs DP	Camperdown (Urban) service basin
		Carlisle Bores (2)		Lismore/Derrinallum Tank DP	Lismore Tank
		– via North Otway Pipeline			
Macarthur	170	Macarthur Bore	N/A	Macarthur WTP	Macarthur clear water storage
Merino - via Casterton WTP	180	Tullich Bores - Bore Field (4)	N/A	Casterton WTP	Casterton clear water storage
					Casterton Arundel Road Basin
				Merino DP	Merino clear water storage
Mortlake - via Terang WTP	690	Arkins Creeks (3)	Gellibrand Tank	Terang WTP	Terang clear water storage
		Gellibrand River	Ewen's Hill Reservoir	Mortlake DP	Noorat Tank

Water Sampling Locality	Population supplied	Source Water	Raw Water Storage	Treatment Plant	Treated Water Storage
		Carlisle Bores (2)	Absalom's Bore Balance Tank		
		– via North Otway Pipeline			Mortlake clear water storage
		and Absalom's Bore (2)			
Noorat/Glenormiston - via Terang WTP	260	Arkins Creeks (3)	Gellibrand Tank	Terang WTP	Terang clear water storage
		Gellibrand River	Ewen's Hill Reservoir		
		Carlisle Bores (2)			Noorat Tank
		– via North Otway Pipeline			
Paaratte - via Port Campbell WTP	30	Port Campbell Bore (1)	N/A	Port Campbell WTP	Paaratte Tower
Penshurst	320	Penshurst Bore (1)	N/A	Penshurst DP	Penshurst clear water storage
Peterborough - via Port Campbell WTP	350	Port Campbell Bore (1)	N/A	Port Campbell WTP	Port Campbell clear water storage
					Brumby's Road Tank
Port Campbell	300	Port Campbell Bore (1)	N/A	Port Campbell WTP	Port Campbell clear water storage
Port Fairy	2350	Port Fairy Bores (2)	N/A	Port Fairy WTP	Port Fairy clear water storage
Portland	5800	Wyatt Street Bore (1)	N/A	Portland Wyatt St WTP	Portland Wyatt St clear water storage (currently offline)
		Bald Hill Bores (2)		Portland Bald Hill WTP	Portland clear water storage
Purnim	100	Arkins Creeks (3)	Gellibrand Tank	Purnim DP	Purnim elevated storage
		Gellibrand River	Ewen's Hill Reservoir		
		Carlisle Bores (2)	Tank Hill Reservoir		
		– via North Otway Pipeline	Purnim Raw Water Tank		
Sandford - via Casterton WTP	90	Tullich Bores - (4)	N/A	Casterton WTP	Casterton clear water storage
					Casterton Arundel Road Basin
Simpson	110	Arkins Creeks (3)	Gellibrand Tank	Simpson WTP	Simpson clear water storage
		Gellibrand River	Simpson Service Basin		
		Carlisle Bores (2)			
		– via North Otway Pipeline			
Tarrington - via Hamilton WTP	160	Grampians National Park	Hayes Reservoir	Hamilton WTP	Hamilton clear water storage
		7 streams on the western slopes of the Victoria Range and drought relief bores (2)	Cruckoor Reservoir		
			Hartwich's Reservoir		Tarrington Pierrepoint Tank
			Hamilton Service Basins 1 & 2		
		Rocklands Reservoir (Grampians Wimmera Mallee Water)			
Terang	1090	Arkins Creeks (3)	Gellibrand Tank	Terang WTP	Terang clear water storage
		Gellibrand River	Ewen's Hill Reservoir		
		Carlisle Bores (2)			
		– via North Otway Pipeline			
Timboon - via Port Campbell WTP	600	Port Campbell Bore (1)	N/A	Port Campbell WTP	Port Campbell clear water storage
					Peterborough Road Tank
					Timboon Basin

Water Sampling Locality	Population supplied	Source Water	Raw Water Storage	Treatment Plant	Treated Water Storage
					Timboon Elevated Tank
					Timboon Rands Road Tank
Warrnambool	16000	Arkins Creeks (3)	Gellibrand Tank	Warrnambool WTP	Warrnambool clear water storage
		Gellibrand River	South Otway Tank		Liebig St Basin
		Carlisle Bores (2)	Ewen's Hill Reservoir		Liebig St elevated storage
		– via North Otway Pipeline	Plantation Rd Storage		East Warrnambool elevated storage
			Tank Hill Reservoir		Doohley's Hill elevated storage
		Gellibrand River – South Otway Pipeline	Warrnambool Storage 1		Warrnambool West elevated storage
			Warrnambool Storage 2		Harrington Road clear water storage
		Albert Park Bores (3)	Brierly Basin		Harrington Road elevated storage
		Roof water (North Warrnambool)	Albert Park Raw Water Storage		Hopkins Point Road Tank

N/A not applicable

1 The figure used is the number of connections

2 Assumption (Lismore and Derrinallum customers 500)

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 2015 specify the water quality standards and the frequency at which they will be sampled. An explanation of the 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. One sample per week is required per locality. The water quality standard for *E. coli* is zero organisms per 100mL. Any detection of E.coli must be thoroughly investigated and the investigation will confirm whether or not the standard was met (a false positive) or not. Specifically:

- All other factors that would indicate the presence of *E.coli* in that water are not present in the water in the water sampling locality at the time of the investigation; and
- The drinking water treatment process applied, or other specified actions taken by the water supplier, are such as would be reasonably expected to have eliminated the presence of *E.coli* in the water sampling locality at the relevant time; and
- All plant and infrastructure associated with the water treatment process were operating to specification at all relevant times; and
- There were no issues arising from degradation of plant or infrastructure in or around the relevant water sampling locality that could reasonably be suspected to have contributed to the presence of *E.coli* in the drinking water in that water sampling locality.

Trihalomethanes - forms when chlorine reacts with naturally-occurring organic matter in the water supply. One sample per month is required per locality. Trihalomethanes (THMs) has a standard limit of 0.25 mg/L.

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). One sample per week is required per locality. The standard is defined as the 95th percentile of results for samples in any 12 month period must be less than or equal to 5.0 NTU.

Wannon Water's water sampling programs 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 and Human Services (DHHS) to remediate the problem. **Wannon Water did not apply for any undertakings in 2017/18**.

Variation to Aesthetic Standards

In accordance with the *Safe Drinking Water Act 2003* a water supplier may apply to the Minister for Health for an exemption to a water quality standard. The Minister will, if satisfied, exempt the water supplier from complying with the water quality standard, as it applies to drinking water supplied by the water supplier. As noted, 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.

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 454.

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.

Wannon Water communicates to customers and the general public via notices on the regular water bill and a 12 monthly notice for each non-drinking water supply. This information is also included in the new customer welcome package. Customers are offered stickers or signage at any time where required.

Wannon Water has a list of where public taps are located. All public taps are signed and Wannon Water audits the signage on a regular basis. Wannon Water communicates the locations of signage to the Environmental Health

Officer of the relevant councils on an annual basis and will supply council with extra signage if new public taps are installed.

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. Customers also receive regular notifications via the billing process. 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 monitors at various locations from source to tap and then 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.

Risk Management Plan Audit

The *Safe Drinking Water Act 2003* (the Act) requires water suppliers to prepare, implement, review, and revise risk management plans for their supply of drinking water. Under Section 11 of the Act, a water supplier must have their management plan audited.

Wannon Water was required to undertake an audit of their risk management plan prior to 30 May 2018. The Risk Management Plan (RMP) Audit was undertaken during 9 to 13 April 2018.

The audit was conducted at the Wannon Water Warrnambool Office for a desktop review of the RMP and the following sites visited to assess the application of the RMP:

- Warrnambool Depot
- Port Fairy WTP
- Koroit-Illowa DP
- Camperdown WTP
- Camperdown Depot
- Ettrick Springs DP
- Garvoc – Regulated Supply
- Portland WTP
- Hamilton Depot
- Hamilton WTP – fluoridation
- Hayes, Hartwichs & Cruckoor raw water storages.

The DHHS approved Auditor, Dr Nick O'Connor, noted 6 minor non-compliance findings from the audit. These relate to the level of documentation of Roles & Responsibilities, Sampling and the Quantification of Microbial Hazards in the RMP.

The Auditors concluding comments noted 'Wannon Water continues to make a strong corporate commitment to the development and implementation of risk management systems including those directed at ensuring compliance with the Act and Regulations. The extent of the quality management system documentation is generally very good, notwithstanding the minor non-compliances observed during the audit, and staff awareness and support for the quality management system is of high standard'.

The non-conformances and opportunities for improvement are summarised in Table 3-1.

The risk management plan audit certificate is attached in Appendix 1.

A HACCP re-certification audit was conducted in May 2018. Overall the auditor found the system was in keeping with the ISO 9001 requirements and were appropriate to the nature and scale of operations in place. One minor non-conformances was identified relating to HACCP review and approval of planned changes to operations prior to adoption of changes.

Table 3-1 Summary of audit findings, Wannon Water actions and progress.

