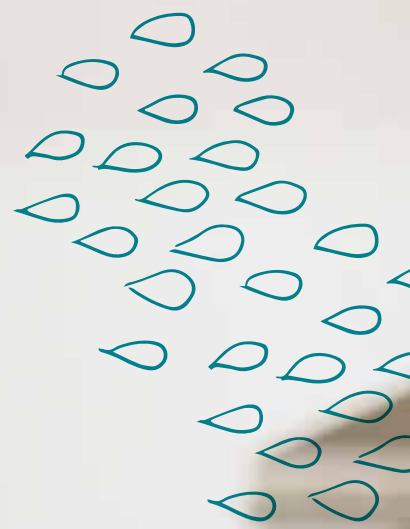




Annual Drinking Water Quality Report

2019/20



Further information



For more information on the 2019/20 Annual Drinking Water Quality Report, or any other concerns regarding water quality, including opportunities to work with us on improving water quality services, please contact our Product Quality Team on 1300 656 007 or email us at info@barwonwater.vic.gov.au.

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Key information

12 major reservoirs	8 surface water treatment plants	1 pre-treatment plant for ground water operations
20 secondary disinfection plants	17 water distribution basins	38 water distribution tanks
6,866 kilometres of water mains	8,100 square kilometres serviced	30 water quality qualities
330,462 permanent population serviced	559,765 peak population serviced	165,804 properties serviced

1. Introduction

In accordance with the *Safe Drinking Water Act 2003*, this report provides an overview of Barwon Water's water supply system, the risk management processes in place to ensure the provision of safe drinking water and water quality performance for the 2019/20 financial year.

Barwon Water supplied approximately 34,053 million litres of drinking water during 2019/20 through a network of 12 reservoirs, 1 groundwater borefield, 8 treatment plants, 20 disinfection sites and 6,866 kilometres of pipes.

To ensure customers are provided with safe drinking water, Barwon Water maintains a HACCP-certified drinking water quality management system, which covers the entire water supply system from the catchment to customers' connection. This system entails:

- detailed water quality risk identification processes
- audited control measures to manage the risks
- verification systems, including an independent water quality monitoring program
- water quality performance reporting to the public
- continuous improvement projects to further increase the systems capabilities.

We maintained full compliance with all water quality standards during the 2019/20 reporting period.

2. Requirements for drinking water

2.1. Meeting customer expectations

Barwon Water is committed to providing water that is safe to drink and free from objectionable taste and odour. This commitment forms part of Barwon Water's Drinking Water Quality Policy and our Customer Charter. To ensure Barwon Water is open to customer feedback, the following measures are in place:

- Complaints management system – this is used to record all complaints received regarding water quality.
- Customer perception surveys – a broad survey carried out to ascertain the general customer attitude towards the quality of service provided.
- Customer Consultative Committee – a committee formed from members of the community who represent Barwon Water customers.
- Customer feedback received during community panel workshops and pricing submission deliberative forums held during the reporting period.

2.2. Legislative requirements

The *Safe Drinking Water Act 2003* (the Act) is the principal legislation applicable to the quality of drinking water supplied by Barwon Water. The Act:

- requires Barwon Water to prepare and implement plans to manage risks in relation to drinking water and some types of non-potable water
- provides criteria for the auditing of those plans by approved auditors
- requires Barwon Water to ensure drinking water meets quality standards specified in

associated regulations (*Safe Drinking Water Regulations 2015*)

- requires Barwon Water to disclose to the public information concerning the quality of drinking water.

The Health (Fluoridation) Act 1973 regulates the safe and effective addition of fluoride into drinking water supplies in Victoria. *The Health (Fluoridation) Act* requires Barwon Water to include the Code of Practice for the Fluoridation of Water Supplies in their quality management system.

2.3. Undertakings, Variations and Exemptions

Barwon Water had no undertakings pursuant to regulation 16(c) of *the Safe Drinking Water Regulations 2015*, during this reporting period.

No variation in aesthetic standards pursuant to regulation 16(i)(i) or exemptions from a water quality standard pursuant to regulation 16(i)(ii) of the *Safe Drinking Water Regulations, 2015* were sought during this reporting period.

3. Defining drinking water

Drinking water supplied by Barwon Water must meet the obligations under the *Safe Drinking Water Act 2003* and *Safe Drinking Water Regulations 2015*. The Australian Drinking Water Guidelines 2011 (ADWG) are used as a benchmark for safe drinking water. These guidelines are intended to provide a framework for good management of drinking water supplies that, if implemented, will assure safety at point of use.

The ADWG include two types of guideline values:

- A health-related guideline value, which is the concentration or measure of a water quality characteristic that, based on present

knowledge, does not result in any significant risk to health of the consumer over a lifetime of consumption.

- An aesthetic guideline value, which is the concentration or measure of a water quality characteristic that is associated with acceptability of water to the consumer, such as appearance, taste and odour.

The intended use of drinking water supplied by Barwon Water is:

- Immediate consumption by the general public, with no further treatment or boiling by the consumer necessary for it to be reasonably considered safe and aesthetically acceptable.
- Other domestic and commercial uses where the requirements for these other applications do not exceed government obligations.

The ADWG states that “*The Guidelines are derived so as to take account of the needs of an individual through a normal lifetime, including changes in sensitivity that may occur between life stages*” and that “*Sensitive sub-populations (including those who are severely immuno-compromised) should seek further medical advice*”.

The water quality data presented in this report is representative of the drinking water supplied in accordance with this definition and the above-mentioned requirements.

3.1. Regulated Water

Regulated water is “... *water that is not intended for drinking water but which could reasonably be mistaken as being drinking water.*” (as defined in the *Department of Health and Human Services, Regulated Water – Drinking Water Regulation Guidance Note*).

Barwon Water does not have any regulated water supplies.

4. System Description

4.1. Overview

Barwon Water provided drinking water to a permanent population of approximately 330,462 people across an area of more than 8,100 square kilometres.

A map of the water supply system, including an overview of Barwon Water's service area and major infrastructure, is provided in Figure 1.

Source water is harvested from water supply catchments and is stored in reservoirs.

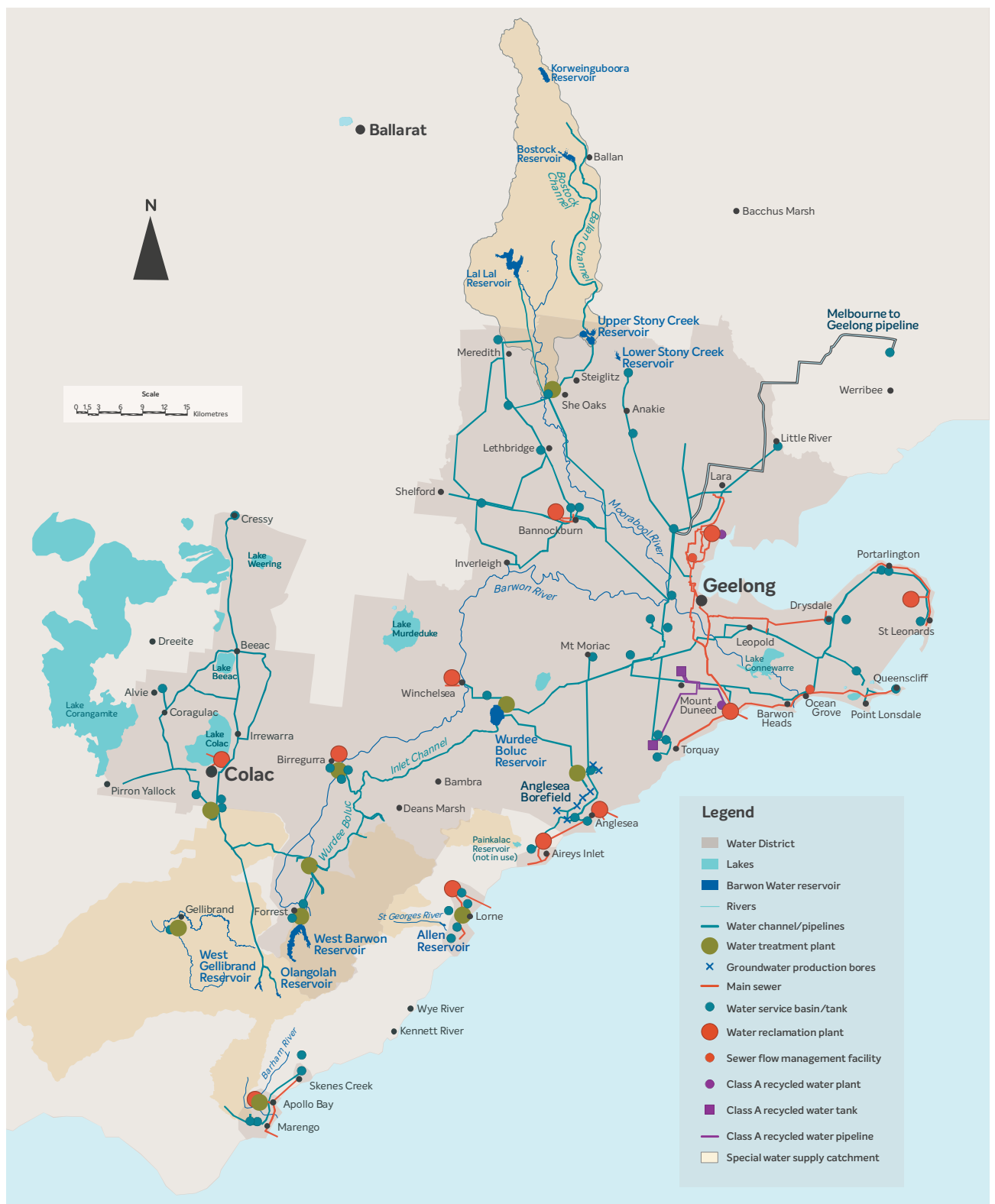
Additional water has been accessed from an interconnection between Geelong and Melbourne, the Melbourne to Geelong Pipeline.

Groundwater from the Anglesea borefield was also utilised during the reporting period.

A network of pipes, channels and pumps then conveys the water to treatment plants, where it is treated to produce drinking water.

The water is then delivered to customers by a network of pipes, basins, tanks and pump station.

Figure 1 Barwon Water service area and major infrastructure



4.2. Water quality localities

Barwon Water's reticulation system is divided into water quality localities for the purpose of monitoring and reporting. Allocation of water quality localities allows for greater consistency in defining quality zones. This provides more meaningful data analysis, a greater understanding of water quality issues directly related to treatment, consistency in

water quality monitoring/ reporting and a more intelligent response to water quality issues and non-conformances should they arise. Table 1 summarises the 2019/20 water quality localities.

A summary of the location of water quality localities in Barwon Water's service district is provided in Figure 2.

