

**2016/17**

# Water Quality ANNUAL REPORT



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and Human Services (Water Program)

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*Cover photo* – Hartwich's Reservoir Outlet Tower Upgrade – Photo by Pabitra Joshi

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# I. INTRODUCTION

Wannon Water is committed to providing safe, reliable drinking water to South-west Victoria. Wannon Water provides water and water reclamation services to a population of approximately 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 2016/17 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).

During 2016/17, Wannon Water continued to achieve a high level of compliance against the requirements of the *Safe Drinking Water Act 2003*.

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

**The 2017 customer value survey showed that 98% of domestic customers were satisfied with the water supply from Wannon Water, while 88% of customers were satisfied with their water quality.**

## Defining Drinking Water

The *Safe Drinking Water Act 2003* defines two 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 Minister for Health 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 2016/17, 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 1,899 kilometres of water mains.

Wannon Water harvested approximately 14,000 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. 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 2016/17, Wannon Water continued sanitary surveys for its source waters in accordance with the *Safe Drinking Water Regulations 2015*. This has included an increased monitoring program of source water.

Figure I-1 illustrates the localities and where the water is sourced from. Table I-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 I-1 - Wannon Water Service Area

**Table I-1 - Source water and treatment systems summary**

Water Sampling Locality	Number of customers <sup>1</sup>	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 Storage <sup>1</sup>		
			Warrnambool Storage <sup>2</sup>		
		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
				Coleraine DP	Casterton Arundel Road Basin
					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 <sup>2</sup>	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			

Water Sampling Locality	Number of customers <sup>1</sup>	Source Water	Raw Water Storage	Treatment Plant	Treated Water Storage
Dunkeld - via Hamilton WTP	390	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	
			Hartwicks Reservoir		
		Rocklands Reservoir (Grampians Wimmera Mallee Water)	Hamilton Service Basins 1 & 2	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		
			Hartwicks Reservoir		
		Rocklands Reservoir (Grampians Wimmera Mallee Water)	Hamilton Service Basins 1 & 2		
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 <sup>2</sup>	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	Tulich Bores - Bore Field (4)	N/A	Casterton WTP	Casterton clear water storage
				Merino DP	Casterton Arundel Road Basin
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
		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		Noorat Tank
		Carlisle Bores (2)			
		– 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		Tarrington Pierrepoint Tank
			Hartwich's Reservoir		
		Rocklands Reservoir (Grampians Wimmera Mallee Water)	Hamilton Service Basins 1 & 2		
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
					Timboon Elevated 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 95<sup>th</sup> 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 2016/17.**

### 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.

**Consultation was undertaken with Cavendish customers, and an exemption from complying with the aluminium water quality standard was granted by the Minister on 30 June 2013; the exemption applies until 30 June 2018.**

### 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. 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**

A regulatory audit was not carried out during the reporting period.

A HACCP surveillance audit was conducted in May 2017. One minor non-conformances was identified:

- Casterton WTP documentation had not yet been updated to reflect the addition of a clarifier.

### 3. 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 2016/17 were similar to 2015/16. Changes and improvements to the system are outlined in Section 5.

**Table 4-1 - Treatment Processes and Added Substances 2016/17**

Treatment Plant/ Disinfection Plant	Treatment Process <sup>^</sup>	Added substance(s)
Allansford DP	Disinfection	Sodium hypochlorite
Balmoral WTP	Coagulation, Flocculation and Clarification, Filtration, Adsorption, Sequestration, Disinfection	Soda Ash, Aluminium chlorohydrate (ACH), Calgon, Sodium hypochlorite, Aqueous ammonia
Camperdown WTP	Coagulation, Flocculation and Clarification Filtration	Hydrated Lime, Aluminium Sulphate, Chlorine gas, Powdered Activated Carbon (PAC)
Caramut DP	Disinfection	Sodium hypochlorite
Casterton WTP	Oxidation, Coagulation, Flocculation and Clarification, Filtration, Disinfection	Ferric Chloride, Magnafloc LT20 flocculant, Sodium hypochlorite
Cavendish DP	Disinfection #	Sodium hypochlorite
Cobden WTP	Coagulation, Flocculation and Clarification, Filtration, Sequestration, Disinfection	Soda Ash, Aluminium Sulphate, Polymer Klaraid, Calgon, Chlorine gas
Coleraine DP	Disinfection	Sodium hypochlorite
Dartmoor DP	Disinfection	Sodium hypochlorite
Dunkeld DP	Disinfection	Sodium hypochlorite
Ettrick Springs DP	Disinfection	Chlorine gas
Glenthompson WTP	Coagulation, Flocculation and Clarification, Filtration, Adsorption, Sequestration, Disinfection #	Aluminium chlorohydrate (ACH), Calgon, Sodium hypochlorite, Aqueous ammonia
Hamilton WTP	Coagulation, Flocculation and Clarification, Filtration, Disinfection, Fluoridation	Hydrated Lime, Aluminium Sulphate, Polymer Nalclean 8170PULN, Chlorine gas, Aqueous ammonia, Fluorosilicic acid
Heywood WTP	Cooling/ aeration towers, Sequestration, Disinfection	Calgon, Chlorine gas
Illowa DP	Disinfection	Chlorine gas
Macarthur WTP	Oxidation, Coagulation, Flocculation and Clarification, Filtration *, Disinfection	Ferric Chloride, Magnafloc LT20 flocculant, Sodium hypochlorite
Merino DP	Disinfection	Sodium hypochlorite
Mortlake DP	Disinfection	Chlorine gas
Penshurst DP	Disinfection	Sodium hypochlorite
Port Campbell WTP	Cooling/ aeration towers, Disinfection	Chlorine gas
Port Fairy WTP	Cooling/ aeration towers, Sequestration, Disinfection	Calgon, Chlorine gas
Portland Bald Hill WTP	Cooling/ aeration towers, Disinfection	Chlorine gas
Portland Wyatt Street WTP	Cooling/ aeration towers, Disinfection	Chlorine gas
Purnim DP	Disinfection#	Sodium hypochlorite
Simpson WTP	Coagulation, Flocculation and Clarification, Filtration, Disinfection	Caustic soda, Aluminium sulphate, Chlorine gas
Terang WTP	Coagulation, Flocculation and Clarification, Filtration, Disinfection	Soda Ash, Aluminium sulphate, Polymer Klaraid, Chlorine gas
Warrnambool WTP	Coagulation, Flocculation and Clarification, Filtration, Disinfection, Fluoridation	Aluminium sulphate, Polyelectrolyte Nalco 3482, Chlorine gas, Hydrated lime, Fluorosilicic acid