Minor Non-conformance	WW Action	Timeframe
Wannon Water has work in progress to quantify pathogens and removals, but this work is not completed yet or incorporated into the Plan. Section 7.2 lists the microbial hazards and treatment processes, but does not quantify them.	Update RMP Section 7.2 to quantify the microbial hazards present in the raw water. This information is included in the Health Based Targets report and will be achieved by cross referencing.	Completed
A water supplier needs to provide the basis in their water sampling program of the process it has adopted to randomly select drinking water sampling locations throughout the supply network to ensure drinking water samples are not collected from the same location on two consecutive occasions.	Update the RMP Appendix 1 'Full Water Sampling Program' to detail how it is ensured that the samples are not taken from the same collection point within a water sampling locality on two consecutive occasions.	Completed
The RMP is required to include details of a water sampling program that outlines how the number of samples of drinking water are, so far as practicable, representative of the drinking water supplied in the water sampling locality.	Include information on how the number of samples of drinking water are considered to be, so far as practicable, representative of the drinking water supplied in the relevant water sampling locality. This will be achieved by referencing ADWG 2011 section 9.5.2 Drinking Water Quality and accompanying documents detailing sample point rationalisation since then.	Completed
The RMP is required to include details of a water sampling program that: • Outlines how the locations for collection of samples have been selected.	This will be achieved by clearly stating how the original sample point locations were selected in consultation with DHHS and cross referencing the accompanying documents detailing sample point rationalisation since then.	Completed
1) The RMP is required to contain details of or reference to emergency management arrangements and procedures for dealing with an incident, event or emergency that may adversely affect the quality or safety of drinking water, or result in water being supplied that poses a risk to human health, including: • The positions held by persons responsible for dealing with such an incident, event or emergency.	1) This will be achieved by cross referencing the accompanying documents that contain this information - e.g. Emergency Management Plan 2) In Section 9.7 of the Drinking Water Quality Management Plan, remove references to the 'Emergency Communications Procedure' (which has been rolled up into the Emergency Management Plan). Improve the layout and availability of information in the Drinking Water Quality Management Plan regarding the methods for communicating or disseminating information to the public in relation to any such incident,	Completed

2) Section 9 of the RMP describes communication to various public bodies (customers, stakeholders, regulatory agencies and emergency agencies). Section 2.4.2 of the "Water Quality Incident Contingency Plan", lists the communications processes to the public and refers to the "Emergency Management Plan" and the "Emergency Communications Procedure". The "Emergency Communications Procedure" has been rolled up into the Emergency Management Plan (i.e. no longer current). Section 2.4.2 of the "Water Quality Contingency Plan" goes on to list templates and advice materials including: • Boil water notice template • Boil water notice Q&A • Do not use water template • Do not use Q&A. The Emergency Management Plan also references a "Media Management Procedure". This information and its layout and availability could be greatly improved so that it would be clear that it complies with the regulation	event, or emergency that may adversely affect the quality or safety of drinking water, or result in water being supplied that poses a risk to human health.	
Wannon Water was not able to demonstrate that the RMP is compliant with the Safe Drinking Water Regulations Section 8(1) (a) as there was no information in the text or tables within the plan detailing the positions held by the persons responsible for managing hazards and risks to the quality of the water identified as set out in the plan, nor was there any reference to companion documentation containing such information.	This will be achieved by cross referencing the accompanying documents that contain this information - e.g. Emergency Management Plan, Water Quality Response Contingency Plan, etc.	Completed

Opportunity for Improvement	WW Action	Timeframe
The addition of thematic surface water catchment maps in the Plan is an opportunity for improvement.	Include linkage to maps of surface water catchments showing waterways, catchments, elevation and land use layers in reference to Wannon Waters areas of operation. This information is the "Enlighten" GIS database. Examples of this are being collated and will be an inclusion within the report	December 2018
An example of a risk register is provided, but there are no links to the registers within the Plan. Access is available via WaterSHED using the search function.	Provide links to the risk registers that accompany the RMP.	Completed
Radionuclides are not described in Appendix 1, but appear in Section 7 and Table 10. There is an opportunity for improvement to make description of which radionuclides are tested and why much clearer.	Provide greater clarity in the Drinking Water Management Plan Appendix 1 "Full Water Sampling Program" as to which radionuclides are tested, where and why.	Completed
Due to the frequent integration of surface water and groundwater sources, frequent bulk raw water connections between a number of systems etc, greater detail on the physical layout of the schemes would be beneficial to orientate the reader more quickly with Wannon Water systems.	Improve the content and clarity of Drinking Water Management Plan Section 6. Provide maps to accompany the schematics of each water supply scheme to better orientate the user in geographical space	December 2018
The description in Section 16 "Training and Competence" was found to be very brief in terms of demonstrating a strong commitment to training for the production of safe drinking water.	Provide more detail in the Drinking Water Management Plan Section 16 "Training and Competence" to better describe the training policies, standards and guidelines that are imposed or adopted, as they relate to monitoring and management of hazards and risk.	Completed
The Drinking Water Quality Management Plan is supported by the "Chemical Purchasing and Receival Procedure" and the "Purchasing, Receival & Storage of Components in Contact with Water Supply". The "Chemical Purchasing and Receival Procedure" lacks specificity to indicate that (together) they are being used effectively and in accordance with the Act and Regulation. Readability could be improved by combining the two documents.	Review the "Chemical Purchasing and Receival Procedure" and the "Purchasing, Receival & Storage of Components in Contact with Water Supply" procedure. Consider rolling the two documents into one and remove generic risk management guidance (i.e. make succinct and specific) to improve usage and auditability	Under review
A number of minor non-compliances were identified in the Drinking Water Quality Management Plan Audit (April 2018). This table would ensure that	Prepare a table for inclusion in the Drinking Water Quality Management Plan that lists which section of the Plan contains the evidence required to show	October 2018

no auditable elements of the plan are overlooked in the preparation of the plan going forward.	compliance with the auditable elements of the Safe Drinking Water Act 2003 and Safe Drinking Water Regulations 2015	
Wannon Water is focussing on achieving backflow compliance on Wannon Water assets and seeking commercial customer compliance. Note there was a recent backflow incident at Heywood.	Ensure that the customer backflow prevention checking procedures are being followed and annual confirmation is being provided. Prepare a risk-based Backflow Prevention Program for commercial premises, to support the existing preventative measures	December 2018
Documents that are features of the water agency that support risk management and their description lacks detail and rigour ion the RMP	In the Drinking Water Quality Management Plan section 1.3, provide a more detailed description of and clearer reference for the 'Water Quality Risk Management Plan for Regulated (non-Drinking) Water Supplies'. In reference to section 3 'Internal Policy and Guidelines', provide more detailed descriptions and clearer references to subordinate and related reference documentation, including - Corporate Vision, Corporate Mission, Corporate Plan, Water Plan 2013-2018, Drinking Water Policy, Risk Management Policy, Supply Catchment Policy. Provide full document title, state the location of / access to the document, provide a brief but specific description etc. For example, Section 3.6 could/should refer to the Wannon Water Enterprise Risk Management Framework document.	Completed

4. WATER TREATMENT

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

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

The water treatment processes employed during 2017/18 were similar to 2016/17. Changes and improvements to the system are outlined in Section 5.

Table 4-1 - Treatment Processes and Added Substances 2017/18

Plants					pH Adjust				Coagulation			Flocculation				Clarification					Disinfection				pH Adjust				
	Raw Water Detention	Cooling / aeration towers	Upstream Water Treatment Plant	Pre-Chlorination Sodium Hypo	Caustic soda	Soda Ash	Hydrated Lime	Carbon Dioxide	Ferric Chloride	Aluminium chlorohydrate	Aluminium Sulphate	Polyelectrolyte Nalco 3482	Magnafloc LT20 flocculant	Polymer Nalclear 8170PULN	Polymer Klaraid	Clarifier	Dissolved air floatation	Filtration	Activated Carbon Adsorption	Calgon Sequestration	Chlorine gas	Sodium hypochlorite	Aqueous ammonia	UV	Caustic soda	Soda Ash	Hydrated Lime	Fluorosilicic acid Fluoridisation	Clear Water Storage
Allansford			✓																			✓							✓
Balmoral	✓					✓				✓							✓	✓	✓	✓		✓	✓			✓			✓
Camperdown	✓						✓				✓						✓	✓			✓						✓		✓
Caramut																						✓							✓
Carlisle River																					✓								
Casterton				✓					✓				✓			✓		✓				✓							✓
Cavendish	✓																				✓			✓					✓
Cobden	✓					✓					✓				✓	✓		✓		✓	✓					✓			✓
Coleraine			✓																			✓		✓					✓
Dartmoor																						✓							✓
Dunkeld			✓																			✓							
Ewen's Hill	✓																				✓				✓				
Glenthompson	✓									✓						✓		✓	✓	✓		✓	✓	✓					✓
Hamilton	✓						✓				✓			✓			✓	✓			✓		✓				✓	✓	✓
Heywood		✓																		✓	✓								✓
Koroit			✓																		✓								✓
Ettrick Springs			✓																			✓							
Lismore/Derrinallum			✓																			✓							✓
Macarthur				✓					✓				✓			✓		✓*				✓							
Merino			✓																			✓							✓
Mortlake			✓																		✓								✓
Penshurst																						✓							✓
Port Campbell		✓																✓			✓								✓
Port Fairy		✓																		✓	✓								✓
Portland Wyatt St		✓																			✓								✓
Portland Bald Hill		✓																			✓								✓
Purnim	✓																					✓		✓					
Sandford			✓																			✓							
Simpson	✓				✓						✓						✓	✓			✓				✓				✓
Tank Hill	✓																				✓				✓				
Terang	✓				✓						✓				✓	✓		✓			✓		✓			✓			✓
Warrnambool	✓										✓	✓				✓	✓	✓			✓		✓				✓	✓	✓

^ See Glossary for description of each treatment process

Treatment process changes

May 2018 - The Cavendish DP changed from sodium hypochlorite to chlorine gas disinfection to stabilise the chlorine residual in the distribution system.

June 2018 - Added pre cooling tower chlorine gas dosing at the Port Campbell WTP.

Treatment process issues

The Warrnambool WTP saw issues with fluoride dosing equipment clogging resulting in reduced dosing ability. Ongoing scheduled maintenance of the fluoride dosing plant has helped reduce extended outages. See hotspot townships in Section 7 below for more information.

Reports made under s. 22 of the Act are detailed in section 7. Emergency incident and event management.

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 via formal training and attendance at relevant conferences and information sessions. In 2017/18 this included:

- Certification III and IV in Water Industry Operations
- Attendance at Water Industry Operators Association (WIOA) Conference
- Oz Water Conference
- Attendance at Victorian Drinking Water Network meetings
- Internal refresher training

Distribution System

Flushing Program

Wannon Water has a regular preventative 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 also uses reactive 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 within its reticulation systems. Frequency of air scouring is risk based. Air scouring was conducted at Balmoral, Heywood, Penshurst and Purnim in this reporting period.

Water 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 2017/18 Wannon Water spent approximately $1.6 million replacing approximately 5.2 kilometres of water mains at Camperdown, Terang, Timboon, Casterton, Dunkeld, Coleraine, Penshurst and Warrnambool.