Table 1 Summary of water sampling localities

Water quality locality (or water supply system)	Source water	Storage	Treatment plant	Number of Connections ¹	Permanent Population ²
Aireys Inlet	Barwon catchments Ground water (used in dry conditions)	Wurdee Boluc reservoir	Wurdee Boluc	1,674	1,100
Anakie	Moorabool catchments Melbourne-Geelong Pipeline*	Stony Creek reservoir	Moorabool	301	610
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Anglesea	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	3,194	2,430
Apollo Bay	Barham River	Marengo basin	Apollo Bay	2,411	1,970
Bannockburn	Moorabool catchments	Stony Creek reservoir	Moorabool	2,361	6,550
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Batesford	Moorabool catchments	Stony Creek reservoir	Moorabool	362	1,300
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Bellarine	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	110	210
Birregurra	West Barwon reservoir	Birregurra basins	Birregurra	393	800
Clifton Springs	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	6,045	13,720
Colac	West Gellibrand and	Colac basin no. 4	Colac	7,889	13,853
	Olangolah reservoirs	Colac basin no. 5			
Cressy	West Gellibrand and	Colac basin no. 4	Colac	197	337
	Olangolah reservoirs	Colac basin no. 5			
Forrest	West Barwon reservoir	Forrest basin	Forrest	149	180
Gellibrand	Lardners Creek	Gellibrand tanks	Gellibrand	74	300

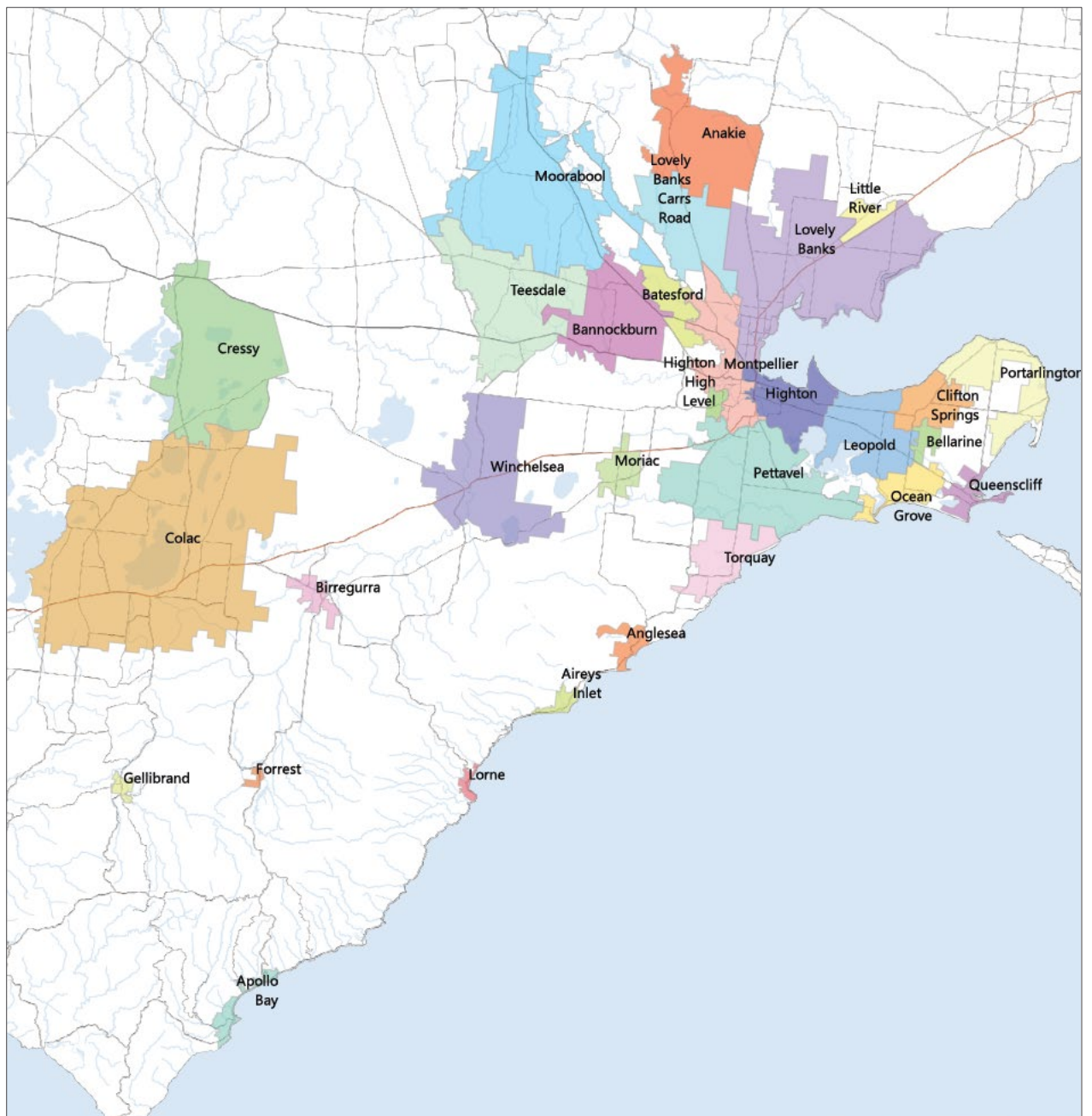
Table 1 continued...

Water quality locality	Source water	Storage	Treatment plant	Number of Connections ¹	Permanent Population ²
Highton	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	21,479	38,030
Highton High Level	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	933	3,290
Leopold	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	7,392	18,040
Little River West	Moorabool catchments Melbourne-Geelong Pipeline*	Stony Creek reservoir	Moorabool	149	360
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Lorne	Lorne catchment	Allen reservoir	Lorne	2,431	1,770
Lovely Banks	Moorabool catchments Melbourne-Geelong Pipeline*	Stony Creek reservoir	Moorabool	26,251	59,330
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Lovely Banks - Carrs Road	Moorabool catchments Melbourne-Geelong Pipeline*	Stony Creek reservoir	Moorabool	47	100
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Montpellier	Moorabool catchments	Stony Creek reservoir	Moorabool	28,083	62,380
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Moorabool	Moorabool catchments	Stony Creek reservoir	Moorabool	632	1,680
Moriac	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	319	970
Ocean Grove	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	11,340	20,850
Pettavel	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	16,590	40,240
Portarlinton	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	7,504	8,490
Queenscliff	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	4,144	4,370
Teesdale	Moorabool catchments	Stony Creek reservoir	Moorabool	1,319	3,540
	Barwon catchments	Wurdee Boluc reservoir	Wurdee Boluc		
Torquay	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	10,896	20,430
Winchelsea	Barwon catchments Ground water (drought)	Wurdee Boluc reservoir	Wurdee Boluc	1,135	2,240

1. This is the total number of properties connected to Barwon Water's waters supply system. This number includes residential and non-residential properties.
2. This is an estimated number of population serviced rounded to the closest 10. The estimation is based ABS data and the number of residential connections.

* The Melbourne-Geelong Pipeline (MGP) and groundwater borefields are alternative water resources for improved water security. Water from the MGP was harvested for drinking water during the 2019/20 reporting period.

Figure 2 Water sampling localities 2019/20



4.3. Source of water

Drinking water is generally harvested from natural run-off into streams and reservoirs. Barwon Water's service area and supply system is relatively complex because it covers many small towns and water is harvested from a variety of different sources.

Lorne, Apollo Bay, Gellibrand and Colac are supplied from separate catchments all located in the Otway Ranges.

Torquay, Anglesea, Aireys Inlet, Winchelsea, Moriac, Forrest, Birregurra and the Bellarine Peninsula are all supplied from the Barwon catchment in the Otway Ranges and can be supplemented by groundwater during times of drought. Geelong, Anakie, Batesford, Lara and Little River West were supplied by water from both the Moorabool and Barwon catchments. Blended water of Moorabool and Wurdee have been received by the Montpellier zone.

Bannockburn, Teesdale, Meredith and Lethbridge are supplied from the Moorabool catchment. The Melbourne to Geelong Pipeline was utilised to supplement drinking water in Lovely Banks and Montpellier water quality localities.

Most catchments are open to the public and subject to a variety of land uses, including townships, rural living, forestry, national parks, agriculture, and recreation. Barwon Water has conducted comprehensive catchment risk assessments to assess the water quality risks associated with activities undertaken in the catchments.

In addition, the impact of catchment activities on water quality is assessed through wide-ranging monitoring in catchments, streams and reservoirs.

Barwon Water aims to prevent deterioration of water quality in our catchments. The catchments are declared Special Water Supply Catchments under the *Catchment and Land Protection Act 1994*. Under the *Planning and Environment Act 1987*, all applications to use and develop land in the catchments must be referred to Barwon Water for comment. Barwon Water assesses each application in light of the risks posed to drinking water quality and has the ability to approve an application subject to conditions, or alternatively, object if the application poses an unacceptable risk to water quality.

Catchment management and protection is the first defense in the multi-barrier approach applied by Barwon Water to ensure safe drinking water. The condition of the catchment is arguably the most important factor influencing the quality of drinking water. It determines how much treatment is needed before the water is safe to drink and the costs associated with treatment. The effectiveness of catchment management is reliant on Barwon Water building and maintaining good relationships with stakeholders.

Barwon Water has a connection to Melbourne's water supply via the Melbourne to Geelong Pipeline. Barwon Water also holds a licence to extract water from the Anglesea borefield.

4.4. Water treatment

After water is harvested from natural run-off into streams and reservoirs, or extracted from groundwater sources, it is filtered and disinfected. These processes provide key risk barriers to ensure safe drinking water.

Filtration is the process of physically removing contaminants from drinking water.

There are five types of filtration methods used at Barwon Water:

1. Dissolved air flotation filtration
2. Direct filtration
3. Conventional clarification/filtration
4. Micro filtration
5. Ultra filtration.

Disinfection is the process of inactivating pathogens so they cannot cause disease. Water disinfection is an important means of ensuring positive public health outcomes are achieved.

The complex system of pipes used to distribute water means disinfection must be maintained from filtration through to our customers' taps, in order to prevent the regrowth of bacteria within the system. This is achieved using three main types of disinfection:

1. Chlorination
2. Chloramination
3. Ultraviolet light (UV).

The type of filtration and disinfection used depends on a number of factors including water quality, size of network and potential rate of consumption. An overview of the treatment processes for each water sampling locality is provided in Table 2.

Over the 2019/20 reporting period there were no issues arising from the treatment plants. Improvements to the treatment plants are explained in Section 9.

Table 2 Water filtration and treatment/disinfection processes

Water sampling locality	Main source	Water treatment plant	Treatment process	Treatment aids (Some aids only used seasonally)
Moorabool, Montpellier, Lovely Banks, Lovely Banks - Carrs Road, Bannockburn, Teesdale, Anakie, Little River West, Batesford.	East and West Moorabool River Barwon catchment (dependent on operational preference and time of year)	Moorabool	Dissolved Air Flotation Filtration (DAFF)	Aluminum Chlorohydrate Polymer
			Chlorination	Chlorine Gas
			Fluoridation	Fluorosilicic Acid
			Ultra Violet disinfection (supernatant return only)	
Lorne	Allen reservoir (St George River)	Lorne	Dissolved Air Flotation Filtration (DAFF)	Aluminum Chlorohydrate Sodium Hydroxide Polymer Potassium Permanganate Sodium Hexametaphosphate
			Chlorination	Sodium Hypochlorite
Colac, Cressy	West Gellibrand reservoir and Olangolah reservoir	Colac	Dissolved Air Flotation Filtration (DAFF)	Aluminum Chlorohydrate Potassium Permanganate Soda Ash Lime Polymer Sodium Hexametaphosphate
			Chlorination	Sodium Hypochlorite Chlorine Gas
			Fluoridation	Fluorosilicic Acid
Birregurra	West Barwon reservoir	Birregurra	Clarification	Aluminum Chlorohydrate
			pH Correction	Sulphuric Acid
			Microfiltration	*Sodium Hydroxide *Citric Acid (*used for cleaning membranes only)
			Chlorination	Sodium Hypochlorite
Forrest	West Barwon reservoir	Forrest	Clarification	Aluminum Sulphate Polymer Potassium Permanganate Soda Ash Sodium Hexametaphosphate
			Filtration	
			Chlorination	Sodium Hypochlorite
			UV disinfection	

Table 2 continued...