<sup>^</sup> See Glossary for description of each treatment process      \*Pressure filters plus iron sorption filters      #Disinfection includes UV

## **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.

The Cavendish UV system has staining issues caused by coloured raw water resulting in reduced UVT. Selective raw water harvesting and the establishment of a routine cleaning program that has alleviated the problem. This issue was reported under section 22 of the Act, please see hotspot townships in Section 7 below for more information.

## 4. 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 2016/17 this included:

- Internal auditor training
- 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

### 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 Cavendish as part of the response to the Section 22 action in 2017. Camperdown and Cobden were air scoured in 2017 as a prevention for customer complaints in response to source water quality (higher iron and manganese) for these towns.

#### 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 2016/17 Wannon Water spent approximately \$570 thousand replacing approximately 2.5 kilometres of mains at Camperdown, Terang, Mortlake, Warrnambool and Koroit.

#### 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 2016/17 cleaning and inspection occurred at:

- Balmoral WTP – Clear Water Storage (I&C)
- Camperdown WTP – Clear Water Storage
- Glenthompson WTP – Clear Water Storage
- Heywood WTP – Clear Water Storage
- Dartmoor Tank – Potable Water Storage
- Lismore Tank – Potable Water Storage
- Merino Tank – Potable Water Storage
- Penshurst DP – Clear Water Storage
- Portland – Bald Hill WTP – Cooling Tower sumps
- Portland – Wyatt Street – Clear Water Storage
- Tarrington – Pierrepont Tank
- Warrnambool – Harrington Road Ground Tank – Potable Water Storage

## **Water Treatment Plant Changes and Improvements**

### **Warrnambool WTP**

Lime supply changed from Sibelco to Boral.

Fluoride supply changed from Incitec Pivot to Axieo Operations Australia Pty Ltd.

Pump replacement at Liebig Street water tower.

### **Port Fairy WTP**

A new chlorine dosing systems and building and a new Calgon dosing system.

### **Macarthur WTP**

Pressure filters were removed and upgraded. Changed granular ferric oxide media in Macarthur filters.

### **Cobden WTP**

T plenum floor and filter media was replaced in Filter B at Cobden WTP.

### **Camperdown WTP**

Dosing of PAC at Camperdown has been improved with a new dosing pump installed.

### **Port Campbell WTP**

Pre-dosing of chlorine has been added to improve iron removal in the treatment plant.

### **Cavendish DP**

New buildings for UV and chemical dosing equipment. Disinfection was changed from Chloramination to free chlorine (as a result of the Section 22 incident discussed in section 7).

Chemical cleaning of UV disinfection unit implemented on a fortnightly basis.

### **Purnim DP**

Chemical cleaning of UV disinfection unit implemented on a fortnightly basis.

### **Glenthompson WTP**

Chemical cleaning of UV disinfection unit implemented on a fortnightly basis.

### **Hartwich's Reservoir**

The reservoir outlet tower was upgraded allowing better control of water sourced from the reservoir (cover photo).

### **Hamilton WTP**

New Sludge Drying beds have been constructed to handle DAF wash water. Hamilton Raw Water Service Basin 2 was desludged to improve raw water quality.

### **Casterton WTP**

A new clarifier was commissioned, improving treatment performance.



**Koroit DP**

De-commissioned disused bores removing any risk that these could have been set up for emergency use.

**Darlington**

Decommissioned an old disused bore removing any risk that these could have been set up for emergency use.

## 5. DRINKING WATER QUALITY RESULTS 2016/17

### Sampling Frequency

The frequency of sampling of the water quality standards (*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.

Regulation 13 (2) of the Safe Drinking Water Regulations 2015 (the Regulations) provides that the Secretary to the DHHS may, by notice published in the Government Gazette, vary the frequencies specified in Schedule 2 of the Regulations at which samples of drinking water are to be collected at a water sampling point located within a water sampling locality. On 5 June 2009 the Secretary approved a variation to the frequency at which a sample of drinking water for *Escherichia coli* (*E.coli*) and turbidity were to be collected at:

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

### Testing Programs

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

**During 2016/17 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 2016/17 three Schedule 2 regulatory samples were missed, all samples were for Total THM. The localities had no history of exceedance and the samples were missed due to

initial teething problems of the new external laboratory contract that were quickly resolved.

*E.coli* and Turbidity samples were not taken at the specified frequency in the locality of Portland on 3 occasions due to laboratory error. The samples were scheduled and sampled by Wannon Water and assumed analysed. The error occurred when the laboratory had entered two Portland reticulation sample points with the same site code, which caused the laboratory information management system to process only one sample point. This resulted in 101 out of 104 samples being analysed.

Trihalomethane samples were not taken at the specified frequency in the locality of Allansford on one occasion due to scheduling error. This resulted in 11 out of 12 samples being analysed.

### Interpreting the results

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

- **orgs/100mL** used for measurement of *E.coli*
- Nephelometric Turbidity Units (**NTU**) a measurement for turbidity
- **pH units** for measurement of pH
- Platinum-Cobalt (**Pt.-Co.**) units for measurement of colour. This unit is interchangeable with Hazen Units (HU)
- **mg/L as calcium carbonate (CaCO<sub>3</sub>)** 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 with the exception of Cavendish as described in section 7 hotspot townships. The number of non compliant results increased by one (Cavendish) compared to the previous 2 years.