Tank Cleaning Program

Wannon Water utilises contractors on a regular basis to inspect or clean tanks within the distribution system and storages at water treatment plants. In 2017/18 cleaning and inspection occurred at:

- Casterton – Arundel Rd Service Basin 1 – Potable Water Storage
- Cavendish Service Basin – Raw Water Storage
- Dunkeld Service Basin – Potable Water Storage
- Glenthompson WTP – Clear Water Storage
- Hamilton WTP – Clear Water Storage
- Heywood – Barclay St Service Basin – Clear Water Storage
- Mortlake Tank – Potable Water Storage
- Portland – Bald Hill WTP – Cooling Tower sumps
- Portland – Bald Hill Service Basin – Clear Water Storage
- Simpson WTP – Clear Water Storage
- Warrnambool – Harrington Road Ground Tank – Potable Water Storage
- Warrnambool – Liebig St Service Basin
- Warrnambool WTP – Clear Water Storage

This program is carried out to ensure structural integrity of the clear water storage and to optimize water quality to the customer.

Water Treatment Plant Changes and Improvements

Warrnambool WTP
Heating installed in lime dosing room.

New post filter turbidity meters installed.

Port Fairy WTP
New building for chlorine dosing system and power systems.

Installed standby generator and automatic changeover switch.

Port Campbell WTP
Cooling tower upgrade.

New chlorination system installed with separate pre and post cooling tower dosing systems.

Cavendish DP
Converted system from liquid sodium hypochlorite to gas chlorination.

Hamilton WTP
Solar panels installed on roof of the clear water storage

Replaced alum bund and second alum storage tank installed.

Casterton WTP
Filter media replacement in gravity filters.

Balmoral WTP
New geo-bag and bund installed.

Dartmoor WTP
New standby generator.

Mortlake WTP
New chlorination system installed and ammonia dosing removed from site.

Portland WTP
New Bore installed at Wyatt St.

6. DRINKING WATER QUALITY RESULTS 2017/18

Sampling Frequency

The frequency of sampling of the water quality parameters (*Escherichia coli*, Trihalomethanes and turbidity) is specified in Schedule 2 of the Safe Drinking Water Regulations 2015. Wannon Water uses its risk assessment process to select an appropriate sampling frequency for additional microbiological, chemical, physical, radiological and algal monitoring.

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 that the samples collected are representative of the supply system. The sampling program is reviewed on a regular basis to align with changes in the risk profile for each locality.

During 2017/18 Wannon Water performed over 48,600 individual tests. Approximately 38% of the tests were sampled at customer's taps within 34 localities.

On occasion, scheduled testing will be missed for various reasons, such as human error, broken or missing sample bottles or the sample point being out of action (e.g. bore not operational at time of sampling). Any missed regulatory samples are communicated to the DHHS at the time. In 2017/18 two Schedule 2 regulatory samples were missed. Samples were for turbidity and E.coli and one for Total THM in the locality of Sandford. The Sandford system has no history of exceedance for those parameters. The first error was sampled but not analysed by the laboratory due to a scheduling software error, the second caused by a sample tap not being accessible and not substituted by another tap in the same locality.

The errors resulted in 50 out of 52 samples being analysed for turbidity and E.coli at Sandford and 11 out of 12 Trihalomethane samples taken at the same locality.

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:

- **cfu/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 ($CaCO_3$)** 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".

Safe Drinking Water Regulations 2015 Standards

Escherichia coli (E. coli)

Standard: No E.coli per 100 millilitres of drinking water, with the exception of any false positive sample.
Outcome: The Standard was met at all localities comparable to the 2015/16 monitoring period there were no non-compliant results, an improvement of one less than 2016/17.

Table 6-1 *E. coli* results by locality 2017/18

E.coli

Water sampling locality	Frequency of sampling	Number of samples	Maximum detected (cfu/100mL)	No. of investigations conducted (s. 22)	No. of samples where standard not met (s.18)
ALLANSFORD	Weekly	52	0.00	0	0
BALMORAL	Weekly	52	2.00	1	0
CAMPERDOWN (RURAL)	Weekly	52	0.00	0	0
CAMPERDOWN (URBAN)	Weekly	52	0.00	0	0
CARAMUT	Weekly	52	0.00	0	0
CASTERTON	Weekly	52	0.00	0	0
CAVENDISH	Weekly	52	0.00	0	0
COBDEN	Weekly	52	0.00	0	0
COLERAINE	Weekly	52	0.00	0	0
DARTMOOR	Weekly	52	0.00	0	0
DERRINALLUM	Weekly	52	0.00	0	0
DUNKELD	Weekly	52	0.00	0	0
GLENTHOMPSON	Weekly	52	0.00	0	0
HAMILTON*	Weekly	104	0.00	0	0
HEYWOOD	Weekly	52	0.00	0	0
KOROIT	Weekly	52	0.00	0	0
LISMORE	Weekly	52	0.00	0	0
MACARTHUR	Weekly	52	0.00	0	0
MERINO	Weekly	52	0.00	0	0
MORTLAKE	Weekly	52	0.00	0	0
NOORAT/GLENORMISTON	Weekly	52	0.00	0	0
PAARATTE	Weekly	52	0.00	0	0
PENSHURST	Weekly	52	0.00	0	0
PETERBOROUGH	Weekly	52	0.00	0	0
PORT CAMPBELL	Weekly	52	0.00	0	0
PORT FAIRY*	Weekly	104	0.00	0	0
PORTLAND*	Weekly	104	0.00	0	0
PURNIM	Weekly	52	0.00	0	0
SANDFORD#	Weekly	50	0.00	0	0
SIMPSON	Weekly	52	0.00	0	0
TARRINGTON	Weekly	52	0.00	0	0
TERANG	Weekly	52	0.00	0	0
TIMBOON	Weekly	52	0.00	0	0
WARRNAMBOOL*	Weekly	156	0.00	0	0

Compliance – Trihalomethanes Results

Standard: Less than or equal to 0.25 milligrams per litre of drinking water
Outcome: The Standard was met at all localities with the exception of Cavendish. Trihalomethanes have remained stable across Wannon Water for the past two years with the exception of Cavendish which continued to see an increase due to changes in plant operations as described in section 7 hotspot townships.

Table 6-2 Trihalomethanes results by locality 2017/18

Trihalomethanes

Water sampling locality	Frequency of sampling	Number of samples	Max. mg/L	Average (mg/L)	No. of samples where standard was not met (s.18))[1]
ALLANSFORD	Monthly	12	0.128	0.087	0
BALMORAL	Monthly	12	0.111	0.067	0
CAMPERDOWN (RURAL)	Monthly	12	0.109	0.084	0
CAMPERDOWN (URBAN)	Monthly	12	0.082	0.059	0
CARAMUT	Monthly	12	0.045	0.032	0
CASTERTON	Monthly	12	0.186	0.132	0
CAVENDISH	Monthly	12	0.362	0.195	3
COBDEN	Monthly	12	0.106	0.073	0
COLERAINE	Monthly	12	0.180	0.146	0
DARTMOOR	Monthly	12	0.006	0.004	0
DERRINALLUM	Monthly	12	0.156	0.128	0
DUNKELD	Monthly	12	0.087	0.054	0
GLENTHOMPSON	Monthly	12	0.106	0.057	0
HAMILTON*	Monthly	12	0.015	0.010	0
HEYWOOD	Monthly	12	0.024	0.018	0
KOROIT	Monthly	12	0.136	0.092	0
LISMORE	Monthly	12	0.150	0.116	0
MACARTHUR	Monthly	12	0.050	0.041	0
MERINO	Monthly	12	0.181	0.138	0
MORTLAKE	Monthly	12	0.121	0.104	0
NOORAT/GLENORMISTON	Monthly	12	0.119	0.088	0
PAARATTE	Monthly	12	0.013	0.008	0
PENSHURST	Monthly	12	0.068	0.033	0
PETERBOROUGH	Monthly	12	0.020	0.014	0
PORT CAMPBELL	Monthly	12	0.035	0.015	0
PORT FAIRY*	Monthly	12	0.004	0.004	0
PORTLAND*	Monthly	12	0.004	0.004	0
PURNIM	Monthly	12	0.146	0.124	0
SANDFORD#	Monthly	11	0.204	0.149	0
SIMPSON	Monthly	12	0.079	0.054	0
TARRINGTON	Monthly	12	0.014	0.009	0
TERANG	Monthly	12	0.118	0.070	0
TIMBOON	Monthly	12	0.051	0.043	0
WARRNAMBOOL*	Monthly	12	0.115	0.080	0

1 - For Trihalomethanes, if the maximum result is 0.255mg/L or greater, then the locality is non-compliant.

Turbidity

Standard: The 95th percentile of results for samples in any 12 month period must be less than or equal to 5.0 NTU

Outcome: The Standard was met at all localities, which is consistent with the previous two years.

Table 6-3 Turbidity results by locality 2017/18

Turbidity

Water sampling locality	Frequency of sampling	Number of samples	Maximum turbidity in a sample (NTU)	Maximum 95th percentile of turbidity results in any 12 months (NTU)	No. of 95th percentile of results in any 12 months above standard (s.18)
ALLANSFORD	Weekly	52	0.5	0.2	0
BALMORAL	Weekly	52	2.2	0.4	0
CAMPERDOWN (RURAL)	Weekly	52	4.3	0.5	0
CAMPERDOWN (URBAN)	Weekly	52	1.6	0.3	0
CARAMUT	Weekly	52	0.8	0.2	0
CASTERTON	Weekly	52	0.9	0.2	0
CAVENDISH	Weekly	52	1.2	0.5	0
COBDEN	Weekly	52	2.3	0.4	0
COLERAINE	Weekly	52	0.3	0.1	0
DARTMOOR	Weekly	52	0.3	0.1	0
DERRINALLUM	Weekly	52	0.8	0.3	0
DUNKELD	Weekly	52	0.6	0.2	0
GLENTHOMPSON	Weekly	52	0.7	0.2	0
HAMILTON *	Weekly	104	0.6	0.2	0
HEYWOOD	Weekly	52	4.0	1.5	0
KOROIT	Weekly	52	1.7	0.4	0
LISMORE	Weekly	52	7.0	0.8	0
MACARTHUR	Weekly	52	0.4	0.1	0
MERINO	Weekly	52	0.5	0.2	0
MORTLAKE	Weekly	52	0.6	0.2	0
NOORAT/GLENORMISTON	Weekly	52	0.5	0.2	0
PAARATTE	Weekly	52	0.7	0.2	0
PENSHURST	Weekly	52	0.5	0.2	0
PETERBOROUGH	Weekly	52	6.3	0.6	0
PORT CAMPBELL	Weekly	52	0.5	0.2	0
PORT FAIRY *	Weekly	104	1.0	0.5	0
PORTLAND *	Weekly	104	1.2	0.1	0
PURNIM	Weekly	52	1.6	1.0	0
SANDFORD#	Weekly	50	0.8	0.2	0
SIMPSON	Weekly	52	0.4	0.2	0
TARRINGTON	Weekly	52	0.5	0.2	0
TERANG	Weekly	52	0.7	0.3	0
TIMBOON	Weekly	52	3.1	0.5	0
WARRNAMBOOL*	Weekly	156	2.4	0.3	0

Other – May Pose a Risk to Human Health

Fluoride

Standard All samples of drinking water collected within a locality not to exceed 1.5 mg/L (ADWG – Health).
Outcome: The Standard was met at all localities, which is consistent with the previous two years.