Water sampling locality	Main source	Water treatment plant	Treatment process	Treatment aids (Some aids only used seasonally)
Apollo Bay	Barham River (Marengo basin)	Apollo Bay	Dissolved Air Floatation (DAF) Clarification	Aluminum Chlorohydrate Sulfuric Acid
			Ultrafiltration	*Sodium Hydroxide *Citric Acid (*used for cleaning membranes only)
			Chlorination	Sodium Hypochlorite
			GAC (Granular Activated Carbon) filtration	
Aireys Inlet, Winchelsea, Moriac, Little River West, Highton High Level, Montpellier, Pettavel, Highton, Lovely Banks, Lovely Banks – Carrs Road, Teesdale, Bannockburn, Batesford, Anakie, Torquay, Ocean Grove, Ocean Acres, Clifton Springs, Anglesea, Leopold, Portarlington, Queenscliff, Bellarine	West Barwon reservoir, East Barwon River, Callahan Creek diversion weir, Matthews Creek diversion weir, Pennyroyal Creek diversion weir and *Anglesea borefield	Wurdee Boluc *Pre-treatment for borefield	Direct enhanced filtration	Aluminum Chlorohydrate Poly DADMAC Polymer
			Chlorination	Chlorine Gas
			Fluoridation	Fluorosilicic Acid
			*Aeration, Oxidation and pH adjustment	*Sodium hypochlorite *Lime *Potassium Permanganate *Polymer
Gellibrand	Lardners Creek	Gellibrand	Clarification	Aluminum Sulphate Polymer Soda Ash
			Filtration	
			Chlorination	Sodium Hypochlorite
			UV disinfection	

4.5. Distribution

After water is filtered and disinfected, it is conveyed to customers by a network of tanks, basins, pumps and pipes. Positive pressure and backflow prevention are the final barriers used by Barwon Water to ensure safe drinking water. Positive pressure means the water will direct any unwanted material away from the water supply system if leaks occur. Barwon Water requires the installation of testable backflow prevention devices when medium and high-hazard properties connect to the water supply system.

4.6. Secondary disinfection

Disinfectant residuals decrease as water passes throughout the distribution system and within storage tanks. Water disinfection plants are used to maintain adequate disinfection levels within the distribution

system. Barwon Water endeavours to maintain a balance between adequate disinfection residuals and aesthetic quality. Barwon Water manages 20 water disinfection plants. The two methods of secondary disinfection employed across the sites are chlorination and chloramination.

Chlorination is a widely used disinfection process, particularly effective against bacteriological organisms, and is most suited in shorter distribution systems.

Chloramination is an alternative disinfection process produced by combining chlorine with ammonia. The ammonia component stabilises the chlorine so disinfection can be sustained for longer in the drinking water distribution system.

Table 3 List of disinfection sites and disinfection mode

Water disinfection plant	Disinfection mode
Aireys Inlet	Chloramination
Alvie	Chlorination
Anakie	Chloramination
Anglesea	Chloramination
Bannockburn	Chloramination
Bellarine	Chlorination
Clifton Springs	Chloramination
Highton	Chlorination (seasonal operation)
Little River	Chlorination
Lovely Banks 1,2&3	Chloramination
Lovely Banks – Carrs Rd	Chloramination
Meredith	Chlorination
Montpellier 2&4	Chlorination (seasonal operation)
Ocean Grove	Chloramination
Pettavel	Chlorination (seasonal operation)
Portarlington	Chloramination
Queenscliff	Chlorination
Teesdale	Chloramination
Torquay	Chlorination
Torquay High Level	Chlorination

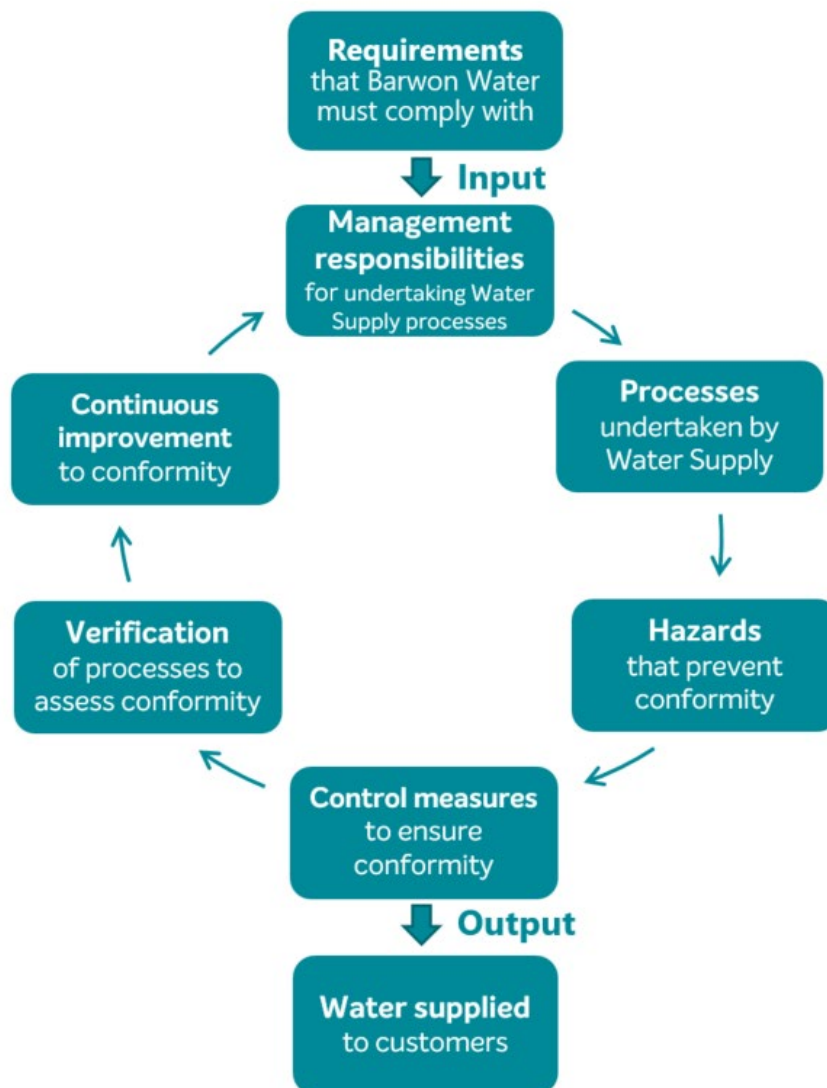
5. Quality management system

5.1. Overview

Barwon Water utilises both ISO 9001:2016 and HACCP principles in its Quality Management System for the supply of safe and

aesthetically pleasing drinking water. This system is summarised in Figure 3 below.

Figure 3 Quality Management System for the supply of drinking water



The requirements Barwon Water must meet, and the processes undertaken to meet these requirements, are described in previous sections of this report.

The following pages outline other steps that form the Quality Management System, namely hazard identification, control measures, verification and continual improvement.

5.2. Hazard identification

To determine key risks to the supply of safe and aesthetically pleasing drinking water, an extensive hazard assessment process has been undertaken from catchment to customer connection involving independent experts, management, engineers and system operators.

The key risks resulting from this assessment are reviewed regularly to identify when new risks emerge or when existing risks change. In addition to system-wide assessments, each water treatment plant undergoes a thorough risk assessment based on asset/component and process failure.

5.3. Control measures

5.3.1. Critical control points

Control measures are established to reduce the key risks to the supply of drinking water to an acceptable level. Where control is vital, critical control points (CCPs) are established using HACCP principles. CCPs in the Barwon Water system include process steps such as chemical receipt, filtration and disinfection.

5.3.2. Maintenance programs

Maintenance programs are undertaken on Barwon Water assets to maintain and improve water quality. These include programmed mains flushing and air scouring, tank and basin cleaning, and risk-based treatment plant asset maintenance and replacement programs.

5.3.3. Trained operators

All operators involved in the water supply process undertake training to ensure a high knowledge of treatment processes and associated risks. Operators are required to achieve a minimum level of qualification and experience as per the National Water Industry Operator Certification Framework. Ongoing

competency is managed and demonstrated through an individual competency plan.

5.4. Verification and monitoring

Verification is used to authenticate the performance of the water supply system with respect to meeting process requirements.

Verification at Barwon Water includes:

- individual supervisory control and data acquisition systems (SCADA)
- system-wide telemetry providing monitoring and alarms 24 hours a day, 7 days a week
- on-call operators with remote access to the telemetry system
- a drinking water quality monitoring program conducted by an independent National Association of Testing Authorities (NATA) accredited laboratory with extensive monitoring at source, treatment and distribution
- a water treatment chemical assurance program that includes quality assured chemical suppliers, the provision of a certificate of analysis, and independent testing to verify the purity of the chemical
- customer feedback captured in the complaints management system and customer perception surveys. These provide important information about the performance of the water supply system.

5.5. Continual improvement

Continuous improvement of water supply processes enables Barwon Water to continually comply with regulatory obligations and meet customer expectations.

This is achieved through improvement actions identified from verification monitoring and through management review.

The production of an annual report directs Barwon Water to the key areas of improvement, particularly in relation to improvement projects.

Section 9 of this report outlines some of the continuous improvement projects implemented in 2019/20, and maintains a strategic focus on continuously improving Barwon Water systems ongoing.

5.6. System auditing/peer review

An annual internal and external auditing program is established to assess the compliance of the quality management system.

5.7. Review of risk management plan

A review of the risk management plan was undertaken throughout the reporting period as part of Barwon Water's internal and external audit program.

The annual external audit of Barwon Water's quality management system was conducted by Bureau Veritas Australia Pty Ltd. This audit included a surveillance audit for our HACCP system.

The report highlighted one minor non-conformance relating to instrument

calibration and assessment of product conformity to the last successful check.

A plan has been developed to create a process to assess and record the impact of calibration variance and implementation will occur prior to the next HACCP surveillance audit, as recommended by the auditor.

The three-yearly regulatory audit of Barwon Water's Drinking Water Quality Risk Management Plan against the requirements of the *Safe Drinking Water Act 2003* and *Safe Drinking Water Regulations 2015* was undertaken during a past reporting period of 2017/18. Barwon Water achieved 100% compliance during this external regulatory audit with no non-conformances identified. 18 Opportunities for Improvement (OFIs) were identified. The OFI's related to procedural, administrative and record-keeping improvements. 12 OFIs were implemented during the 2018/19 reporting period in addition to the five OFI's completed in 2017/18. One OFI is under consideration.

The next regulatory audit is due to be completed during the 2020/21 financial year.

6. Water quality for 2019/20

Barwon Water has developed a Drinking Water Quality Monitoring Program (DWQMP), undertaken by an independent laboratory, accredited by the National Association of Testing Authorities (NATA), under a laboratory services contract.

Source waters such as streams, channels and reservoirs, are analysed to provide for the early notice of changing upstream water quality and to verify catchment management plans are effective in minimising risks to source water quality.

Treated waters are analysed to provide critical control point monitoring and to verify water quality risks associated with treatment plant operation are minimised.

Water throughout the distribution system and at designated customer water meters are analysed to verify Barwon Water is

consistently delivering safe, high-quality water that meets identified guidelines.