**Table 5-1 E. coli results by locality 2016/17**

#### E.coli

Water sampling locality	Frequency of sampling	Number of samples	Maximum detected (org/s100mL)	No. of investigations conducted (s. 22)	No. of samples where standard not met (s.18)
ALLANSFORD	Weekly	53	1	1	0
BALMORAL	Weekly	53	0	0	0
CAMPERDOWN (RURAL)	Weekly	52	0	0	0
CAMPERDOWN (URBAN)	Weekly	53	0	0	0
CARAMUT	Weekly	53	0	0	0
CASTERTON	Weekly	53	0	0	0
CAVENDISH	Weekly	52	2	2	1
COBDEN	Weekly	53	0	1	0
COLERAINE	Weekly	52	0	1	0
DARTMOOR	Weekly	53	0	0	0
DERRINALLUM	Weekly	53	0	0	0
DUNKELD	Weekly	53	0	0	0
GLENTHOMPSON	Weekly	53	0	0	0
HAMILTON	Weekly	106	0	0	0
HEYWOOD	Weekly	53	0	0	0
KOROIT	Weekly	53	0	0	0
LISMORE	Weekly	53	0	0	0
MACARTHUR	Weekly	52	0	0	0
MERINO	Weekly	53	0	0	0
MORTLAKE	Weekly	53	0	0	0
NOORAT/GLENORMISTON	Weekly	53	0	0	0
PAARATTE	Weekly	53	0	0	0
PENSHURST	Weekly	52	0	0	0
PETERBOROUGH	Weekly	53	0	0	0
PORT CAMPBELL	Weekly	53	0	0	0
PORT FAIRY	Weekly	104	0	0	0
PORTLAND	Weekly	101#	0	0	0
PURNIM	Weekly	53	0	0	0
SANDFORD	Weekly	53	0	0	0
SIMPSON	Weekly	53	0	0	0
TARRINGTON	Weekly	53	0	0	0
TERANG	Weekly	53	0	0	0
TIMBOON	Weekly	53	0	0	0
WARRNAMBOOL	Weekly	159	0	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 saw an increase due to changes in plant operations as described in section 7 hotspot townships.

**Table 5-2 Trihalomethanes results by locality 2016/17**

### 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) <sup>1</sup>
ALLANSFORD	Monthly	11#	0.130	0.086	0
BALMORAL	Monthly	12	0.140	0.089	0
CAMPERDOWN (RURAL)	Monthly	12	0.084	0.065	0
CAMPERDOWN (URBAN)	Monthly	12	0.074	0.050	0
CARAMUT	Monthly	12	0.041	0.028	0
CASTERTON	Monthly	12	0.149	0.095	0
CAVENDISH	Monthly	12	0.656	0.173	2
COBDEN	Monthly	12	0.101	0.073	0
COLERAINE	Monthly	12	0.200	0.146	0
DARTMOOR	Monthly	12	0.005	0.003	0
DERRINALLUM	Monthly	12	0.160	0.123	0
DUNKELD	Monthly	12	0.082	0.064	0
GLENTHOMPSON	Monthly	12	0.088	0.064	0
HAMILTON	Monthly	12	0.016	0.013	0
HEYWOOD	Monthly	12	0.033	0.019	0
KOROIT	Monthly	12	0.150	0.098	0
LISMORE	Monthly	12	0.156	0.108	0
MACARTHUR	Monthly	12	0.045	0.039	0
MERINO	Monthly	12	0.160	0.138	0
MORTLAKE	Monthly	12	0.150	0.108	0
NOORAT/GLENORMISTON	Monthly	12	0.160	0.095	0
PAARATTE	Monthly	12	0.009	0.006	0
PENSHURST	Monthly	12	0.043	0.023	0
PETERBOROUGH	Monthly	12	0.016	0.010	0
PORT CAMPBELL	Monthly	12	0.016	0.012	0
PORT FAIRY	Monthly	12	0.004	0.002	0
PORTLAND	Monthly	12	0.005	0.003	0
PURNIM	Monthly	12	0.125	0.106	0
SANDFORD	Monthly	12	0.170	0.140	0
SIMPSON	Monthly	12	0.055	0.042	0
TARRINGTON	Monthly	12	0.018	0.012	0
TERANG	Monthly	12	0.140	0.077	0
TIMBOON	Monthly	12	0.053	0.041	0
WARRNAMBOOL	Monthly	12	0.110	0.077	0

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

## Turbidity

**Standard:** The 95<sup>th</sup> 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 5-3 Turbidity results by locality 2016/17**

### 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 95 <sup>th</sup> percentile of results in any 12 months above standard (s.18)
ALLANSFORD	Weekly	52	0.4	0.2	0
BALMORAL	Weekly	52	2.3	0.5	0
CAMPERDOWN (RURAL)	Weekly	52	1.0	0.3	0
CAMPERDOWN (URBAN)	Weekly	52	0.8	0.2	0
CARAMUT	Weekly	52	0.5	0.2	0
CASTERTON	Weekly	52	1.7	0.2	0
CAVENDISH	Weekly	52	2.5	0.8	0
COBDEN	Weekly	52	3.4	0.4	0
COLERAINE	Weekly	52	0.8	0.2	0
DARTMOOR	Weekly	52	0.3	0.1	0
DERRINALLUM	Weekly	52	4.3	0.4	0
DUNKELD	Weekly	52	1.0	0.3	0
GLENTHOMPSON	Weekly	52	5.8	0.5	0
HAMILTON *	Weekly	104	2.5	0.2	0
HEYWOOD	Weekly	52	3.7	1.3	0
KOROIT	Weekly	52	0.8	0.3	0
LISMORE	Weekly	52	4.4	0.5	0
MACARTHUR	Weekly	52	1.7	0.2	0
MERINO	Weekly	52	0.5	0.1	0
MORTLAKE	Weekly	52	1.1	0.2	0
NOORAT/GLENORMISTON	Weekly	52	0.5	0.1	0
PAARATTE	Weekly	52	0.4	0.2	0
PENSHURST	Weekly	52	14.0	1.2	0
PETERBOROUGH	Weekly	53	1.0	0.2	0
PORT CAMPBELL	Weekly	52	0.5	0.2	0
PORT FAIRY *	Weekly	104	5.2	0.6	0
PORTLAND *	Weekly	101#	2.9	0.2	0
PUENIM	Weekly	52	2.2	1.2	0
SANDFORD	Weekly	52	0.2	0.1	0
SIMPSON	Weekly	52	0.5	0.2	0
TARRINGTON	Weekly	52	0.6	0.2	0
TERANG	Weekly	52	1.9	0.2	0
TIMBOON	Weekly	52	0.3	0.1	0
WARRNAMBOOL *	Weekly	156	1.5	0.3	0