Table 6-4 Fluoride results by locality 2017/18

Fluoride

Water sampling locality	Frequency of sampling	Number of samples	Target optimum operating fluoride concentration (mg/L)	Maximum (mg/L)	Average (mg/L)	No. of samples where standard was not met (s.18)
ALLANSFORD +	Weekly	53	0.9	1.00	0.86	0
BALMORAL	Yearly	1	-	0.10	0.10	0
CAMPERDOWN (RURAL)	Yearly	1	-	0.10	0.10	0
CAMPERDOWN (URBAN)	Yearly	1	-	0.10	0.10	0
CARAMUT	Yearly	1	-	0.10	0.10	0
CASTERTON	Yearly	1	-	0.10	0.10	0
CAVENDISH	Yearly	1	-	0.10	0.10	0
COBDEN	Yearly	1	-	0.10	0.10	0
COLERAINE	Yearly	1	-	0.10	0.10	0
DARTMOOR	Yearly	1	-	0.10	0.10	0
DERRINALLUM	Yearly	1	-	0.10	0.10	0
DUNKELD +	Weekly	53	0.9	0.99	0.88	0
GLENTHOMPSON	Yearly	1	-	0.10	0.10	0
HAMILTON + *	Weekly	107	0.9	1.00	0.88	0
HEYWOOD	Yearly	1	-	0.43	0.43	0
KOROIT +	Weekly	51	0.9	1.00	0.86	0
LISMORE	Yearly	1	-	0.10	0.10	0
MACARTHUR	Yearly	1	-	0.41	0.41	0
MERINO	Yearly	1	-	0.10	0.10	0
MORTLAKE	Yearly	1	-	0.10	0.10	0
NOORAT/GLENORMISTON	Yearly	1	-	0.10	0.10	0
PAARATTE	Yearly	1	-	0.15	0.15	0
PENSHURST	Yearly	1	-	0.10	0.10	0
PETERBOROUGH	Yearly	1	-	0.16	0.16	0
PORT CAMPBELL	Yearly	1	-	0.15	0.15	0
PORT FAIRY^	Yearly	1	-	0.79	0.79	0
PORTLAND^*	Monthly	12	-	1.30	1.03	0
PURNIM	Yearly	1	-	0.10	0.10	0
SANDFORD	Yearly	1	-	0.10	0.10	0
SIMPSON	Yearly	1	-	0.10	0.10	0

TARRINGTON +	Weekly	53	-	1.00	0.88	0
TERANG	Yearly	1	-	0.10	0.10	0
TIMBOON	Yearly	1	-	0.16	0.16	0
WARRNAMBOOL + *	Weekly	156	0.9	1.00	0.87	0

+ Fluoride added to drinking water supply. For supplies where fluoride has been added, compliance is measured against the ADWG health guideline value

* More than one sample site was analysed per week for fluoride (based on population) where fluoride is added to the supply.

^ It is noted that the Port Fairy and Portland localities have naturally occurring fluoride which achieves the average concentration.

Missing tests due to reasons stated under Testing Programs in this report.

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)
Outcome: The Standard was met at all localities, which is consistent with the previous two years.

Table 6-5 Manganese results by locality 2017/18

Manganese

Water sampling locality	Frequency of sampling	Number of samples	No. of Non complying samples	Maximum result (mg/L)	Average (mg/L)	No. of samples where standard was not met (s.18)
ALLANSFORD	Monthly	12	0	0.004	0.002	0
BALMORAL	Monthly	12	0	0.011	0.004	0
CAMPERDOWN (RURAL)	Monthly	12	0	0.017	0.006	0
CAMPERDOWN (URBAN)	Monthly	12	0	0.054	0.010	0
CARAMUT	Monthly	12	0	0.000	0.000	0
CASTERTON	Monthly	12	0	0.007	0.003	0
CAVENDISH	Monthly	12	0	0.003	0.001	0
COBDEN	Monthly	12	0	0.047	0.011	0
COLERAINE	Monthly	12	0	0.006	0.002	0
DARTMOOR	Monthly	12	0	0.001	0.000	0
DERRINALLUM	Monthly	12	0	0.023	0.006	0
DUNKELD	Monthly	12	0	0.003	0.002	0
GLENTHOMPSON	Monthly	12	0	0.003	0.002	0
HAMILTON	Monthly	12	0	0.012	0.007	0
HEYWOOD	Monthly	12	0	0.092	0.059	0
KOROIT	Monthly	12	0	0.004	0.002	0
LISMORE	Monthly	12	0	0.413	0.050	0
MACARTHUR	Monthly	12	0	0.002	0.000	0
MERINO	Monthly	12	0	0.006	0.002	0
MORTLAKE	Monthly	12	0	0.003	0.001	0
NOORAT/GLENORMISTON	Monthly	12	0	0.004	0.001	0
PAARATTE	Monthly	12	0	0.001	0.000	0
PENSHURST	Monthly	12	0	0.001	0.000	0
PETERBOROUGH	Monthly	12	0	0.013	0.001	0
PORT CAMPBELL	Monthly	12	0	0.000	0.000	0
PORT FAIRY	Monthly	12	0	0.027	0.011	0
PORTLAND	Monthly	12	0	0.003	0.001	0
PURNIM	Monthly	12	0	0.014	0.007	0
SANDFORD#	Monthly	11	0	0.020	0.003	0
SIMPSON	Monthly	12	0	0.008	0.002	0
TARRINGTON	Monthly	12	0	0.014	0.004	0
TERANG	Monthly	12	0	0.007	0.002	0
TIMBOON	Monthly	12	0	0.001	0.000	0
WARRNAMBOOL	Monthly	12	0	0.008	0.003	0

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)
Outcome: The Standard was met at all localities, which is consistent with the previous two years.

Table 6-6 Lead results by locality 2017/18

Lead

Water sampling locality	Frequency of sampling	Number of samples	No. of Non complying samples	Maximum result (mg/L)	Average (mg/L	No. of samples where standard was not met (s.18)t
ALLANSFORD	Yearly	1	0	<0.001	0.001	0
BALMORAL	Yearly	1	0	<0.001	0.001	0
CAMPERDOWN (RURAL)	Yearly	1	0	<0.001	0.001	0
CAMPERDOWN (URBAN)	Yearly	1	0	<0.001	0.001	0
CARAMUT	Yearly	1	0	<0.001	0.001	0
CASTERTON	Yearly	1	0	0.001	0.001	0
CAVENDISH	Yearly	1	0	<0.001	0.001	0
COBDEN	Yearly	1	0	<0.001	0.001	0
COLERAINE	Yearly	1	0	0.001	0.001	0
DARTMOOR	Yearly	1	0	<0.001	0.001	0
DERRINALLUM	Yearly	1	0	<0.001	0.001	0
DUNKELD	Yearly	1	0	<0.001	0.001	0
GLENTHOMPSON	Yearly	1	0	<0.001	0.001	0
HAMILTON	Yearly	1	0	<0.001	0.001	0
HEYWOOD	Yearly	1	0	<0.001	0.001	0
KOROIT	Yearly	1	0	<0.001	0.001	0
LISMORE	Yearly	1	0	<0.001	0.001	0
MACARTHUR	Yearly	1	0	0.001	0.001	0
MERINO	Yearly	1	0	0.001	0.001	0
MORTLAKE	Yearly	1	0	<0.001	0.001	0
NOORAT/GLENORMISTON	Yearly	1	0	<0.001	0.001	0
PAARATTE	Yearly	1	0	<0.001	0.001	0
PENSHURST	Yearly	1	0	<0.001	0.001	0
PETERBOROUGH	Yearly	1	0	0.001	0.001	0
PORT CAMPBELL	Yearly	1	0	<0.001	0.001	0
PORT FAIRY	Yearly	1	0	<0.001	0.001	0
PORTLAND	Yearly	1	0	0.001	0.001	0
PURNIM	Yearly	1	0	0.002	0.002	0
SANDFORD	Yearly	1	0	<0.001	0.001	0
SIMPSON	Yearly	1	0	<0.001	0.001	0
TARRINGTON	Yearly	1	0	<0.001	0.001	0
TERANG	Yearly	1	0	<0.001	0.001	0
TIMBOON	Yearly	1	0	<0.001	0.001	0
WARRNAMBOOL	Yearly	1	0	<0.001	0.001	0

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).
Outcome: The Standard was met at all localities, which is consistent with the previous two years.