The DWQMP is based on sound risk management principles in accordance with Barwon Water's HACCP plan and the recommendations of the Annual Drinking Water Guidelines.

The monitoring results and performance assessments of drinking water are presented in this report. Results include all regulatory sampling conducted during the 2019/20 financial year.

Additional water quality data, including that which may prove helpful for enthusiasts such as home brewers can be found on the Barwon Water public website

www.barwonwater.vic.gov.au. This data is updated quarterly to provide up-to-date, representative information to our customers.

6.1. Escherichia coli (*E. coli*)

- Limit of detection = 0 MPN/100 mL
- Regulatory standard 100% of samples with 0 MPN/100 mL with the exception of any false positive

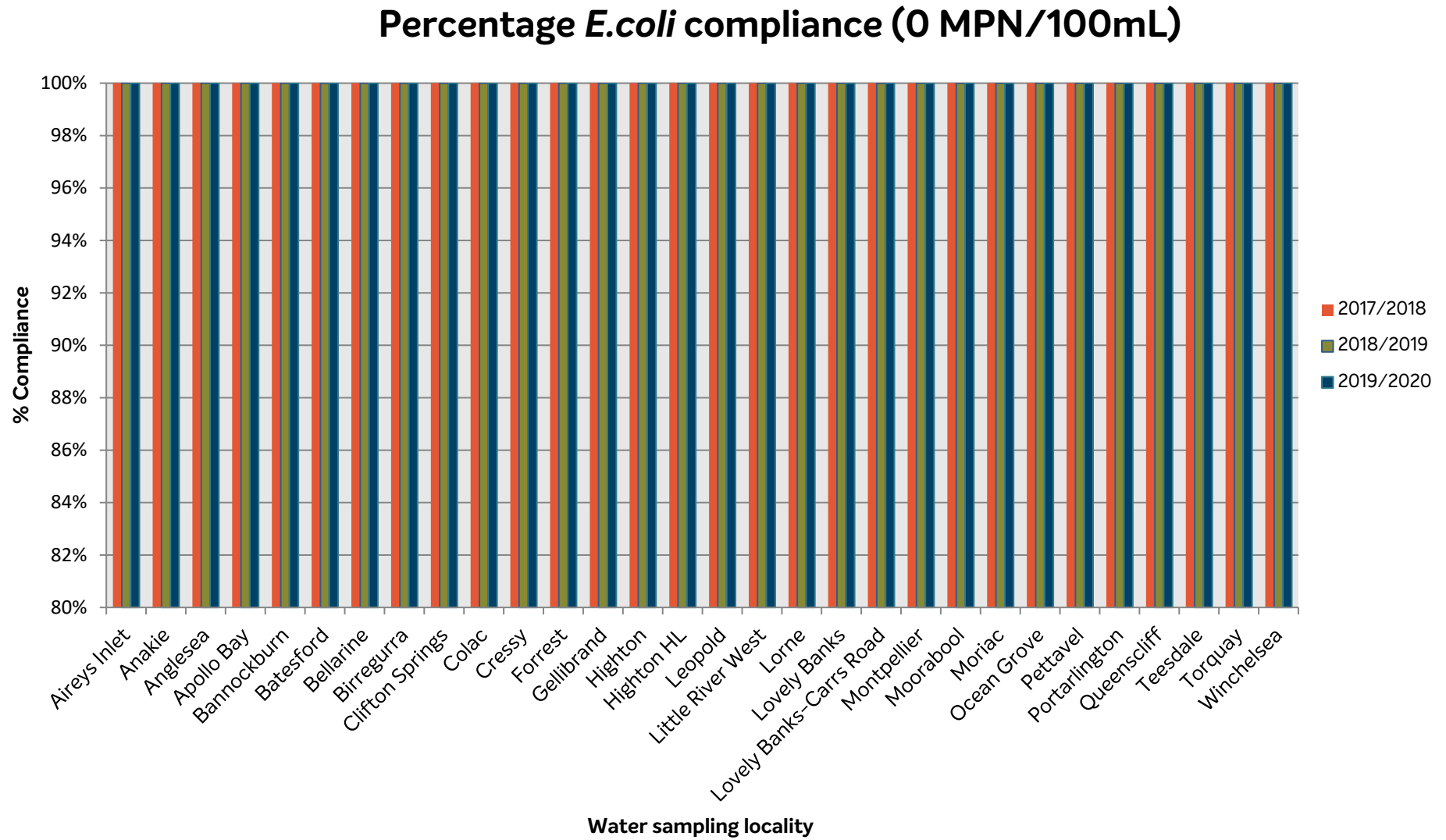
6.1.1. Results

Table 4 *E. coli* compliance

Water quality locality	Frequency of sampling	Number of samples	Maximum results (orgs/100ml)	Number of detections and investigations conducted (s22)	Number of samples where standard was not met (s18)
Aireys Inlet	> weekly	77	0	0	0
Anakie	> weekly	76	0	0	0
Anglesea	> weekly	82	0	0	0
Apollo Bay	> weekly	88	0	0	0
Bannockburn	> weekly	76	0	0	0
Batesford	> weekly	57	0	0	0
Bellarine	> weekly	76	0	0	0
Birregurra	> weekly	81	3	1	0
Clifton Springs	> weekly	93	0	0	0
Colac	> weekly	181	0	0	0
Cressy	> weekly	77	0	0	0
Forrest	> weekly	80	0	0	0
Gellibrand	> weekly	76	0	0	0
Highton	> weekly	159	0	0	0
Highton HL	> weekly	76	0	0	0
Leopold	> weekly	105	0	0	0
Little River West	> weekly	74	0	0	0
Lorne	> weekly	88	0	0	0
Lovely Banks	> weekly	253	0	0	0
Lovely Banks–Carrs Road	> weekly	72	0	0	0
Montpellier	> weekly	231	0	0	0
Moorabool	> weekly	101	0	0	0
Moriac	> weekly	78	0	0	0
Ocean Grove	> weekly	126	0	0	0
Pettavel	> weekly	173	0	0	0
Portarlinton	> weekly	106	0	0	0
Queenscliff	> weekly	86	0	0	0
Teesdale	> weekly	77	0	0	0
Torquay	> weekly	149	0	0	0
Winchelsea	> weekly	76	0	0	0

* Sampling frequency is dependent on population and varies in each locality as described in the Australian Drinking Water Guidelines 2011. This is in addition to distribution entry point samples taken to compare the representativeness of reticulation samples.

Figure 4 *E. coli*



6.1.2. Analysis of results

Trend over localities

In 2019/20, all 30 of Barwon Water's water quality sampling localities complied with the *E. coli* water quality standard over the duration of the reporting period.

The Birregurra locality recorded one *E. coli* detection. An investigation, conducted in accordance with the requirements of the 2015 Drinking Water Regulations, concluded that the result was a false positive. This means the locality has complied with the water quality standard. Further details are recorded in Section 7.

Trend over time

The past three years have seen 100% compliance for *E. coli* across all water quality sampling localities.

6.2. Trihalomethanes (THMs)

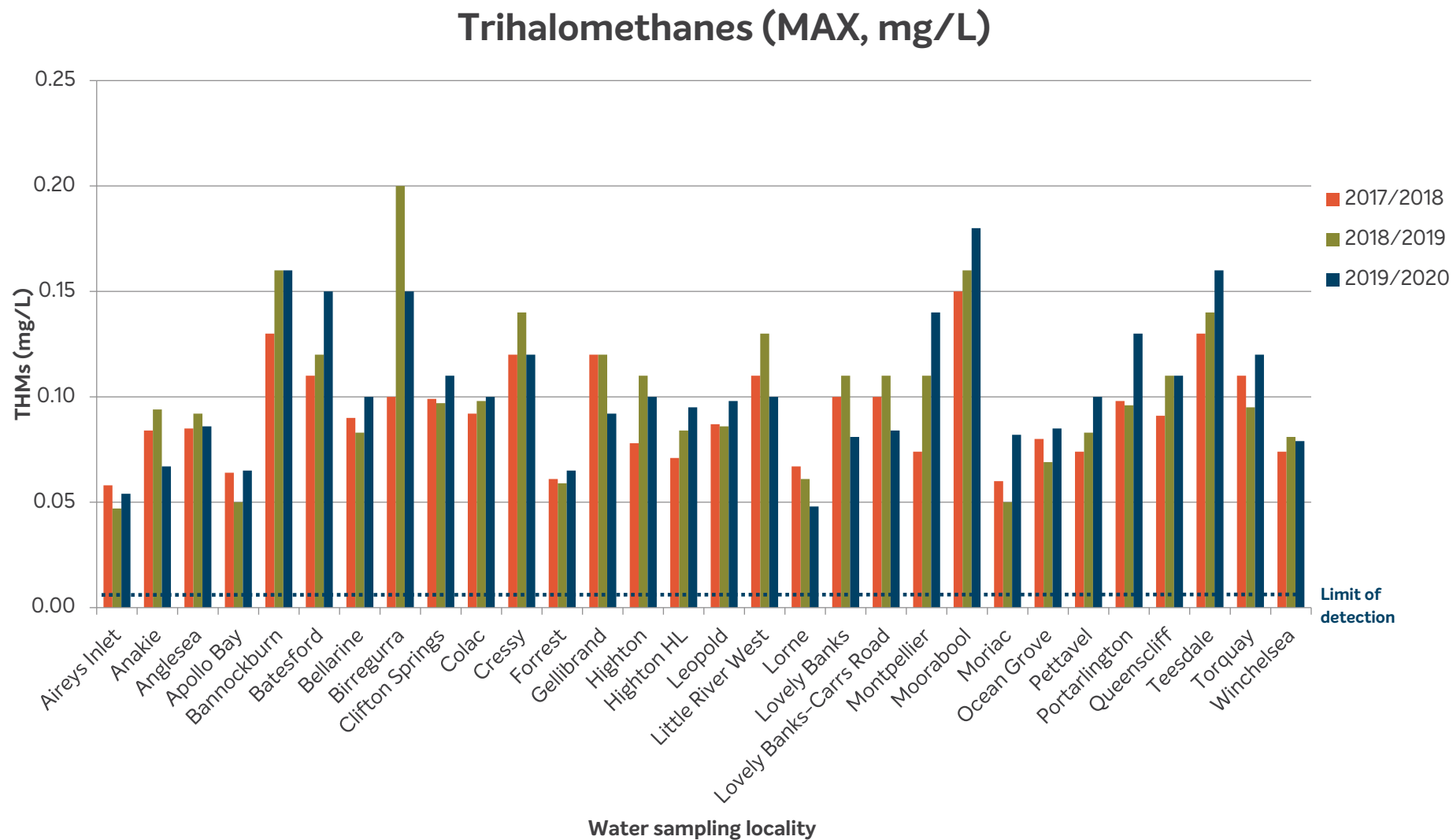
- Limit of detection = 0.004 mg/L
- Regulatory standard <0.250 mg/L