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

## 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).

**Table 5-4 Fluoride results by locality 2016/17**

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	0.80	0
BALMORAL	Yearly	1	-	0.05	0.05	0
CAMPERDOWN (RURAL)	Yearly	1	-	0.05	0.05	0
CAMPERDOWN (URBAN)	Yearly	1	-	0.05	0.05	0
CARAMUT	Yearly	1	-	0.08	0.08	0
CASTERTON	Yearly	1	-	0.11	0.11	0
CAVENDISH	Yearly	1	-	0.05	0.05	0
COBDEN	Yearly	1	-	0.05	0.05	0
COLERAINE	Yearly	1	-	0.11	0.11	0
DARTMOOR	Yearly	1	-	0.09	0.09	0
DERRINALLUM	Yearly	1	-	0.05	0.05	0
DUNKELD +	Weekly	53	0.9	1.00	0.84	0
GLENTHOMPSON	Yearly	1	-	0.07	0.07	0
HAMILTON + *	Weekly	104	0.9	1.10	0.86	0
HEYWOOD	Yearly	1	-	0.43	0.43	0
KOROIT +	Weekly	53	0.9	0.99	0.77	0
LISMORE	Yearly	1	-	0.05	0.05	0
MACARTHUR	Yearly	1	-	0.44	0.44	0
MERINO	Yearly	1	-	0.11	0.11	0
MORTLAKE	Yearly	1	-	0.05	0.05	0
NOORAT/GLENORMISTON	Yearly	1	-	0.05	0.05	0
PAARATTE	Yearly	1	-	0.16	0.16	0
PENSHURST	Yearly	1	-	0.05	0.05	0
PETERBOROUGH	Yearly	1	-	0.16	0.16	0
PORT CAMPBELL	Yearly	1	-	0.16	0.16	0
PORT FAIRY^	Yearly	1	-	0.78	0.78	0
PORTLAND^	Monthly	12	-	1.20	1.09	0
PURNIM	Yearly	1	-	0.05	0.05	0
SANDFORD	Yearly	1	-	0.11	0.11	0
SIMPSON	Yearly	1	-	0.05	0.05	0

TARRINGTON +	Weekly	53	-	1.10	0.85	0
TERANG	Yearly	1	-	0.05	0.05	0
TIMBOON	Yearly	1	-	0.16	0.16	0
WARRNAMBOOL + *	Weekly	156	0.9	1.10	0.79	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.



## Manganese Results

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

**Table 5-5 Manganese results by locality 2016/17**

Manganese					
Water sampling locality	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average (mg/L)	No. of samples where standard was not met (s.18)
ALLANSFORD	Monthly	12	0.003	0.002	0
BALMORAL	Monthly	12	0.011	0.005	0
CAMPERDOWN (RURAL)	Monthly	12	0.038	0.008	0
CAMPERDOWN (URBAN)	Monthly	12	0.020	0.007	0
CARAMUT	Monthly	12	0.002	0.001	0
CASTERTON	Monthly	12	0.002	0.001	0
CAVENDISH	Monthly	12	0.002	0.002	0
COBDEN	Monthly	12	0.017	0.004	0
COLERAINE	Monthly	12	0.002	0.001	0
DARTMOOR	Monthly	12	0.002	0.001	0
DERRINALLUM	Monthly	12	0.028	0.007	0
DUNKELD	Monthly	12	0.010	0.003	0
GLENTHOMPSON	Monthly	12	0.018	0.005	0
HAMILTON	Monthly	12	0.018	0.006	0
HEYWOOD	Monthly	12	0.081	0.052	0
KOROIT	Monthly	12	0.003	0.002	0
LISMORE	Monthly	12	0.014	0.005	0
MACARTHUR	Weekly	12	0.002	0.001	0
MERINO	Monthly	12	0.002	0.001	0
MORTLAKE	Monthly	12	0.017	0.003	0
NOORAT/GLENORMISTON	Monthly	12	0.003	0.002	0
PAARATTE	Monthly	12	0.002	0.001	0
PENSHURST	Monthly	12	0.022	0.003	0
PETERBOROUGH	Monthly	12	0.004	0.002	0
PORT CAMPBELL	Monthly	12	0.002	0.002	0
PORT FAIRY	Monthly	12	0.064	0.015	0
PORTLAND	Monthly	12	0.002	0.002	0
PURNIM	Monthly	12	0.014	0.008	0
SANDFORD	Monthly	12	0.002	0.001	0
SIMPSON	Monthly	12	0.031	0.006	0
TARRINGTON	Monthly	12	0.013	0.004	0
TERANG	Monthly	12	0.057	0.008	0
TIMBOON	Monthly	12	0.002	0.001	0
WARRNAMBOOL	Monthly	12	0.011	0.003	0

If the maximum result manganese is 0.55 mg/L or greater, then the locality is non-compliant.