Table 6-7 Copper results by locality 2017/18

Copper

Water sampling locality	Frequency of sampling	Number of samples	No. of Non complying samples	Maximum result (mg/L)	Average (mg/L	No. of samples where standard was not met (s.18)
ALLANSFORD	Yearly	1	0	0.027	0.027	0
BALMORAL	Yearly	1	0	0.005	0.005	0
CAMPERDOWN (RURAL)	Yearly	1	0	0.001	0.001	0
CAMPERDOWN (URBAN)	Yearly	1	0	0.003	0.003	0
CARAMUT	Yearly	1	0	0.007	0.007	0
CASTERTON	Yearly	1	0	0.300	0.300	0
CAVENDISH	Yearly	1	0	0.006	0.006	0
COBDEN	Yearly	1	0	0.016	0.016	0
COLERAINE	Yearly	1	0	0.127	0.127	0
DARTMOOR	Yearly	1	0	0.007	0.007	0
DERRINALLUM	Yearly	1	0	0.001	0.001	0
DUNKELD	Yearly	1	0	0.025	0.025	0
GLENTHOMPSON	Yearly	1	0	0.007	0.007	0
HAMILTON	Yearly	1	0	0.001	0.001	0
HEYWOOD	Yearly	1	0	0.002	0.002	0
KOROIT	Yearly	1	0	0.008	0.008	0
LISMORE	Yearly	1	0	0.001	0.001	0
MACARTHUR	Yearly	1	0	0.012	0.012	0
MERINO	Yearly	1	0	0.038	0.038	0
MORTLAKE	Yearly	1	0	0.004	0.004	0
NOORAT/GLENORMISTON	Yearly	1	0	0.002	0.002	0
PAARATTE	Yearly	1	0	0.002	0.002	0
PENSHURST	Yearly	1	0	0.006	0.006	0
PETERBOROUGH	Yearly	1	0	0.018	0.018	0
PORT CAMPBELL	Yearly	1	0	0.004	0.004	0
PORT FAIRY	Yearly	1	0	0.009	0.009	0
PORTLAND	Yearly	1	0	0.002	0.002	0
PURNIM	Yearly	1	0	0.070	0.070	0
SANDFORD	Yearly	1	0	0.060	0.060	0
SIMPSON	Yearly	1	0	0.007	0.007	0
TARRINGTON	Yearly	1	0	0.002	0.002	0
TERANG	Yearly	1	0	0.002	0.002	0
TIMBOON	Yearly	1	0	0.001	0.001	0
WARRNAMBOOL	Yearly	1	0	0.006	0.006	0

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).
Outcome: The Standard was met at all localities, which is consistent with the previous two years.

Table 6-8 Arsenic results by locality 2017/18

Arsenic

Water sampling locality	Frequency of sampling	Number of samples	No. of Non complying samples	Maximum result (mg/L)	Average (mg/L	No. of samples where standard was not met (s.18)
ALLANSFORD	Yearly	1	0	0.001	0.001	0
BALMORAL	Yearly	1	0	<0.001	<0.001	0
CAMPERDOWN (RURAL)	Yearly	1	0	0.000	<0.001	0
CAMPERDOWN (URBAN)	Yearly	1	0	0.001	0.001	0
CARAMUT	Yearly	1	0	<0.001	<0.001	0
CASTERTON	Yearly	1	0	<0.001	<0.001	0
CAVENDISH	Yearly	1	0	<0.001	<0.001	0
COBDEN	Yearly	1	0	0.001	0.001	0
COLERAINE	Yearly	1	0	<0.001	<0.001	0
DARTMOOR	Yearly	1	0	0.001	0.001	0
DERRINALLUM	Yearly	1	0	<0.001	<0.001	0
DUNKELD	Yearly	1	0	<0.001	<0.001	0
GLENTHOMPSON	Yearly	1	0	<0.001	<0.001	0
HAMILTON	Yearly	1	0	<0.001	<0.001	0
HEYWOOD	Yearly	1	0	<0.001	<0.001	0
KOROIT	Yearly	1	0	<0.001	<0.001	0
LISMORE	Yearly	1	0	0.001	0.001	0
MACARTHUR	Weekly	51	0	0.007	0.001	0
MERINO	Yearly	1	0	<0.001	<0.001	0
MORTLAKE	Yearly	1	0	0.001	0.001	0
NOORAT/GLENORMISTON	Yearly	1	0	<0.001	<0.001	0
PAARATTE	Yearly	1	0	<0.001	<0.001	0
PENSHURST	Yearly	1	0	0.002	0.002	0
PETERBOROUGH	Yearly	1	0	0.001	0.001	0
PORT CAMPBELL	Yearly	1	0	0.001	0.001	0
PORT FAIRY	Yearly	1	0	0.004	0.004	0
PORTLAND	Yearly	1	0	0.001	0.001	0
PURNIM	Yearly	1	0	0.001	0.001	0
SANDFORD	Yearly	1	0	<0.001	<0.001	0
SIMPSON	Yearly	1	0	<0.001	<0.001	0
TARRINGTON	Yearly	1	0	<0.001	<0.001	0
TERANG	Yearly	1	0	<0.001	<0.001	0
TIMBOON	Yearly	1	0	<0.001	<0.001	0
WARRNAMBOOL	Yearly	1	0	<0.001	0.001	0

Water treatment related chemicals

Table 6-9 lists the water treatment related chemicals monitored at each locality during 2017/18. All test results were less than the ADWG health-related guideline values.

Table 6-9 water treatment related chemical sampling summary and health-related guideline values

Parameter	Sampling frequency	ADWG Value (mg/L)
1,1,1-Trichloropropan-2-one	Yearly *	-
1,1,3-Trichloropropan-2-one	Yearly *	-
1,1-Dichloropropan-2-one	Yearly *	-
1,3-Dichloropropan-2-one	Yearly *	-
2,4,6-Trichlorophenol	Yearly *	-
2,4-Dichlorophenol	Yearly *	0.2
2-Chlorophenol	Yearly *	0.3
Carbon tetrachloride	Yearly *	0.003
Cyanogen Chloride	Yearly *	0.08
Trichloroacetaldehyde	Quarterly/ Yearly *	0.021

*All results were less than detection limits

Inorganics

Table 6-10 lists the metals monitored at each locality during 2017/18. All localities recorded levels less than the ADWG health-related guideline values.

Table 6-10 – metals sampling summary and health-related guideline values

Parameter	Sampling Frequency	ADWG Value (mg/L)
Cadmium	Yearly *	0.002
Chromium	Yearly*	0.05
Nickel	Yearly *	0.02
Zinc	Yearly*	3
Tin	Yearly*	-
Silver	Yearly *	0.1
Beryllium	Yearly *	0.06
Uranium	Yearly *	0.017
Iodide	Yearly*	0.5
Molybdenum	Yearly*	0.05
Boron	Yearly*	4
Barium	Yearly*	2
Selenium	Yearly	0.01
Mercury	Yearly *	0.001

*All results were less than detection limits

Polycyclic Aromatic Hydrocarbon Results

Table 6-11lists the suite of polycyclic aromatic hydrocarbons monitored at each locality during 2017/18.

Table 6-11 - PAH sampling summary and health related guideline values

Parameter	Sampling Frequency	ADWG Value (mg/L)
Acenapthene	Yearly *	-
Acenapthylene	Yearly *	-
Anthracene	Yearly *	-
Benz(a)anthracene	Yearly *	-
Benzo(a)pyrene	Yearly *	0.00001
Benzo(b)fluoranthene	Yearly *	-
Benzo(g,h,i)perylene	Yearly *	-
Benzo(k)fluoranthene	Yearly *	-
Chrysene	Yearly *	-
Dibenz(a,h)anthracene	Yearly *	-
Fluoranthene	Yearly *	-
Indeno(1,2,3-cd)pyrene	Yearly *	-
Phenanthrene	Yearly *	-
Pyrene	Yearly *	-
Total PAH	Yearly *	-

*All results were less than detection limits

Disinfection by-products

Chlorite

Wannon Water does not disinfect with chlorine dioxide therefore, this parameter is not included in the testing regime. Table 6-12 lists the chloramine disinfection by-products monitored at each locality during 2016/17. All test results were less than the ADWG health-related guideline values.

Table 6-12 – chloramine disinfection by-products sampling summary and health-related guideline values

Parameter	Sampling Frequency	ADWG Value (mg/L)
Nitrate (as nitrate)	Monthly/Quarterly*	50
Nitrite (as nitrite)	Monthly/Yearly**	3
1,2-Dibromo-3-Chloropropane	Yearly	-
1,2-Dibromoethane	Yearly	-

* Monthly at Mortlake and Quarterly at Caramut only.

** Monthly at localities where ammonia is added to the drinking water supply, yearly at all other localities.

Pesticide/Herbicide Results

Table 6-13 lists the pesticides and herbicides monitored at representative raw water storage, rivers/creeks or at the customer tap during 2017/18. All test results were less than the detection limits which were below the ADWG values.

Table 6-13 – pesticide and herbicide sampling summary and health-related guideline values

Parameter	Sampling Frequency	ADWG Value (mg/L)
2,4,5-T	Yearly	100
2,4,5-TP	Yearly	0.1
2,4,6-T	Yearly	20
2,4-D	Yearly	0.03
2,4-DB	Yearly	-
2,4-DP	Yearly	0.03
2,6-D	Yearly	-
4,4-DDD	Yearly	-
4,4-DDE	Yearly	-
4,4-DDT	Yearly	0.009
4-Chlorophenoxy acetic acid	Yearly	-
Aldrin	Yearly	0.0003
Ametryn	Yearly	0.07
Atrazine	Yearly	0.02
BHC (Alpha Isomer)	Yearly	-
BHC (Beta Isomer)	Yearly	-
BHC (Delta Isomer)	Yearly	-
Chlordane	Yearly	0.0015
Chloropyrifos	Yearly	10
CIS-1,3-Dichloropropene	Yearly	-
cis-Chlordane	Yearly	0.002
Dicamba	Yearly	0.1
Dieldrin	Yearly	0.003
Endosulphan 1	Yearly	0.02
Endosulphan 2	Yearly	0.02
Endosulphan Sulphate	Yearly	0.02
Endrin	Yearly	-
Endrin Aldehyde	Yearly	-
Endrin Ketone	Yearly	-
Glyphosate	Yearly	1
Heptachlor	Yearly	0.0003
Heptachlor Epoxide	Yearly	0.0003
Hexachlorbenzene	Yearly	-
Hexazinone	Yearly	400
Lindane	Yearly	0.01
MCPA	Yearly	0.04
MCPB	Yearly	-
Mecoprop	Yearly	-
Methoxychlor	Yearly	0.3
Molinate	Yearly	4
oxy-Chlordane	Yearly	0.11
Prometon	Yearly	-
Prometryn	Yearly	-
Propazine	Yearly	0.05
Propiconazole	Yearly	100
Simazine	Yearly	0.02
Simetryn	Yearly	-
Temephos	Yearly	400
Terbutryn	Yearly	0.4
Tertbuthylazine	Yearly	0.01
Trans-1,3-Dichloropropene	Yearly	-
Trans-Chlordane	Yearly	0.011
Trichlopyr	Yearly	0.02

Industrial Chemical Results

Table 6-14 lists industrial chemical health-related parameters tested at each locality during 2018/19. All test results were below the ADWG health limits.