6.2.1. Results

Table 5 Trihalomethane results

Water quality locality	Frequency of sampling	Number of samples	Drinking water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s18)
Aireys Inlet	> monthly	25	0.25	0.054	0.041	0
Anakie	> monthly	24	0.25	0.067	0.045	0
Anglesea	> monthly	25	0.25	0.086	0.069	0
Apollo Bay	> monthly	26	0.25	0.065	0.031	0
Bannockburn	> monthly	24	0.25	0.160	0.109	0
Batesford	> monthly	26	0.25	0.150	0.095	0
Bellarine	> monthly	24	0.25	0.100	0.077	0
Birregurra	> monthly	26	0.25	0.150	0.096	0
Clifton Springs	> monthly	24	0.25	0.110	0.082	0
Colac	> weekly	59	0.25	0.100	0.063	0
Cressy	> monthly	25	0.25	0.120	0.083	0
Forrest	> monthly	25	0.25	0.065	0.037	0
Gellibrand	> monthly	24	0.25	0.092	0.050	0
Highton	> monthly	24	0.25	0.100	0.074	0
Highton HL	> monthly	24	0.25	0.095	0.067	0
Leopold	> monthly	24	0.25	0.098	0.074	0
Little River West	> monthly	24	0.25	0.100	0.061	0
Lorne	> monthly	26	0.25	0.048	0.030	0
Lovely Banks	> monthly	47	0.25	0.081	0.060	0
Lovely Banks-Carrs Road	> monthly	23	0.25	0.084	0.059	0
Montpellier	> monthly	37	0.25	0.140	0.088	0
Moorabool	> monthly	37	0.25	0.180	0.088	0
Moriac	> monthly	26	0.25	0.082	0.054	0
Ocean Grove	> monthly	24	0.25	0.085	0.064	0
Pettavel	> monthly	38	0.25	0.100	0.064	0
Portarlinton	> monthly	24	0.25	0.130	0.090	0
Queenscliff	> monthly	24	0.25	0.110	0.081	0
Teesdale	> monthly	25	0.25	0.160	0.101	0
Torquay	> monthly	36	0.25	0.120	0.081	0
Winchelsea	> monthly	24	0.25	0.079	0.062	0

Figure 5 Trihalomethanes



6.2.2. Analysis of results

Trend over localities

Full compliance was achieved for all water quality localities for Trihalomethanes (THMs). The highest result for the year was from the Moorabool water quality locality at 0.18 mg/L. Elevated THMs results are common in the Moorabool water quality locality.

This is due to the seasonal higher level of organics in the source water and required chlorine disinfection dose.

Trend over time

In general, the 2019/20 results for THMs were consistent with those achieved in 2018/19 and 2018/17. THMs in the localities supplied by the Moorabool catchment increased slightly this year.

Low storage levels and an increase of organics in the source water might have contributed to the increase of THMs post treatment.

6.3. Turbidity

- Limit of detection = 0.1 NTU
- Regulatory standard = The 95th percentile of results for samples in any 12-month period must be less than or equal to 5 NTU.

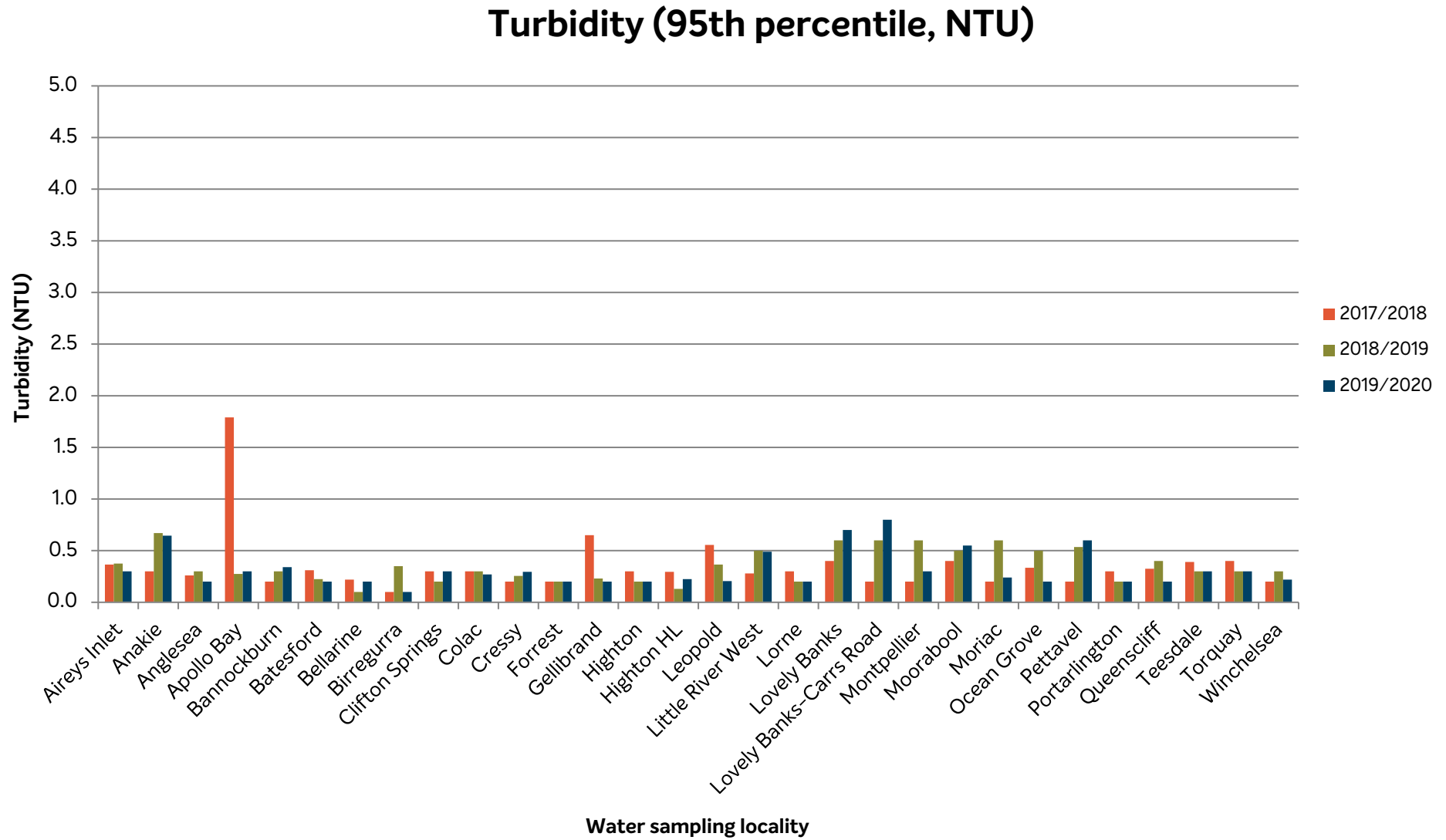
6.3.1. Results

Table 6 Turbidity

Water quality locality	Frequency of sampling	Number of samples	Maximum (NTU)	Maximum 95th Percentile of turbidity results in any 12 months (NTU)	Number of 95th Percentile of results in any 12 months above the standard (s18)
Aireys Inlet	> weekly	53	0.6	0.3	0
Anakie	weekly	52	0.9	0.6	0
Anglesea	> weekly	59	0.3	0.2	0
Apollo Bay	> weekly	63	0.4	0.3	0
Bannockburn	weekly	52	0.5	0.3	0
Batesford	> weekly	54	0.4	0.2	0
Bellarine	weekly	52	0.2	0.2	0
Birregurra	> weekly	56	1.8	0.1	0
Clifton Springs	> weekly	69	0.6	0.3	0
Colac	> weekly	79	0.4	0.3	0
Cressy	> weekly	53	0.6	0.3	0
Forrest	> weekly	55	0.2	0.2	0
Gellibrand	weekly	52	0.2	0.2	0
Highton	> weekly	135	0.6	0.2	0
Highton HL	weekly	52	1.7	0.2	0
Leopold	> weekly	81	0.4	0.2	0
Little River West	weekly	52	0.8	0.5	0
Lorne	> weekly	63	0.3	0.2	0
Lovely Banks	> weekly	188	1.2	0.7	0
Lovely Banks-Carrs Road	weekly	52	2.2	0.8	0
Montpellier	> weekly	182	0.4	0.3	0
Moorabool	> weekly	53	2.3	0.6	0
Moriac	> weekly	53	0.4	0.2	0
Ocean Grove	> weekly	104	0.4	0.2	0
Pettavel	> weekly	123	0.3	0.6	0
Portarlinton	> weekly	82	0.4	0.2	0
Queenscliff	> weekly	62	0.3	0.2	0
Teesdale	> weekly	53	0.4	0.3	0
Torquay	> weekly	101	0.7	0.3	0
Winchelsea	weekly	52	0.3	0.2	0

* Sampling frequency is dependent on population and varies in each locality as described in the Australian Drinking Water Guidelines 2011. This is in addition to distribution entry point samples taken to compare the representativeness of reticulation samples.

Figure 6 Turbidity



6.3.2. Analysis of results

Trend over localities

The turbidity (95th Percentile) standard was met in each locality during the reporting period.

Trend over time

Turbidity results during 2019/20 followed a similar pattern to previous years. All localities displayed results well below the quality standard.

6.4. Fluoride

The *Health (Fluoridation) Act 1973* states that the annual average fluoride concentration in drinking water shall not exceed 1 mg/L. The Department of Health and Human Services (DHHS) directs that fluoride plants should achieve: a minimum level greater than or equal to 0.6 mg/L; and an average level as

close as possible to the operating target of 0.9 mg/L).

The natural background fluoride levels from the catchment were monitored and are reported in Section 6.7.3 of this report.

6.4.1. Results

- Limit of detection = 0.05 mg/L
- ADWG health guideline value < 1.5 mg/L

Table 7 Fluoride

Water quality locality	Water Treatment Plant	Frequency of sampling	Number of samples	Drinking water quality standard (mg/L)	Target optimum fluoride concentration (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s. 18)
Anakie	Moorabool WTP	monthly	12	1.5	0.9	0.92	0.84	0
Bannockburn		monthly	12	1.5	0.9	0.90	0.70	0
Batesford		> monthly	19	1.5	0.9	0.91	0.72	0
Little River West		monthly	12	1.5	0.9	0.93	0.83	0
Lovely Banks		> monthly	15	1.5	0.9	0.92	0.83	0
Lovely Banks-Carrs Road		> quarterly	11	1.5	0.9	0.91	0.82	0
Montpellier		monthly	12	1.5	0.9	0.88	0.79	0
Moorabool		> monthly	97	1.5	0.9	0.97	0.73	0
Teesdale		monthly	12	1.5	0.9	0.82	0.71	0
Aireys Inlet	Colac WTP	> monthly	13	1.5	0.9	0.93	0.78	0
Anglesea		> monthly	13	1.5	0.9	0.97	0.80	0
Bellarine		monthly	12	1.5	0.9	0.88	0.78	0
Clifton Springs		monthly	12	1.5	0.9	0.87	0.79	0
Highton		monthly	12	1.5	0.9	0.86	0.76	0
Highton HL		monthly	12	1.5	0.9	0.86	0.75	0
Leopold		monthly	12	1.5	0.9	0.89	0.75	0
Moriac		> weekly	87	1.5	0.9	0.98	0.79	0
Ocean Grove		monthly	12	1.5	0.9	0.89	0.79	0
Pettavel		monthly	12	1.5	0.9	0.90	0.72	0
Portarlinton		monthly	12	1.5	0.9	0.90	0.78	0
Queenscliff		monthly	12	1.5	0.9	0.87	0.74	0
Torquay		monthly	12	1.5	0.9	0.84	0.76	0
Winchelsea		monthly	12	1.5	0.9	0.91	0.74	0
Colac		> weekly	111	1.5	0.9	0.79	0.51	0
Cressy		> weekly	53	1.5	0.9	0.79	0.50	0