## Lead Results

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

**Table 5-6 Lead results by locality 2016/17**

### Lead

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

**Table 5-7 Copper results by locality 2016/17**

### Copper

Water sampling locality	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average (mg/L)	No. of samples where standard was not met (s.18)
ALLANSFORD	Yearly	1	0.008	0.008	0
BALMORAL	Yearly	1	0.004	0.004	0
CAMPERDOWN (RURAL)	Yearly	1	0.001	0.001	0
CAMPERDOWN (URBAN)	Yearly	1	0.007	0.007	0
CARAMUT	Yearly	1	0.006	0.006	0
CASTERTON	Yearly	1	0.130	0.130	0
CAVENDISH	Yearly	1	0.004	0.004	0
COBDEN	Yearly	1	0.006	0.006	0
COLERAINE	Yearly	1	0.070	0.070	0
DARTMOOR	Yearly	1	0.006	0.006	0
DERRINALLUM	Yearly	1	0.001	0.001	0
DUNKELD	Yearly	1	0.022	0.022	0
GLENTHOMPSON	Yearly	1	0.008	0.008	0
HAMILTON	Yearly	1	0.006	0.006	0
HEYWOOD	Yearly	1	0.002	0.002	0
KOROIT	Yearly	1	0.011	0.011	0
LISMORE	Yearly	1	0.001	0.001	0
MACARTHUR	Yearly	1	0.012	0.007	0
MERINO	Yearly	1	0.017	0.017	0
MORTLAKE	Yearly	1	0.007	0.007	0
NOORAT/GLENORMISTON	Yearly	1	0.002	0.002	0
PAARATTE	Yearly	1	0.002	0.002	0
PENSHURST	Yearly	1	0.004	0.004	0
PETERBOROUGH	Yearly	1	0.005	0.005	0
PORT CAMPBELL	Yearly	1	0.006	0.006	0
PORT FAIRY	Yearly	1	0.002	0.002	0
PORTLAND	Yearly	1	0.002	0.002	0
PURNIM	Yearly	1	0.067	0.067	0
SANDFORD	Yearly	1	0.052	0.052	0
SIMPSON	Yearly	1	0.027	0.027	0
TARRINGTON	Yearly	1	0.002	0.002	0
TERANG	Yearly	1	0.003	0.003	0
TIMBOON	Yearly	1	0.002	0.002	0
WARRNAMBOOL	Yearly	1	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).

**Table 5-8 Arsenic results by locality 2016/17**

### Arsenic

Water sampling locality	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average (mg/L)	No. of samples where standard was not met (s.18)
ALLANSFORD	Yearly	1	<0.001	0.001	0
BALMORAL	Yearly	1	<0.001	0.001	0
CAMPERDOWN (RURAL)	Yearly	1	<0.001	0.001	0
CAMPERDOWN (URBAN)	Yearly	1	<0.001	0.001	0
CARAMUT	Yearly	1	<0.001	0.001	0
CASTERTON	Yearly	1	<0.001	0.001	0
CAVENDISH	Yearly	1	<0.001	0.001	0
COBDEN	Yearly	1	<0.001	0.001	0
COLERAINE	Yearly	1	<0.001	0.001	0
DARTMOOR	Yearly	1	<0.001	0.001	0
DERRINALLUM	Yearly	1	<0.001	0.001	0
DUNKELD	Yearly	1	<0.001	0.001	0
GLENTHOMPSON	Yearly	1	<0.001	0.001	0
HAMILTON	Yearly	1	<0.001	0.001	0
HEYWOOD	Yearly	1	<0.001	0.001	0
KOROIT	Yearly	1	<0.001	0.001	0
LISMORE	Yearly	1	<0.001	0.001	0
MACARTHUR	Weekly	52	0.009	0.002	0
MERINO	Yearly	1	<0.001	0.001	0
MORTLAKE	Yearly	1	<0.001	0.001	0
NOORAT/GLENORMISTON	Yearly	1	<0.001	0.001	0
PAARATTE	Yearly	1	<0.001	0.001	0
PENSHURST	Yearly	1	0.002	0.002	0
PETERBOROUGH	Yearly	1	<0.001	0.001	0
PORT CAMPBELL	Yearly	1	<0.001	0.001	0
PORT FAIRY	Yearly	1	0.003	0.003	0
PORTLAND	Yearly	1	<0.001	0.001	0
PURNIM	Yearly	1	<0.001	0.001	0
SANDFORD	Yearly	1	<0.001	0.001	0
SIMPSON	Yearly	1	<0.001	0.001	0
TARRINGTON	Yearly	1	<0.001	0.001	0
TERANG	Yearly	1	<0.001	0.001	0
TIMBOON	Yearly	1	<0.001	0.001	0
WARRNAMBOOL	Yearly	1	<0.001	0.001	0

## Water treatment related chemicals

Table 6-9 lists the water treatment related chemicals monitored at each locality during 2016/17. All test results were less than the ADWG health-related guideline values.

**Table 5-9 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 2016/17. 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 6-11 lists the suite of polycyclic aromatic hydrocarbons monitored at each locality during 2016/17.

**Table 5-11 - PAH sampling summary and health related guideline values**

Parameter	Sampling Frequency	ADWG Value (mg/L)
Acenaphthene	Yearly *	-
Acenaphthylene	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 2016/17. All test results were less than the detection limits.

**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	0.1
2,4,5-TP	Yearly	0.1
2,4,6-T	Yearly	0.02
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	0.002
Chloropyrifos	Yearly	0.01
CIS-1,3-Dichloropropene	Yearly	-
cis-Chlordane	Yearly	0.002
Dicamba	Yearly	0.1
Dieldrin	Yearly	0.0003
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	0.4
Lindane	Yearly	0.01
MCPA	Yearly	0.04
MCPB	Yearly	-
Mecoprop	Yearly	-
Methoxychlor	Yearly	0.3
Molinate	Yearly	0.004
oxy-Chlordane	Yearly	0.11
Prometon	Yearly	-
Prometryn	Yearly	-
Propazine	Yearly	0.05
Propiconazole	Yearly	0.1
Simazine	Yearly	0.02
Simetryn	Yearly	-
Temephos	Yearly	0.4
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 2016/17. 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	0.001
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	-
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  $\geq 1.3$  ug/L (microcystin\_LR toxicity equivalents)
- $\geq 6500$  cells/mL *Microcystis aeruginosa*
- Total combined biovolume of known toxic species  $\geq 0.6$  mm<sup>3</sup>/L
- Total combined biovolume of all cyanobacterial  $> 10$ mm<sup>3</sup>/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 2016/17 Wannon Water collected samples following a risk-rated approach, sampling monthly to fortnightly from all storages that supplied raw water to drinking water localities. These samples were sent to a NATA certified laboratory for algal identification and counts. The sampling frequency was increased if blue green algae were detected and the numbers were noted to be increasing.