Table 6-14 – Industrial chemicals sampling summary and health-based guideline values

Parameter	Sampling Frequency	ADWG Value
1,1,1,2-Tetrachlorethane	Yearly	-
1,1,1-Trichloroethane	Yearly	-
1,1,2,2-Tetrachloroethane	Yearly	-
1,1,2-Trichloroethane	Yearly	-
1,1-Dichloroethane	Yearly	-
1,1-Dichloroethene	Yearly	0.03
1,1-Dichloropropene	Yearly	-
1,2,3-Trichlorobenzene	Yearly	-
1,2,3-Trichloropropane	Yearly	-
1,2,4-Trichlorobenzene	Yearly	0.03
1,2,4-Trimethylbenzene	Yearly	-
1,2-Dichlorobenzene	Yearly	1.5
1,2-Dichloroethane	Yearly	0.003
1,2-Dichloropropane	Yearly	-
1,3,5-Trimethylbenzene	Yearly	-
1,3-Dichlorobenzene	Yearly	0.02
1,3-Dichloropropane	Yearly	-
1,4-Dichlorobenzene	Yearly	0.04
2,2-Dichloropropane	Yearly	-
2-Chlorotoluene	Yearly	-
4-Chlorotoluene	Yearly	
Benzene	Yearly	0.0011
Bromobenzene	Yearly	-
Bromochloromethane	Yearly	-
Carbon Disulphide	Yearly	-
Chlorobenzene	Yearly	0.3
CIS-1,2-Dichloroethene	Yearly	0.06
Dibromomethane	Yearly	-
Ethylbenzene	Yearly	0.3
Hexachloro-1,3-Butadiene	Yearly	0.0007
Isopropylbenzene	Yearly	-
M-&-P-Xylene	Yearly	0.6
Methylenechloride	Yearly	0.04
N-Butylbenzene	Yearly	-
N-Propylbenzene	Yearly	-
o-Xylene	Yearly	0.6
P-Isopropyltoluene	Yearly	-
Sec-Butylbenzene	Yearly	-
Styrene	Yearly	0.03
Tert-Butylbenzene	Yearly	-
Tetrachloroethene	Yearly	0.05
Toluene	Yearly	0.8
Trans-1,2-Dichloroethene	Yearly	0.06
Tributyltin as Sn	Yearly	10.1
Trichloroethene	Yearly	-
Vinyl chloride	Yearly	0.0003

Algae Results

Wannon water has an obligation to notify DHHS if the presence of Blue Green algae (BGA) may pose a consumption risk for drinking water supplies. The Blue Green Algae circular (DELWP) sets out different ways toxic blue green algae species are measured. Where blooms relates to drinking water the triggers are:

- Total microcystins ≥ 1.3 ug/L (microcysitn_LR toxicity equivalents)
- ≥ 6500 cells/mL Microcystis aeruginosa
- Total combined biovolume of known toxic species ≥ 0.6 mm^3/L
- Total combined biovolume of all cyanobacterial > 10mm^3/L OR
- BGA is present in drinking water at levels that may cause widespread public complaint for example through taste and odour. If this occurs then a section 22 notification in accordance with the Safe Drinking Water Act should be made

During 2017/18 Wannon Water collected samples following a risk-rated approach, sampling monthly to fortnightly from all storages that supplied raw water for treatment into 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 or geosmin and methylisoborneol levels are above taste and odour thresholds.

Radionuclides – Gross Beta, Gross Alpha Radioactivity Results

Table 6-15 lists the radionuclides monitored in surface water (rivers/creeks) during 2016/17. All test results were less than the detection limits. No radionuclide monitoring was conducted during 2017/18.

Table 6-15 – radionuclides sampling summary and health-related guideline values

Parameter	Sampling Frequency	ADWG Value (Bq/L)
Gross Alpha	Every two years	0.5
Gross Beta	Every two years	0.5

The Australian Drinking Water Guidelines recommend Gross Alpha and Gross Beta parameters are screened every two years for groundwater supplies and every five years for surface water supplies.

Surface waters and groundwater bores are scheduled to be sampled in 2018/19.

Other Results

Table 6-16 lists other parameters tested at the customer tap during 2017/18. All test results were less than the ADWG health-related guideline values.

Table 6-16 - Other parameters sampling summary and health-based guideline values

Parameter	Sampling Frequency	ADWG Value (mg/L)
Sulphate	Quarterly	500

Aesthetic Parameters
pH Results

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

Table 6-17 pH results by locality 2017/18

pH

Water sampling locality	Frequency of sampling	Number of samples	Maximum (pH units)	Minimum (pH units)
ALLANSFORD	Weekly	52	7.6	6.8
BALMORAL	Weekly	52	7.5	7.0
CAMPERDOWN (RURAL)	Weekly	52	8.9	7.0
CAMPERDOWN (URBAN)	Weekly	52	7.6	6.8
CARAMUT	Weekly	52	8.7	7.7
CASTERTON	Weekly	52	8.1	7.4
CAVENDISH	Weekly	52	9.3	6.9
COBDEN	Weekly	52	7.8	6.8
COLERAINE	Weekly	52	8.4	7.6
DARTMOOR	Weekly	52	8.2	7.7
DERRINALLUM	Weekly	52	9.6	7.4
DUNKELD	Weekly	52	7.1	6.4
GLENTHOMPSON	Weekly	52	8.7	7.3
HAMILTON	Weekly	104*	7.6	6.3
HEYWOOD	Weekly	52	8.9	7.7
KOROIT	Weekly	52	7.6	7.0
LISMORE	Weekly	52	9.2	7.5
MACARTHUR	Weekly	52	8.6	7.9
MERINO	Weekly	52	7.9	7.6
MORTLAKE	Weekly	52	8.1	7.5
NOORAT/GLENORMISTON	Weekly	52	9.3	6.8
PAARATTE	Weekly	52	8.4	7.8
PENSHURST	Weekly	52	8.8	7.8
PETERBOROUGH	Weekly	52	8.5	7.8
PORT CAMPBELL	Weekly	52	8.3	7.8
PORT FAIRY	Weekly	104*	8.7	8.3
PORTLAND	Weekly	104*	8.8	8.4
PURNIM	Weekly	52	7.3	6.6
SANDFORD	Weekly	50	8.1	7.5
SIMPSON	Weekly	52	7.5	7.0
TARRINGTON	Weekly	52	8.2	6.2
TERANG	Weekly	52	7.7	6.6
TIMBOON	Weekly	52	8.4	8.0
WARRNAMBOOL	Weekly	156*	7.7	6.6

* More than one sample per week

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.

Management of high pH
Camperdown Rural, Derrinallum and Lismore
These localities are all supplied from Camperdown WTP. There is a chlorine booster station at Ettrick Springs which services Derrinallum and Lismore, the chlorination was changed from liquid to gas during 2013/14, which improved pH. Regular flushing is conducted to reduce detention times and improve pH levels.

Cavendish and Noorat/Glenormiston
These localities are both small in population and frequently experience low demand, which leads to long detention times in cement lined mains. Regular flushing is conducted to reduce detention times and improve pH levels.

Iron Results

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

Table 6-18 Iron results by locality 2017 /18

Iron				
Water sampling locality	**Frequency of sampling**	**Number of samples**	**Maximum (mg/L)**	**Average result (mg/L)**
ALLANSFORD	Monthly	12	0.083	0.020
BALMORAL	Monthly	12	0.252	0.086
CAMPERDOWN (RURAL)	Monthly	12	0.067	0.016
CAMPERDOWN (URBAN)	Monthly	12	0.200	0.037
CARAMUT	Monthly	12	0.018	0.008
CASTERTON	Monthly	12	0.058	0.016
CAVENDISH	Monthly	12	0.298	0.143
COBDEN	Monthly	12	0.142	0.042
COLERAINE	Monthly	12	0.046	0.027
DARTMOOR	Monthly	12	0.022	0.004
DERRINALLUM	Monthly	12	0.061	0.029
DUNKELD	Monthly	12	0.266	0.069
GLENTHOMPSON	Monthly	12	0.239	0.065
HAMILTON	Monthly	12	0.087	0.022
HEYWOOD	Monthly	12	0.030	0.011
KOROIT	Monthly	12	0.049	0.030
LISMORE	Monthly	12	0.452	0.087
MACARTHUR	Monthly	12	0.104	0.021
MERINO	Monthly	12	0.060	0.017
MORTLAKE	Monthly	12	0.123	0.034
NOORAT/GLENORMISTON	Monthly	12	0.047	0.020
PAARATTE	Monthly	12	0.269	0.107
PENSHURST	Monthly	12	0.077	0.026
PETERBOROUGH	Monthly	12	4.250	0.392
PORT CAMPBELL	Monthly	12	0.268	0.118
PORT FAIRY	Monthly	12	0.298	0.115
PORTLAND	Monthly	12	0.071	0.029
PURNIM	Monthly	12	0.288	0.197
SANDFORD	Monthly	11	0.031	0.012
SIMPSON	Monthly	12	0.057	0.017
TARRINGTON	Monthly	12	0.114	0.046
TERANG	Monthly	12	0.028	0.010
TIMBOON	Monthly	12	0.269	0.081
WARRNAMBOOL	Monthly	12	0.110	0.031