Figure 7 Fluoride

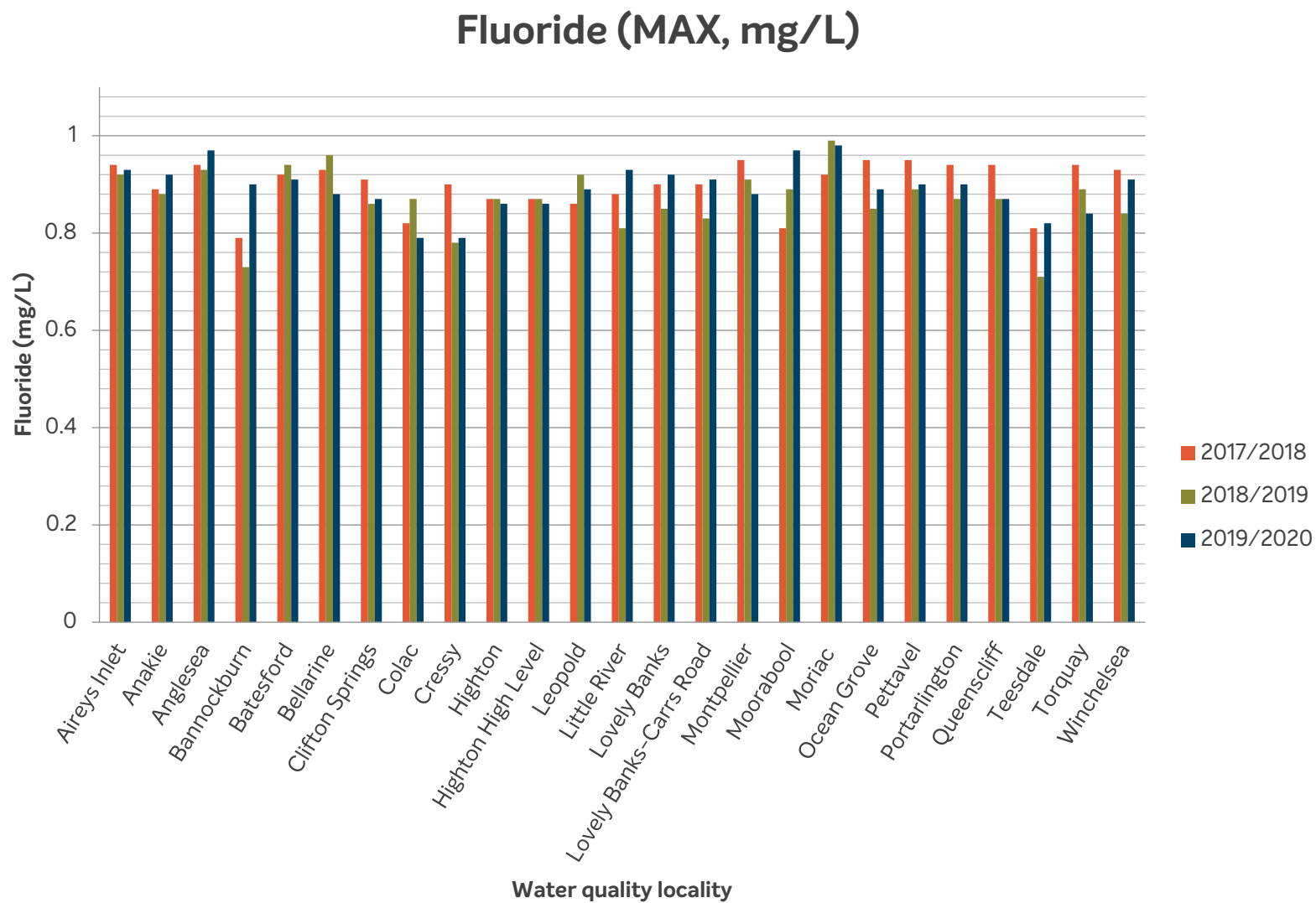
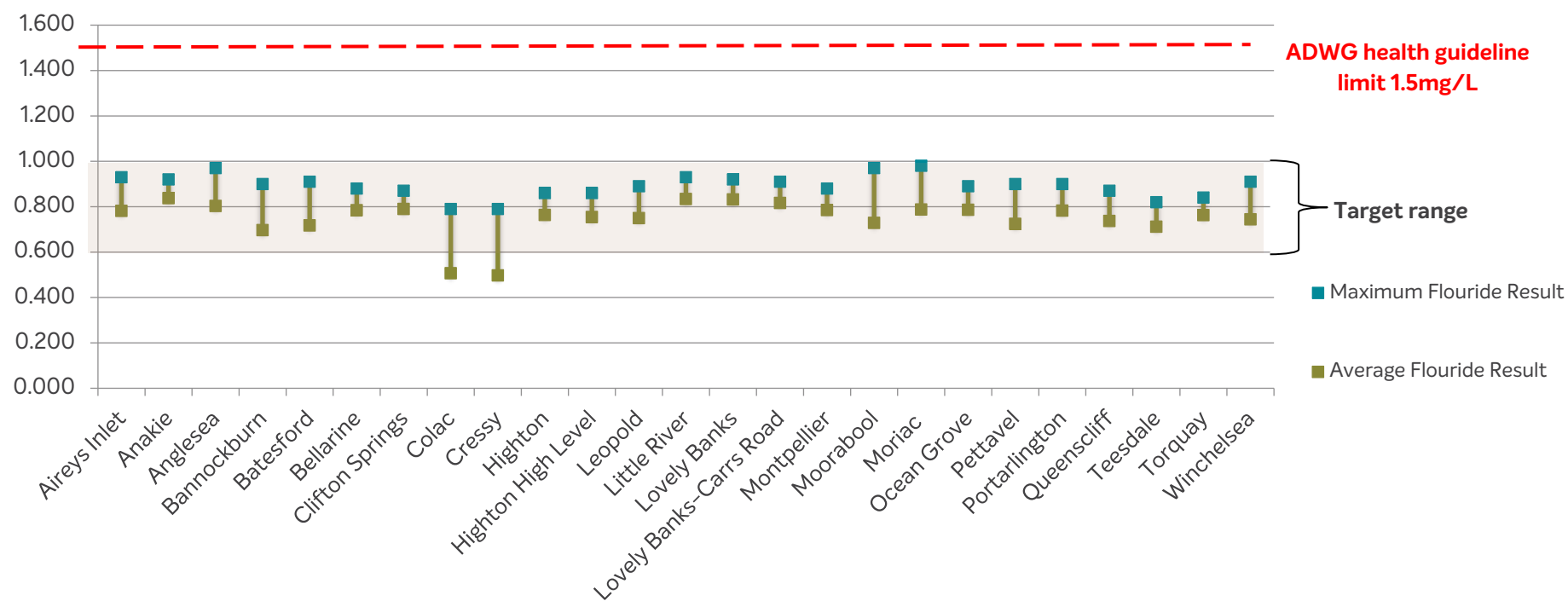


Figure 8 Fluoride (target)



6.4.2. Analysis of results

Trend over localities

The maximum fluoride level within all localities supplied by these treatment plants was below the drinking water quality standard value of 1.5 mg/L. Barwon Water is working towards meeting the annual average directive of 0.9mg/L, as per the updated Fluoridation Code of Practice. A project plan for this has been approved by DHHS, including plant upgrades, which will be carried out over the next year. The lower annual average for Colac and Cressy localities, was due to short periods where fluoride dosing was either turned off or

a lower concentration was targeted for the purposes of maintenance works, upgrade planning or plant optimisation.

Trend over time

Fluoride levels across all fluoridated localities were consistent with 2017/18 and 2018/19 results, other than Colac and Cressy localities, where there was a reduction in fluoride level, due to maintenance and the need for upgrade planning and additional process optimisation. There have been zero instances of the drinking water quality standard being exceeded in any of these years.

6.5. Total chlorine

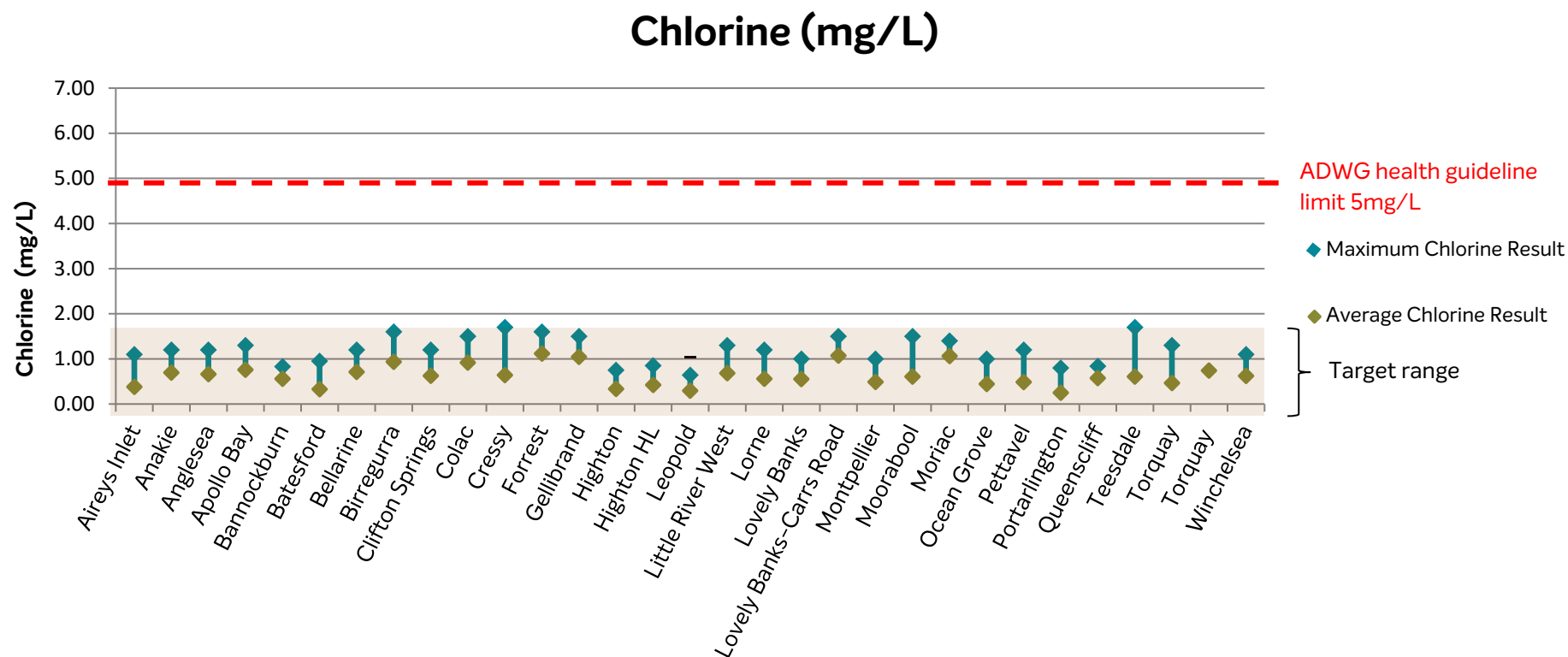
- Limit of detection = 0.1 mg/L
- ADWG health guideline value < 5.0 mg/L