## 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.

**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 were sampled in 2016/17, groundwater bores are scheduled to be sampled in 2017/18.

## Other Results

Table 6-16 lists other parameters tested at the customer tap during 2016/17. 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 5-17 pH results by locality 2016/17**

pH				
Water sampling locality	Frequency of sampling	Number of samples	Maximum (pH units)	Minimum (pH units)
ALLANSFORD	Weekly	52	7.7	6.9
BALMORAL	Weekly	52	8.2	6.8
CAMPERDOWN (RURAL)	Weekly	52	9.2	7.2
CAMPERDOWN (URBAN)	Weekly	52	7.5	7.0
CARAMUT	Weekly	52	8.5	7.6
CASTERTON	Weekly	52	7.9	7.2
CAVENDISH	Weekly	52	9.3	7.0
COBDEN	Weekly	52	7.7	6.8
COLERAINE	Weekly	52	8.1	7.4
DARTMOOR	Weekly	52	8.2	7.6
DERRINALLUM	Weekly	52	10.0	8.2
DUNKELD	Weekly	52	7.1	6.4
GLENTHOMPSON	Weekly	52	8.7	7.0
HAMILTON	Weekly	104*	7.8	6.3
HEYWOOD	Weekly	52	8.8	8.1
KOROIT	Weekly	52	7.7	6.8
LISMORE	Weekly	52	9.4	7.9
MACARTHUR	Weekly	52	8.2	7.9
MERINO	Weekly	53	8.2	7.5
MORTLAKE	Weekly	52	8.4	7.5
NOORAT/GLENORMISTON	Weekly	53	9.2	6.9
PAARATTE	Weekly	52	8.1	7.7
PENSHURST	Weekly	52	8.6	7.4
PETERBOROUGH	Weekly	52	8.3	7.9
PORT CAMPBELL	Weekly	52	8.2	7.8
PORT FAIRY	Weekly	104*	8.6	8.3
PORTLAND	Weekly	101*#	8.8	8.3
PURNIM	Weekly	52	7.2	6.8
SANDFORD	Weekly	53	8.0	7.2
SIMPSON	Weekly	52	7.5	6.9
TARRINGTON	Weekly	52	8.6	6.6
TERANG	Weekly	52	8.1	6.6
TIMBOON	Weekly	52	8.3	8.0
WARRNAMBOOL	Weekly	156*	7.7	6.3

\* 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 5-18 Iron results by locality 2016 /17**

Iron				
Water sampling locality	Frequency of sampling	Number of samples	Maximum (mg/L)	Average result (mg/L)
ALLANSFORD	Monthly	12	0.028	0.013
BALMORAL	Monthly	12	0.174	0.085
CAMPERDOWN (RURAL)	Monthly	12	0.120	0.018
CAMPERDOWN (URBAN)	Monthly	12	0.023	0.014
CARAMUT	Monthly	12	0.010	0.006
CASTERTON	Monthly	12	0.034	0.012
CAVENDISH	Monthly	12	0.370	0.195
COBDEN	Monthly	12	0.033	0.016
COLERAINE	Monthly	12	0.022	0.014
DARTMOOR	Monthly	12	0.007	0.006
DERRINALLUM	Monthly	12	0.039	0.023
DUNKELD	Monthly	12	0.306	0.101
GLENTHOMPSON	Monthly	12	0.110	0.049
HAMILTON	Monthly	12	0.106	0.033
HEYWOOD	Monthly	12	0.057	0.017
KOROIT	Monthly	12	0.052	0.023
LISMORE	Monthly	12	0.092	0.036
MACARTHUR	Monthly	12	0.076	0.024
MERINO	Monthly	12	0.027	0.012
MORTLAKE	Monthly	12	0.110	0.028
NOORAT/GLENORMISTON	Monthly	12	0.111	0.020
PAARATTE	Monthly	12	0.082	0.050
PENSHURST	Monthly	12	0.039	0.015
PETERBOROUGH	Monthly	12	0.690	0.084
PORT CAMPBELL	Monthly	12	0.139	0.056
PORT FAIRY	Monthly	12	0.670	0.158
PORTLAND	Monthly	12	0.067	0.023
PURNIM	Monthly	12	0.250	0.192
SANDFORD	Monthly	12	0.020	0.008
SIMPSON	Monthly	12	0.041	0.014
TARRINGTON	Monthly	12	0.120	0.050
TERANG	Monthly	12	0.036	0.013
TIMBOON	Monthly	12	0.084	0.037
WARRNAMBOOL	Monthly	12	0.110	0.030

### 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 5-19 True Colour results by locality 2016/17**

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	7	3
CAMPERDOWN (RURAL)	Monthly	12	2	1
CAMPERDOWN (URBAN)	Monthly	12	3	1
CARAMUT	Monthly	12	2	1
CASTERTON	Monthly	12	2	1
CAVENDISH	Monthly	12	85	36
COBDEN	Monthly	12	3	2
COLERAINE	Monthly	12	2	1
DARTMOOR	Monthly	12	1	1
DERRINALLUM	Monthly	12	3	1
DUNKELD	Monthly	12	2	1
GLENTHOMPSON	Monthly	12	5	3
HAMILTON	Monthly	12	3	2
HEYWOOD	Monthly	12	2	1
KOROIT	Monthly	12	2	1
LISMORE	Monthly	12	2	1
MACARTHUR	Monthly	12	2	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	2	1
PETERBOROUGH	Monthly	12	1	1
PORT CAMPBELL	Monthly	12	1	1
PORT FAIRY	Monthly	12	5	1
PORTLAND	Monthly	12	4	2
PURNIM	Monthly	12	7	3
SANDFORD	Monthly	12	2	1
SIMPSON	Monthly	12	2	1
TARRINGTON	Monthly	12	4	2
TERANG	Monthly	12	1	1
TIMBOON	Monthly	12	3	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 Headworks. 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.