Description

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

Colour Results

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

Table 6-19 True Colour results by locality 2017/18

True Colour				
Water sampling locality	**Frequency of sampling**	**Number of samples**	**Maximum (Pt-Co)**	**Average result (Pt-Co)**
ALLANSFORD	Monthly	12	2	1
BALMORAL	Monthly	12	3	2
CAMPERDOWN (RURAL)	Monthly	12	2	1
CAMPERDOWN (URBAN)	Monthly	12	2	1
CARAMUT	Monthly	12	1	1
CASTERTON	Monthly	12	2	1
CAVENDISH	Monthly	12	18	8
COBDEN	Monthly	12	2	1
COLERAINE	Monthly	12	2	1
DARTMOOR	Monthly	12	1	1
DERRINALLUM	Monthly	12	2	1
DUNKELD	Monthly	12	1	1
GLENTHOMPSON	Monthly	12	6	3
HAMILTON	Monthly	12	3	2
HEYWOOD	Monthly	12	2	1
KOROIT	Monthly	12	4	1
LISMORE	Monthly	12	2	1
MACARTHUR	Monthly	12	1	1
MERINO	Monthly	12	2	1
MORTLAKE	Monthly	12	2	1
NOORAT/GLENORMISTON	Monthly	12	2	1
PAARATTE	Monthly	12	1	1
PENSHURST	Monthly	12	1	1
PETERBOROUGH	Monthly	12	1	1
PORT CAMPBELL	Monthly	12	1	1
PORT FAIRY	Monthly	12	2	1
PORTLAND	Monthly	12	5	4
PURNIM	Monthly	12	8	5
SANDFORD	Monthly	11	3	1
SIMPSON	Monthly	12	3	1
TARRINGTON	Monthly	12	3	2
TERANG	Monthly	12	1	1
TIMBOON	Monthly	12	1	1
WARRNAMBOOL	Monthly	12	2	1

Description

Colour is an important aesthetic characteristic for customer acceptance. Treatment processes can be optimised to remove colour.

Management of Colour
Cavendish – The colour of the Cavendish supply is derived from the raw source water of the Grampians headwork. Surface water run-off, particularly the initial flows, tends to be high in colour due to high levels of tannin. Cavendish is a disinfection-only plant and therefore there is no capacity for colour removal. During this reporting period Wannon Water has begun selectively harvesting which will reduce the risk of receiving high coloured water to the plant. During the 2018/19 period alternative water treatment options will be investigated for Cavendish.

Alkalinity and Hardness

Alkalinity Guideline
There is no health-based or aesthetic guideline for alkalinity however low levels (<50) can corrode surfaces. High levels (>200) tend to deposit calcium carbonate on pipes, fittings and hot water services.
Description Alkalinity is the ability of water to buffer changes in pH.

Hardness Guideline The guideline limit for hardness is 200 mg/L as calcium carbonate ($CaCO_3$). There is no health based guideline.
Description Caused by calcium and magnesium salts. Hard water is difficult to lather.
Less than 60 mg/L $CaCO_3$ – soft but possible corrosive
60-200 mg/L $CaCO_3$ – good quality
200-500 mg/L $CaCO_3$ – increasing scaling problems
Greater than 500 mg/L $CaCO_3$ – severe scaling

Alkalinity and hardness is not controllable by treatment processes at any of Wannon Water localities. Wannon Water has a large data set of very consistent data for localities where source water is groundwater and hence elected not to test for these parameters during 2017/18. There is some variation found in surface water hence representative samples are collected monthly for each of these systems. Refer to Tables 6-20 and 6-21 for the 2017/18 representative results for source waters.

Table 6-20 Total Alkalinity as $CaCO_3$ results by locality 2017/18

Total Alkalinity as $CaCO_3$				
Water sampling locality	**No. of Samples**	**No. of Non complying samples**	**Maximum result (mg/L CaCO3)**	**Average (mg/L CaCO3)**
BALMORAL	12	0	26	24
CAMPERDOWN (URBAN)	12	0	24	17
CAVENDISH	12	0	22	13
GLENTHOMPSON	12	0	37	31
HAMILTON	12	0	7	5
WARRNAMBOOL	12	0	23	21

Table 6-21 Total Hardness as $CaCO_3$ results by locality 2017/18

Total Hardness as $CaCO_3$				
Water sampling locality	**No. of Samples**	**No. of Non complying samples**	**Maximum result (mg/L)**	**Average (mg/L)**
BALMORAL	12	0	96	88
CAMPERDOWN (URBAN)	12	0	36	26
CAVENDISH	12	0	25	18
GLENTHOMPSON	12	0	90	77
HAMILTON	12	0	25	18
WARRNAMBOOL	12	0	34	31

Total Dissolved Solids Results

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

Table 6-22 Total Dissolved Solids results by locality 2017/18

Total Dissolved Solids				
Treatment Plant	**Water sampling locality**	**Frequency of sampling**	**Number of samples**	**Maximum result (mg/L)**
Balmoral WTP	Balmoral	Quarterly	4	480
Camperdown WTP	Camperdown, Derrinallum, Lismore	Quarterly	4	150
Caramut DP	Caramut	Quarterly	4	230
Casterton WTP	Casterton, Coleraine, Sandford, Merino	Quarterly	4	510
Cavendish DP	Cavendish	Quarterly	4	150
Cobden WTP	Cobden	Quarterly	4	150
Dartmoor WTP	Dartmoor	Quarterly	4	400
Glenthompson WTP	Glenthompson	Quarterly	4	440
Hamilton WTP	Dunkeld, Hamilton, Tarrington	Quarterly	4	160
Heywood WTP	Heywood	Quarterly	4	700
Macarthur WTP	Macarthur	Quarterly	4	1000
Mortlake DP	Mortlake	Quarterly	4	230
Penshurst DP	Penshurst	Quarterly	4	780
Port Campbell WTP	Peterborough, Port Campbell, Timboon	Quarterly	4	300
Port Fairy WTP	Port Fairy	Quarterly	4	920
Portland Bald Hill WTP	Portland	Quarterly	4	680
Purnim DP	Purnim	Quarterly	4	120
Simpson WTP	Simpson	Quarterly	4	140
Terang WTP	Mortlake, Noorat/ Glenormiston, Terang	Quarterly	4	150
Warrnambool WTP	Allansford, Koroit, Warrnambool	Quarterly	4	200

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

Management of Total Dissolved Solids
Total Dissolved Solids is not controllable by treatment at any of Wannon Water's localities. This is an opportunity for improvement in some of the groundwater supplied townships. An initiative has been implemented for Portland, Port Fairy and Heywood to reduce drinking water salinity and improve the aesthetics of these supplies.

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 DHHS of any potential or actual contaminated water supplied for drinking purposes. Information relating to all Section 22 incidents during 2017/18 is listed in Table 7-1.

Table 7-1 – Section 22 incidents 2017/18

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
22/08/2017 (1 day)	Caramut Clear Water Storage	*E.coli* 1 cfu/100 mL and Total Coliforms 86 cfu/100 mL	Caramut	Conclusions from an investigation found that the source of the E.coli detection was by incorrect labelling of micro sample bottles from the Caramut Groundwater Bore B and Caramut Clear Water Storage causing the samples to be swapped. No further actions were taken
13/10/2017 (1 day)	Balmoral reticulation	*E.coli* 2 cfu/100 mL and Total Coliforms 100 cfu/100 mL	Balmoral	The investigation found the positive detect was caused during the sampling process with the location of sample tap in long grass which was handled prior to taking the sample. Wannon Water management communicated to all field staff that if a sample tap is located where there may be risk of contamination or unsafe access to notify their direct manager to have the sample point moved or cleaned up where appropriate.

19/10/2017 (3 days)	Warrnambool low level reticulation storage	Vandalism	Warrnambool, Koroit	The storage was immediately isolated and inspected by divers and samples taken with the following outcomes: • Chlorine residual, pH and other factors at the time of the incident not indicate the presence of microbiological contamination; • No evidence was found during site inspection or tank inspection to indicate chemical contamination; • Diving inspection indicated the integrity of the storage was adequate; • Monitoring customer complaints found no increases in questions or complaints from the community directly affected; • Long term verification monitoring results showed that safe drinking water has been consistently supplied; • Results for pesticide, herbicide and metals comply with the ADWG guideline values. Corrective actions following the incident included: • Review of security management program; • Security awareness training for field staff; • Improved process for communication of any corrective actions required to ensure site security controls are maintained.
6/04/2018 (1 day)	Heywood Reticulation	Backflow of non-potable water in to reticulation system	Heywood	Wannon Water conducted the following actions in response to identifying backflow protocols not being followed by the industrial customer: • Physical break immediately installed. • Notice of contravention of the Water Act was issued to the industrial customer. • Wannon Water require all works to be undertaken in accordance with Australian Standards. The industrial customer was provided with details of the relevant standards so that they could have their plumber amend the internal pipework to comply with current standards. • Extensive review of current major customer backflow setups to ensure risk is minimal across Wannon Water region. • Review current RPZ verification process for all RPZ applications.

Section 18 Incidents

The objective of Section 18 of the *Safe Drinking Water Act 2003* is to indicate where drinking water has not complied with drinking water quality standards. Wannon Water must inform the DHHS when drinking water does not or is not likely to comply with any relevant water quality standard. Information relating to all Section 18 incidents during 2017/18 is listed in Table 7-2.

Table 7-2 – Section 18 incidents 2017/18

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
14/07/2017, 5/09/2017 & 23/11/2017 (3 single days)	Cavendish Reticulation	THM results exceeded the ADWG health guideline values on three occasions	Cavendish	• Install UVT at head of Cavendish plant to improve selective harvesting of source water. This has been purchased and waiting for Cultural Heritage approval for installation. • Actuated valve installed to enable remote selective harvesting of source water. • Improved UV cleaning program. • Increased flushing in Cavendish reticulation. • Allocated funds in Water Plan for plant upgrades.

Other Incidents

Wannon Water communicates other water quality related events to DHHS. Information relating to these which occurred during 2017/18 is listed in Table 7-3.