6.5.1. Results

Table 8 Total Chlorine

Water quality locality	Frequency of sampling	Number of samples	Maximum (mg/L)	Average (mg/L)	Complying (Yes/No)
Aireys Inlet	> weekly	154	1.10	0.38	Yes
Anakie	> weekly	150	1.20	0.69	Yes
Anglesea	> weekly	165	1.20	0.66	Yes
Apollo Bay	> weekly	88	1.30	0.76	Yes
Bannockburn	> weekly	152	0.83	0.56	Yes
Batesford	> weekly	57	0.95	0.33	Yes
Bellarine	> weekly	76	1.20	0.71	Yes
Birregurra	> weekly	81	1.60	0.94	Yes
Clifton Springs	> weekly	184	1.20	0.62	Yes
Colac	> weekly	181	1.50	0.92	Yes
Cressy	> weekly	77	1.70	0.64	Yes
Forrest	> weekly	80	1.60	1.12	Yes
Gellibrand	> weekly	76	1.50	1.04	Yes
Highton	> weekly	159	0.75	0.33	Yes
Highton HL	> weekly	76	0.85	0.42	Yes
Leopold	> weekly	105	0.64	0.29	Yes
Little River West	> weekly	150	1.30	0.68	Yes
Lorne	> weekly	88	1.20	0.56	Yes
Lovely Banks	> weekly	510	1.00	0.55	Yes
Lovely Banks-Carrs Road	> weekly	145	1.50	1.07	Yes
Montpellier	> weekly	231	1.00	0.49	Yes
Moorabool	> weekly	101	1.50	0.61	Yes
Moriac	> weekly	78	1.40	1.06	Yes
Ocean Grove	> weekly	256	1.00	0.44	Yes
Pettavel	> weekly	172	1.20	0.48	Yes
Portarlington	> weekly	212	0.80	0.25	Yes
Queenscliff	> weekly	86	0.84	0.57	Yes
Teesdale	> weekly	154	1.70	0.61	Yes
Torquay	> weekly	149	1.30	0.46	Yes
Winchelsea	> weekly	76	1.10	0.62	Yes

Figure 9 Total Chlorine (target)



6.5.2. Analysis of results

Trend over localities

During 2019/20, the maximum and average total chlorine results for the majority of localities were within Barwon Water's target range, with results from individual localities influenced by method of storage, system length, and water demand. In all localities, the maximum total chlorine result was well below the ADWG health guideline value of 5.0 mg/L (4.1 mg/L in chloraminated systems).

All water quality localities met their target of maintaining minimum average total chlorine residual of >0.2 mg/L. Additional water quality end of system monitoring has been added to

the routine monitoring program to inform future water quality improvement plans and proactive system changes to guide residuals management practices in all water quality localities.

Trend over time

Total chlorine results for the 2019/20 year are similar to those seen in the 2018/19 and 2017/18 years. An increased focus on targeting appropriate chlorine levels to achieve adequate chlorine residual at network ends in recent years has led to improvements in the average residual experienced in most localities.

6.6. Analysis of results – summary for regulatory standards

Table 9 Compliance with regulatory standards outlined in Schedule 2 of the Safe Drinking Water Regulations (2015) over time – by analyte

Parameter	Percentage of water quality localities receiving compliant water									
	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020
<i>E. Coli</i>	100	100	100	100	100	100	97	100	100	100
Trihalomethanes	100	100	100	100	100	100	100	100	100	100
Turbidity	100	100	100	100	100	100	100	100	100	100

In 2019/20, results were compliant with the regulatory standards in all 30 water sampling localities.

Table 10 Compliance with standards over time – by percentage of population

Year	Percentage of population with complying water
2010/11	100
2011/12	100
2012/13	99.5
2013/14	100
2014/15	100
2015/16	100
2016/17	99.63
2017/18	100
2018/19	100
2019/20	100

In 2019/20, 100 percent of the serviced population received water compliant with the regulatory standards.

6.7. Other health related parameters

6.7.1. Arsenic

Barwon Water tests for the presence of arsenic in post-filtration water samples on a quarterly basis.

- Limit of detection = 0.001 mg/L
- ADWG health guideline value <0.01 mg/L

Table 11 Arsenic

Water quality locality	Source of supply	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average result (mg/L)	Complying (Yes/No)
Anakie	Wurdee Boluc WTP, Moorabool WTP	Quarterly	4	<0.001	<0.001	Yes
Little River West						
Lovely Banks						
Lovely Banks-Carrs Road			4	<0.001	<0.001	Yes
Montpellier						
Batesford						
Anglesea	Wurdee Boluc WTP	Quarterly	4	<0.001	<0.001	Yes
Aireys Inlet						
Bellarine						
Clifton Springs						
Highton						
Highton High Level						
Ocean Grove						
Leopold						
Pettavel						
Portarlington						
Queenscliff						
Torquay						
Moriac						
Winchelsea						
Bannockburn	Moorabool WTP	Quarterly	4	<0.001	<0.001	Yes
Moorabool						
Teesdale						
Colac	Colac WTP	Quarterly	4	<0.001	<0.001	Yes
Cressy						
Apollo Bay	Apollo Bay WTP	Quarterly	4	<0.001	<0.001	Yes
Birregurra	Birregurra WTP	Quarterly	4	<0.001	<0.001	Yes
Forrest	Forrest WTP	Quarterly	4	<0.001	<0.001	Yes
Gellibrand	Gellibrand WTP	Quarterly	4	<0.001	<0.001	Yes
Lorne	Lorne WTP	Quarterly	4	<0.001	<0.001	Yes

6.7.2. Copper

- Limit of detection = 0.001 mg/L
- ADWG health guideline value <2 mg/L

Table 12 Copper

Water quality locality	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average result (mg/L)	Complying (Yes/No)
Aireys Inlet	> monthly	13	0.083	0.014	Yes
Anakie	monthly	12	0.007	0.005	Yes
Anglesea	> monthly	13	0.074	0.032	Yes
Apollo Bay	> monthly	17	0.020	0.010	Yes
Bannockburn	monthly	12	0.021	0.008	Yes
Batesford	> monthly	15	0.046	0.010	Yes
Bellarine	monthly	12	0.025	0.011	Yes
Birregurra	> monthly	17	0.008	0.003	Yes
Clifton Springs	monthly	12	0.110	0.022	Yes
Colac	> monthly	16	0.034	0.008	Yes
Cressy	> monthly	13	<0.001	<0.001	Yes
Forrest	> monthly	16	0.007	0.005	Yes
Gellibrand	> monthly	16	0.027	0.015	Yes
Highton	monthly	12	0.089	0.035	Yes
Highton HL	monthly	12	0.028	0.014	Yes
Leopold	monthly	12	0.061	0.019	Yes
Little River West	monthly	12	0.005	0.002	Yes
Lorne	> monthly	17	0.053	0.015	Yes
Lovely Banks	monthly	12	0.018	0.007	Yes
Lovely Banks-Carrs Road	monthly	12	0.006	0.004	Yes
Montpellier	monthly	12	0.032	0.010	Yes
Moorabool	> monthly	19	0.240	0.033	Yes
Moriac	> monthly	17	0.015	0.008	Yes
Ocean Grove	monthly	12	0.048	0.015	Yes
Pettavel	monthly	12	0.100	0.019	Yes
Portarlington	monthly	12	0.059	0.014	Yes
Queenscliff	monthly	12	0.063	0.020	Yes
Teesdale	> monthly	13	0.019	0.007	Yes
Torquay	monthly	12	0.069	0.030	Yes
Winchelsea	monthly	12	0.140	0.043	Yes

6.7.3. Fluoride

The following results are for the natural background fluoride levels from the catchment. The fluoride results for localities supplied with fluoridated water are reported in Table 7.

- Limit of detection = 0.05 mg/L
- ADWG health guideline value < 1.5 mg/L

Table 13 Natural fluoride

Water quality locality	Source of supply	Minimum frequency of sampling	Number of samples	Maximum (mg/L)	Minimum (mg/L)	Average (mg/L)
Anakie	Wurdee Boluc Reservoir, East and West Moorabool River	Monthly	13	0.09	<0.05	0.07
Little River West						
Lovely Banks			13	0.17	0.07	0.10
Lovely Banks-Carrs Road						
Anglesea	Wurdee Boluc Reservoir	Monthly	13	0.17	0.07	0.10
Aireys Inlet						
Bellarine						
Clifton Springs						
Highton						
Ocean Grove						
Leopold						
Montpellier						
Pettavel						
Portarlington						
Queenscliff						
Torquay						
Moriac						
Winchelsea						
Highton High Level						
Batesford	East and West Moorabool River	Monthly	13	0.17	0.07	0.10
Bannockburn						
Moorabool						
Teesdale						
Colac	Colac Basin No. 4 & 5	Monthly	12	0.77	<0.05	0.77
Cressy						
Apollo Bay	Marengo Basin	Monthly	13	0.11	0.07	0.08
Birregurra	Birregurra Basin	Monthly	13	0.18	0.13	0.15
Forrest	Forrest Basin	Monthly	12	0.12	<0.05	0.09
Gellibrand	Lardners Creek	Monthly	12	0.74	<0.05	0.74
Lorne	Allen Reservoir	Monthly	13	0.08	<0.05	0.06

6.7.4. Lead

- Limit of detection = 0.001 mg/L
- ADWG health guideline value < 0.01 mg/L

Table 14 Lead

Water quality locality	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average result (mg/L)	Complying (Yes/No)
Aireys Inlet	> monthly	13	0.004	0.004	Yes
Anakie	monthly	12	<0.001	<0.001	Yes
Anglesea	> monthly	13	0.001	0.001	Yes
Apollo Bay	> monthly	17	<0.001	<0.001	Yes
Bannockburn	monthly	12	<0.001	<0.001	Yes
Batesford	> monthly	15	0.002	0.001	Yes
Bellarine	monthly	12	<0.001	<0.001	Yes
Birregurra	> monthly	17	<0.001	<0.001	Yes
Clifton Springs	monthly	12	0.001	0.001	Yes
Colac	> monthly	16	<0.001	<0.001	Yes
Cressy	> monthly	13	<0.001	<0.001	Yes
Forrest	> monthly	16	<0.001	<0.001	Yes
Gellibrand	> monthly	16	<0.001	<0.001	Yes
Highton	monthly	12	0.002	0.002	Yes
Highton HL	monthly	12	<0.001	<0.001	Yes
Leopold	monthly	12	<0.001	<0.001	Yes
Little River West	monthly	12	<0.001	<0.001	Yes
Lorne	> monthly	17	<0.001	<0.001	Yes
Lovely Banks	monthly	12	<0.001	<0.001	Yes
Lovely Banks-Carrs Road	monthly	12	<0.001	<0.001	Yes
Montpellier	monthly	12	0.002	0.002	Yes
Moorabool	> monthly	17	0.001	0.001	Yes
Moriac	> monthly	17	0.001	0.001	Yes
Ocean Grove	monthly	12	0.002	0.002	Yes
Pettavel	monthly	12	0.002	0.001	Yes
Portarlington	monthly	12	<0.001	<0.001	Yes
Queenscliff	monthly	12	<0.001	<0.001	Yes
Teesdale	> monthly	13	<0.001	<0.001	Yes
Torquay	monthly	12	0.010	0.008	Yes
Winchelsea	monthly	12	0.001	0.001	Yes