## 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 ( $\text{CaCO}_3$ ). There is no health based guideline.

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

Less than 60 mg/L  $\text{CaCO}_3$  – soft but possible corrosive

60-200 mg/L  $\text{CaCO}_3$  – good quality

200-500 mg/L  $\text{CaCO}_3$  – increasing scaling problems

Greater than 500 mg/L  $\text{CaCO}_3$  – 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 2016/17. 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 2016/17 representative results for source waters.

**Table 5-20 Total Alkalinity as  $\text{CaCO}_3$  results by locality 2016/17**

Total Alkalinity as $\text{CaCO}_3$				
Water sampling locality	No. of Samples	No. of Non complying samples	Maximum result (mg/L $\text{CaCO}_3$ )	Average (mg/L $\text{CaCO}_3$ )
BALMORAL	12	0	23	16
CAMPERDOWN (URBAN)	12	0	24	15
CAVENDISH	12	0	26	20
GLENTHOMPSON	12	0	43	33
HAMILTON	12	0	11	8
WARRNAMBOOL	12	0	45	35

**Table 5-21 Total Hardness as  $\text{CaCO}_3$  results by locality 2016/17**

Total Hardness as $\text{CaCO}_3$				
Water sampling locality	No. of Samples	No. of Non complying samples	Maximum result (mg/L)	Average (mg/L)
BALMORAL	12	0	100	89
CAMPERDOWN (URBAN)	12	0	47	38
CAVENDISH	12	0	32	25
GLENTHOMPSON	12	0	140	94
HAMILTON	12	0	74	57
WARRNAMBOOL	12	0	80	68



## Total Dissolved Solids Results

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

**Table 5-22 Total Dissolved Solids results by locality 2016/17**

Total Dissolved Solids				
Treatment Plant	Water sampling locality	Frequency of sampling	Number of samples	Maximum result (mg/L)
Balmoral WTP	Balmoral	Quarterly	4	590
Camperdown WTP	Camperdown, Derrinallum, Lismore	Quarterly	4	130
Caramut DP	Caramut	Quarterly	4	270
Casterton WTP	Casterton, Coleraine, Sandford, Merino	Quarterly	4	480
Cavendish DP	Cavendish	Quarterly	4	200
Cobden WTP	Cobden	Quarterly	4	220
Dartmoor WTP	Dartmoor	Quarterly	4	400
Glenthompson WTP	Glenthompson	Quarterly	4	660
Hamilton WTP	Dunkeld, Hamilton, Tarrington	Quarterly	4	210
Heywood WTP	Heywood	Quarterly	4	680
Macarthur WTP	Macarthur	Quarterly	4	1000
Mortlake DP	Mortlake	Quarterly	4	210
Penshurst DP	Penshurst	Quarterly	4	880
Port Campbell WTP	Peterborough, Port Campbell, Timboon	Quarterly	4	310
Port Fairy WTP	Port Fairy	Quarterly	4	910
Portland Bald Hill WTP	Portland	Quarterly	4	680
Purnim DP	Purnim	Quarterly	4	110
Simpson WTP	Simpson	Quarterly	4	140
Terang WTP	Mortlake, Noorat/ Glenormiston, Terang	Quarterly	4	140
Warrnambool WTP	Allansford, Koroit, Warrnambool	Quarterly	4	210

### 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.

## 6. 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 2016/17 is listed in Table 7-1.

**Table 6-1 – Section 22 incidents 2016/17**

<b>Date (and Duration) of Incident</b>	<b>Location of Incident</b>	<b>Nature of Incident</b>	<b>Potentially Affected/ Affected Drinking Water Supplies</b>	<b>Actions Taken in Response to Incident</b>
7 <sup>th</sup> July 2016	Coleraine Clear Water Storage	<i>E.coli</i> 18 MPN/100 mL and Total Coliforms 140 MPN/100 mL	Coleraine	Samples immediately retaken at Clear Water Storage, three customer taps in the reticulation in addition to the Clear Water Storage and a customer tap in Casterton. An investigation established that correct bottle labelling procedure was not followed. At the time of the detection plant performance was adequate for the supply of safe drinking water. Free chlorine residual and turbidity were not conducive to the survival of <i>E.coli</i> .
28 <sup>th</sup> December 2016	Allansford Reticulation	<i>E.coli</i> 1 MPN/ 100 mL and Total Coliforms 23 MPN/100 mL	Allansford	Samples retaken at the same customer tap as well as two others, without flushing. An investigation established that at the time of sampling the sampler noted it was raining heavily. At the time leading up to and after the detection, plant performance was adequate for the supply of safe drinking water. Chlorine contact times showed disinfection was adequate. Free chlorine residual, pH and other factors were not conducive to the survival of <i>E.coli</i> .
19 <sup>th</sup> January 2017 (15 days)	Cavendish Reticulation	<i>E.coli</i> 2 MPN/100 mL and Total Coliforms 24 MPN/100 mL	Cavendish	Samples immediately retaken at the Cavendish Clear Water Storage Outlet as well as four customer taps without flushing. Resamples did not show the presence of <i>E.coli</i> however an investigation found that a shortfall in chlorine contact time was occurring. Disinfection changed from Chloramination to Free chlorine dosing to avoid future shortfalls in chlorine contact time.
31 <sup>st</sup> January 2017 (2 days)	Cavendish Clear Water Storage	<i>E.coli</i> 1 MPN/100 mL and Total Coliforms >200 MPN/100 mL	Cavendish	Samples immediately retaken at same location as well as three other sample points and the Clear Water Storage. Resamples did not show the presence of <i>E.coli</i> however, an investigation found a shortfall in UVT. Disinfection changed from Chloramination to Free chlorine dosing to avoid future shortfalls in chlorine contact time. UV system cleaning programs and UVT CCPs were reviewed.
6 <sup>th</sup> March 2017 (2 Days)	Warrnambool I CBD	Widespread customer complaint – coloured water	Warrnambool	Colour in the CBD Warrnambool due to contractor works. Wannon Water staff contacted affected and potentially affected customers and conducted flushing and air scouring.
3 <sup>rd</sup> April 2017	Cobden Clear Water Storage	<i>E.coli</i> 8 cfu/100 mL and Total Coliforms 8 cfu/100 mL	Cobden	Samples retaken at Clear Water Storage and two customer taps without flushing. An investigation established that correct sampling procedure was not followed. Chlorine residual and turbidity in the Clear Water Storage were not indicative of the presence of <i>E. coli</i> . The plant was performing normally up to and after the detection event.