Table 7-3 – Other incidents 2017/18

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
1/09/2017 (3 days)	Warrnambool WTP	Fluoride instruments clogging	Warrnambool, Koroit and Allansford	Fluoride plant offline due to faulty dosing pumps. Dosing pumps were replaced, equipment flushed and bought back online.
19/09/2017 (7 days)	Warrnambool WTP	Fluoride instruments clogging	Warrnambool, Koroit and Allansford	Fluoride plant offline due to flow meter and non-return valve maintenance. Equipment flushed and bought back online.
5/03/2018 to 9/04/2018 (35 days)	Terang, Warrnambool	Blue-green algae producing taste and odour compounds affecting multiple raw water storages	Terang, Warrnambool, Koroit and Allansford	Isolated and copper sulphate dosed highly impacted raw water storages, selectively harvested best quality water, and communicated progress of the incident to public via local media sources.
18/03/2018 (20 days)	Terang, Camperdown, Cobden & Cobrico	Bushfires	Nil	Installation of a temporary pipeline to help provide water to control a peat fire at Cobrico. Rebate offered to community members of affected areas to clean and refill drinking water tanks.

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
31/05/2018 (3 days)	Warrnambool WTP	Fluoride instruments clogging	Warrnambool, Koroit and Allansford	Fluoride plant offline due to a pressure pump failure. Pump was replaced, equipment flushed and bought back online.

Customer Complaints

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

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 Commissions reporting principles. This is also supported by Wannon Water's Customer Charter.

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 to investigate the event. Appropriate actions are then taken using the AIIMS structure and Wannon Water's Emergency Management Plan.

The total number of complaints for 2017/18 was higher than previous years due to widespread algae related taste and odour issues. A summary of the types of complaints received is presented in Table 7-4, with all localities recording less than 1 complaint per 100 customers.

Table 7-4 – Types of complaints compared to previous years

Type of complaint^	2017/18	2016/17	2015/16	Comment
Alleged Illness#	4	6	12	
Coloured Water	90	96	65	Higher colour complaints for the 16/17 and 17/18 reporting periods were contributed to by Warrnambool CBD refurbishment – see Hot Spot Townships below.
Other	9	11	10	
Taste/Odour	103	39	46	60 due to Warrnambool algae issues in March 18

^ 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.

Table 7-5 – Types of complaints by locality

Locality	Alleged Illness / Heath Effects	Coloured Water	General WQ Complaint	Other	Taste/Odour	Total complaints
Allansford	0	0	0	0	1	**1**
Camperdown Rural	0	4	0	0	0	**4**
Camperdown	0	0	0	0	3	**3**
Casterton	0	2	0	1	0	**3**
Cavendish	0	3	0	0	0	**3**
Cobden Urban	0	1	0	0	0	**1**
Cobden	0	1	0	1	0	**2**
Dartmoor	0	0	0	1	0	**1**
Glenthompson	0	1	0	0	0	**1**
Hamilton	0	3	0	1	3	**7**
Heywood	0	12	0	0	5	**17**
Koroit	0	2	0	0	0	**2**
Lismore and Derrinallum	0	9	0	0	1	**10**
Merino	0	1	0	0	1	**2**
Mortlake	0	1	0	0	1	**2**
Penshurst	0	2	0	0	2	**4**
Peterborough	0	0	0	1	0	**1**
Port Fairy	0	2	0	2	1	**5**
Portland	1	2	0	0	6	**9**
Purnim	0	3	0	0	0	**3**
Simpson	0	1	0	0	0	**1**
Terang	0	3	0	0	4	**7**
Timboon	0	1	0	0	0	**1**
Warrnambool	3	36	0	2	75	**116**

Only localities where a complaint was made is listed in this table.

Wannon Water continued to maintain its proactive approach to customer complaints by continuing to:

- Allocate specific resources to trouble shoot hot spot townships identified in the 2017/18 period.
- Maintained resourcing to meet the scheduled flushing program for each of Wannon Water's localities.
- Proactive approach taken by Operations Branch to quality trend variances.

Hot spot townships

The Port Fairy township was systematically flushed, and had a sequestering agent added to the water, just prior to Christmas, to clean the reticulation before the tourist season. These activities kept the number of customer complaints in this locality low.

Cavendish township has had persistent issues with disinfection by-product formation due to colour and organic matter in the raw water supply. Historically Wannon Water has managed disinfection by-product formation at Cavendish by using chloramination, but following two separate detections of E. coli, Wannon Water took actions to reduce disinfection by-products whilst not compromising disinfection. Those actions include cessation of ammonia addition as ammonia addition reduces the strength of disinfection, switching from sodium hypochlorite to gaseous chlorine, routinely optimising the UV system, allowing reduced chlorine when effective, selectively

harvesting raw water to obtain higher quality water with lower organics and increased routine flushing of the township's reticulation network.

Following a planned water main shut down in the Warrnambool CBD due to extensive redevelopment, a number of water quality complaints for colour were received. This was due to the redirection of flow stirring up sediment in the reticulation network. Once the issue was resolved through continuous flushing of a wider area, changes were then made to the process for future recharging of mains for any planned works associated with this area of the CBD. The same issue had occurred in the previous reporting period.

Seasonal blue-green algae producing taste and odour compounds affecting multiple raw water storages caused an increase in customer complaints in the Warrnambool region due to the inability to remove such compounds at the Warrnambool WTP. Highly impacted raw water storages were isolated and dosed with copper sulphate to manage the algae blooms while raw water was selectively harvested from other storages in an attempt to reduce customer dissatisfaction. Customers were kept informed via local media sources.

8. GLOSSARY

Adsorption	Process to remove dissolved organic matter, particles, algal toxins and compounds causing taste and odour problems. Granulated activated carbon (GAC) is used for adsorption at Wannon Water.
ADWG	Australian Drinking Water Guidelines (2011)
AIIMS	Australian Inter-Service Incidents Management System
BGA	Blue Green Algae
Dissolved Air Flotation (DAF)	Treatment process for coarse removal of particles through air flotation
DHHS	Department of Health and Human Services Victoria
DP	Disinfection Plant
CCP	Critical control point
Clarification	Two main primary solids removal processes are utilised; sedimentation and dissolved air flotation
Coagulation	Treatment to destabilise colloidal particles (turbidity and colour) by neutralising the surface charge of the particle to allow floc formation. Coagulants used at Wannon Water are ferric chloride, aluminium chlorohydrate (ACH) and aluminium sulphate (alum)
Cooling/ aeration towers	Treatment process which cools water via aeration.
Disinfection	Treatment process to kill bacteria and viruses. Note all drinking water supplied by Wannon Water is disinfected (chlorination, chloramination or UV disinfection) to ensure that microorganisms are eliminated. Chlorine gas, sodium hypochlorite, aqueous ammonia and UV are used for disinfection.
Filtration	Treatment process which remove suspended material by passing through a granular media such as sand.
Flocculation	Used to increase the floc size to enhance clarification and aid filtration. Flocculants used at Wannon Water include polyelectrolyte Nalco, Magnafloc, polymer Nalclear and polymer Klaraid.
Fluoridation	Treatment process to provide a dental health benefit. Fluorosilicic acid is used for fluoridation at Wannon Water.
HACCP	Hazard Analysis and Critical Control Point. A system that identifies evaluates and controls hazards.
Mean	The average of a number of numerical values.
ML	Megalitre – one million litres
NATA	National Association of Testing Authorities, Australia.
Oxidation	Process used to convert soluble contaminants to insoluble contaminants for easier removal. Sodium hypochlorite is used for oxidation at Wannon Water.
pH correction/ stabilisation	Treatment 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 at Wannon Water.
Raw water	Water that has not been treated in any way.
Raw water detention	Clarification, via settling, microbial die-off and reducing variability in water quality.
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	*Safe Drinking Water Act 2003*
SDWR	Safe Drinking Water Regulations 2015
Sedimentation	Treatment process for coarse removal of particles through settling under gravity

Sequestration	Treatment process which involves the addition of sequestering agents to keeps dissolved iron and manganese from oxidising and precipitating. Calgon is used as a sequestering agent at Wannon Water.
WTP	Water Treatment Plant

Information regarding water treatment can be obtained from Wannon Water's web site:

www.wannonwater.com.au

Results for 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

Appendix 1- Risk management plan audit certificate

Risk Management Plan Audit Certificate

SCHEDULE 1

Regulation 10

Safe Drinking Water Regulations 2015

Risk Management Plan Audit Certificate

Certificate Number: **1314-2018**

Audit period: **20 May 2016 to April 8th, 2018**

To: Brent Smith, Audit and Risk Officer, Wannon Water

25 Gateway Road, Warrnambool, Victoria

Australian Business Number (ABN): **94 007 404 851**

I, *Nicholas Alan O'Connor*, after conducting a risk management plan audit of the

(print full name of approved auditor)

water supplied by Wannon Water, am of the opinion that—

Wannon Water has not complied with the obligations

imposed by section 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

The details of the reasons for noncompliance are: non-compliance

Safe Drinking Water Regulations 2015	Grade	Audit Findings	Reason for non-compliance
r. 8(1)(b)	Mi	Minor non-compliance	Risk management plan missing required information on positions held by those responsible for managing hazards and risks to the quality of the water.
r. 8(1)(c)	Mi	Minor non-compliance	Risk management plan missing required information on the positions held by persons responsible for dealing with water quality incidents, events or emergency.
r. 8(1)(d)(i) r. 8(1)(d)(ii) r. 8(1)(d)(iii)	Mi	Minor non-compliance	Risk management plan does not address item 8(1)(d)(iii): how the locations for collection of samples have been selected.
r. 8(1)(d)(iv)	Mi	Minor non-compliance	Risk management plan does not contain any information required under section 8(1)(d)(iv)(A) and(B) which specify discussion of the selection of locations and the appropriate numbers of samples for sampling to ensure that the samples are representative of the drinking water supplied at each location.
r. 8(1)(d)(v)	Mi	Minor non-compliance	Risk management plan does not specify how it is ensured that samples are not taken from the same collection point within a reticulation water sampling locality on two consecutive occasions.
r. 8(2)(a) r. 8(2)(b)(i) r. 8(2)(b)(ii)	Mi	Minor non-compliance	Risk management plan does not quantify the concentration of microbial hazards in water to be treated, nor the extent of removal of the hazards by the water treatment processes.

Signature of approved auditor: _____ Date: 17 / April / 2018

Wannon Water
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