## 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. These are listed at Table 7-2.

**Table 6-2 – Section 18 incidents 2016/17**

Date (and Duration) of Incident	Location of Incident	Nature of Incident	Potentially Affected/ Affected Drinking Water Supplies	Actions Taken in Response to Incident
13 January – 1 February 2017 (19 days)	Cavendish	Trihalomethanes	Cavendish	<p>High organic loads in the Cavendish raw water supply resulted in an increase in Trihalomethanes when disinfection was converted from total chlorine to free chlorine following a positive E.coli detect. Disinfection of the Cavendish water supply was priority while raw water harvesting and plant optimisation occurred. These enhancements include:</p> <p>Keeping the UV dosing unit optimised (established a trigger level and cleaning it when it hits trigger level), which when effective allows reduced dosing concentration of chlorine.</p> <p>Installing an online UV unit and an actuated valve prior to the raw water storage to detect poor water quality and allow selected harvesting to keep source water for Cavendish at the best quality possible.</p>
6 February – 30 June 2017 (144 days)	Cavendish	Trihalomethanes	Cavendish	<p>Installation of a sample tap on the Cavendish/ Hamilton raw water branch to be able to test for water quality (no power available for online instrumentation). This will provide further information for source water harvesting.</p> <p>Routine flushing of entire town to clean the system and/or draw through best quality water, conducted at a monthly frequency.</p> <p>Allocation of monies into the first year of the next pricing submission to establish better treatment outcomes for the customers of Cavendish.</p>

## Other Incidents

Wannon Water communicates other water quality related events to DHHS. Information relating to these which occurred during 2016/17 is listed in Table 7-3.

**Table 6-3 – Other incidents 2016/17**

<b>Date (and Duration) of Incident</b>	<b>Location of Incident</b>	<b>Nature of Incident</b>	<b>Potentially Affected/ Affected Drinking Water Supplies</b>	<b>Actions Taken in Response to Incident</b>
7/10/2016 (1 day)	Warrnambool WTP	Fire in PLC.	Warrnambool, Koroit and Allansford	Plant ran in manual for ~24 hrs. No water quality issues or CCP triggered. Fluoride offline until PLC back online.
1/07/2016	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.
23/09/2016	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.
7/10/2016	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.
18/01/2017	Warrnambool WTP	Fluoride chemical	Warrnambool, Koroit and Allansford	Low amount of stock chemical from new supplier.
27/02/2017	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.

## Customer Complaints

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

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

The collection, processing and reporting of Wannon Water's complaints is managed through a customer relationship database, allowing Wannon Water to meet its obligations under the Customer Service Code issued by the Essential Services Commission, under its 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 AIMS structure and Wannon Water's Emergency Management Plan.

The total number of complaints for 2016/17 was low. A summary of the types of complaints received is presented in Table 6-4, with all localities recording less than 1 complaint per 100 customers.

**Table 6-4 – Types of complaints compared to previous years**

Type of complaint	2016/17	2015/16	2014/15	Comment
Alleged Illness / Health Effects	6	12	5*	
Coloured Water	96	65	4*	Higher colour complaints were contributed to by Warrnambool CBD refurbishment, older reticulation systems – see Hot Spot Townships below.
Other	11	10	1*	High TDS in Portland System.
Taste/Odour	39	46	13*	

\* the Essential Services Commission definition of customer complaint changed after 2014/15 resulting in more customer contacts recorded as complaints in the following years.

^ 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 6-5 – Types of complaints by locality**

Locality	Alleged Illness / Health Effects	Coloured Water	General WQ Complaint	Other	Taste/Odour	Total complaints
Camperdown	0	5	0	0	1	6
Camperdown Rural	0	3	0	0	0	3
Carpenters Water	0	1	0	0	0	1
Casterton	0	1	0	0	0	1
Cobden Urban	0	4	0	0	0	4
Cobden	0	4	0	0	2	6
Dunkeld	0	1	0	0	0	1
Glenthompson	1	1	0	0	0	2
Hamilton	0	5	0	0	7	12
Heywood	0	7	0	1	2	10
Koroit	0	1	0	0	2	3
Lismore and Derrinallum	0	4	0	0	3	7
Merino	0	0	0	1	0	1
Mortlake	0	2	0	0	1	3
Noorat and Glenormiston	0	1	0	0	0	1
Penshurst	0	0	0	0	1	1
Peterborough	0	0	0	0	1	1
Port Campbell	0	1	0	0	0	1
Port Fairy	1	16	0	0	0	17
Portland	3	3	3	1	7	17
Purnim	0	2	0	0	0	2
Terang	0	1	0	1	0	2
Terang	0	1	0	0	0	1
Timboon	0	1	0	0	0	1
Warrnambool	1	31	1	3	12	48

\* 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 2016/17 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 again 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, routinely optimising the UV system, allowing reduced chlorine when effective, selectively harvesting raw water to obtain higher quality and 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 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.



## 7. 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 Nalclex 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](http://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](mailto:info@wannonwater.com.au)

Address PO Box 1158 Warrnambool Vic 3280