6.7.5. Manganese

- Limit of detection = 0.002 mg/L
- ADWG health guideline value < 0.5 mg/L

Table 15 Manganese

Water quality locality	Frequency of sampling	Number of samples	Maximum result (mg/L)	Average result (mg/L)	Complying (Yes/No)
Aireys Inlet	> monthly	25	0.120	0.065	Yes
Anakie	> monthly	24	<0.002	<0.002	Yes
Anglesea	> monthly	25	<0.002	<0.002	Yes
Apollo Bay	> monthly	50	<0.002	<0.002	Yes
Bannockburn	> monthly	24	0.030	0.030	Yes
Batesford	> monthly	35	0.002	0.002	Yes
Bellarine	> monthly	24	<0.002	<0.002	Yes
Birregurra	> monthly	50	<0.002	<0.002	Yes
Clifton Springs	> monthly	24	<0.002	<0.002	Yes
Colac	> monthly	48	<0.002	<0.002	Yes
Cressy	> monthly	25	<0.002	<0.002	Yes
Forrest	> monthly	49	0.080	0.024	Yes
Gellibrand	> monthly	48	<0.002	<0.002	Yes
Highton	> monthly	24	<0.002	<0.002	Yes
Highton HL	> monthly	24	0.010	<0.002	Yes
Leopold	> monthly	24	<0.002	<0.002	Yes
Little River West	> monthly	24	<0.002	<0.002	Yes
Lorne	> monthly	50	<0.002	<0.002	Yes
Lovely Banks	> monthly	24	<0.002	<0.002	Yes
Lovely Banks-Carrs Road	> monthly	24	<0.002	<0.002	Yes
Montpellier	> monthly	24	0.010	0.010	Yes
Moorabool	> weekly	53	0.001	0.001	Yes
Moriac	> monthly	50	<0.002	<0.002	Yes
Ocean Grove	> monthly	24	<0.002	<0.002	Yes
Pettavel	> monthly	24	<0.002	<0.002	Yes
Portarlinton	> monthly	24	<0.002	<0.002	Yes
Queenscliff	> monthly	24	<0.002	<0.002	Yes
Teesdale	> monthly	25	<0.002	<0.002	Yes
Torquay	> monthly	24	<0.002	<0.002	Yes
Winchelsea	> monthly	24	<0.002	<0.002	Yes

6.7.6. Other

The complete list of other health-related parameters analysed in 2019/20 are listed in Table 16, Table 17 and Table 18.

Table 16 Other health-related parameters for 2019/20

Analytes	Frequency of sampling (minimum)	Health guideline compliance (Yes/No)
Antimony	Quarterly	Yes
Barium	Quarterly	Yes
Boron ¹	Quarterly	Yes
Cadmium	Quarterly	Yes
Chloral Hydrate (Trichloroacetaldehyde)	Annually	Yes
Chlorophenols ¹²	Annually	Yes
Chlorine	Weekly	Yes
Chromium	Quarterly	Yes
Cyanide ¹	Quarterly	Yes
Iodide ¹	Annually	Yes
Mercury	Quarterly	Yes
Molybdenum ¹	Quarterly	Yes
Monochloramine	Weekly	Yes
Nickel	Quarterly	Yes
Nitrate	Monthly	Yes
Nitrite	Monthly	Yes
Pesticides/herbicides ¹	Quarterly/monthly	Yes
Radioactive constituents	Annually	Yes
Selenium	Quarterly	Yes
Silver ¹	Annually	Yes
Sulphate	Quarterly/Monthly	Yes
Uranium ¹	Annually	Yes
Volatile organic carbons ¹	Annually	Yes

- (1) Analytes only measured in source water pre-treatment.
- (2) See Table 17 for a full list of pesticides/herbicides analysed
- (3) See Table 18 for a full list of volatile organic carbons analysed.

All pesticides/herbicides are only monitored in the source water pre-treatment.

Table 17 Pesticides/herbicides analysed for in 2019/20

44-DDD	CHLOROPYRIFOS	24DB
44-DDE	COUMAPHOS	24DP
44-DDT	DEMETON-S	26D, 24D
ALDRIN	DIAZINON	4-Chlorophenoxyaceticacid
ATRAZINE	DICHLORVOS	Clopyralid
BHC (ALPHA ISOMER)	CHLORFENVINPHOS	Dicamba
BHC (BETA ISOMER)	CHLOROTHALONIL	MCPA
BHC (DELTA ISOMER)	EPN	MCPB
CIS-CHLORDANE	FENSULFOTHION	PHENOLS
DIQUAT	FENTHION	TRICHLOPYR
DIELDRIN	MALATHION	HEXAZINONE
ENDOSULPHAN I	METHYL PARATHION	MOLINATE
ENDOSULPHAN II	MONOCROTOPHOS	PICLORAN
ENDOSULPHAN	PARATHION	TEMEPHOS
ENDOSULPHAN SULPHATE	PHORATE	PROPICONAZOLE
ENDRIN ALDEHYDE	PROPHOS	PARAQUAT
HEPTACHLOR EPOXIDE	RONNEL	SIMAZINE
HEPTACHLOR	TETRACHLORVINPHOS	QUINTOZENE
HEXACHLOROBENZENE	TETRAETHYLDITHIOPYRPHOS	PIRIMICARB
LINDANE	TRICHLORINATE	DIURON
METHOXYCHLOR	TUKUTHION	PROPACHLOR
MECOPROP	245T	
TRANS-CHLORDANE	246T	
GLYCOPHATE		

All volatile organic compounds are monitored in both the source water pre-treatment, post-filtration water entry and reticulation.

Table 18 Volatile organic compounds analysed for in 2019/20

VINYL CHLORIDE	13-DICHLOROPROPANE	HEXACHLORO-13-BUTADIENE
1112-TETRACHLOROETHANE	14-DICHLOROBENZENE	ISOPROPYLBENZENE
111-TRICHLOROETHANE	22-DICHLOROPROPANE	METHYLENECHLORIDE
1122-TETRACHLOROETHANE	2-CHLOROTOLUENE	MP-XYLENE
112-TRICHLOROETHANE	4-CHLOROTOLUENE	NAPHTHALENE
11-DICHLOROETHANE	BENZENE	N-BUTYLBENZENE
11-DICHLOROETHENE	BROMOBENZENE	N-PROPYLBENZENE
11-DICHLOROPROPENE	BROMOCHLOROMETHANE	O-XYLENE
123-TRICHLOROBENZENE	BROMODICHLOROMETHANE	P-ISOPROPYLTOLUENE
123-TRICHLOROPROPANE	BROMOFORM	SEC-BUTYLBENZENE
124-TRICHLOROBENZENE	CARBON DISULPHIDE	STYRENE
124-TRIMETHYLBENZENE	CARBONTETRACHLORIDE	TERT-BUTYLBENZENE
12-DIBROMO-3-CHLOROPROPANE	CHLOROBENZENE	TETRACHLOROETHENE
12-DIBROMOETHANE	CHLOROFORM	TOLUENE
12-DICHLOROBENZENE	CIS-12-DICHLOROETHENE	TRANS-12-DICHLOROETHENE
12-DICHLOROETHANE	CIS-12-DICHLOROPROPENE	TRANS-13-DICHLOROPROPENE
12-DICHLOROPROPANE	DIBROMOCHLOROMETHANE	TRICHLOROETHENE
135-TRIMETHYLBENZENE	DIBROMOMETHANE	NAPHTHALENE
13-DICHLOROBENZENE	ETHYLBENZENE	

6.7.7. Analysis of results

Trend over localities

There were no non-compliances relating to other health-related water quality parameters, herbicides/pesticides or volatile organic compounds during 2019/20 in any locality. All results for these parameters were well below their respective health guideline value.

Trend over time

The results for these parameters in the 2019/20 period are consistent with those experienced in the 2018/19 and 2017/18 periods.

6.8. Other aesthetic (not health-related)

6.8.1. Colour

The apparent colour is the colour that one actually sees; it is the colour resulting from the combined effect of true colour and any particulate matter, or turbidity in the water.

- Limit of detection = 1 Hu
- ADWG quality value < 15 Hu

Table 19 Colour

Water quality locality	Frequency of sampling	Number of samples	Maximum (HU)	Minimum (HU)	Average (HU)
Aireys Inlet	> weekly	77	2	<1	1.17
Anakie	> weekly	76	2	<1	1.07
Anglesea	> weekly	82	2	<1	1.22
Apollo Bay	> weekly	88	2	<1	1.15
Bannockburn	> weekly	76	2	<1	1.08
Batesford	> weekly	78	2	<1	1.14
Bellarine	> weekly	76	1	<1	1.00
Birregurra	> weekly	77	2	<1	1.10
Clifton Springs	> weekly	93	2	<1	1.21
Colac	> weekly	180	1	<1	1.00
Cressy	> weekly	77	1	<1	1.00
Forrest	> weekly	75	2	<1	1.29
Gellibrand	> weekly	75	2	<1	1.19
Highton	> weekly	159	4	<1	1.26
Highton HL	> weekly	76	3	<1	1.28
Leopold	> weekly	105	3	<1	1.20
Little River West	> weekly	74	2	<1	1.05
Lorne	> weekly	88	2	<1	1.17
Lovely Banks	> weekly	253	3	<1	1.21
Lovely Banks-Carrs Road	> weekly	72	2	<1	1.10
Montpellier	> weekly	231	3	<1	1.18
Moorabool	> weekly	103	4	<1	1.35
Moriac	> weekly	77	2	<1	1.20
Ocean Grove	> weekly	126	2	<1	1.17
Pettavel	> weekly	173	2	<1	1.16
Portarlington	> weekly	106	2	<1	1.11
Queenscliff	> weekly	86	1	<1	1.00
Teesdale	> weekly	77	2	<1	1.38
Torquay	> weekly	149	2	<1	1.02
Winchelsea	> weekly	75	2	<1	1.21

* Sampling frequency is dependent on population and varies in each locality, as described in the Australian Drinking Water Guidelines 2011.

6.8.2. Hardness (Total)

Total hardness is the sum of the concentrations of calcium and magnesium ions expressed as a calcium carbonate equivalent.

Hard water requires more soap than soft water to obtain lather. It can also cause scale to form on hot water pipes and fittings.

- Limit of detection = 1 mg/L
- ADWG quality value < 200 mg/L

Table 20 Hardness (total)

Water quality locality	Source of supply	Frequency of sampling (min)	Number of samples	Maximum (mg/L)	Minimum (mg/L)	Average (mg/L)
Anakie	Wurdee Boluc Reservoir, East and West Moorabool River	>monthly	13	39	29	35
Little River West						
Lovely Banks						
Lovely Banks-Carrs Road		monthly	12	130	64	99
Montpellier						
Anglesea	Wurdee Boluc Reservoir	>monthly	13	39	29	35
Aireys Inlet						
Bellarine						
Clifton Springs						
Highton						
Ocean Grove						
Leopold						
Pettavel						
Portarlinton						
Queenscliff						
Torquay						
Moriac						
Winchelsea						
Highton High Level						
Batesford	East and West Moorabool River	monthly	12	130	64	99
Bannockburn						
Lethbridge						
Teesdale						
Colac	Colac Basin No. 4 & No. 5	monthly	12	23	18	20
Cressy						
Apollo Bay	Marengo Basin	>monthly	13	43	33	39
Birregurra	Birregurra Basin	>monthly	13	57	39	48
Forrest	Forrest Basin	>monthly	13	33	23	28
Gellibrand	Lardners Creek	monthly	12	30	18	23
Lorne	Allen Reservoir	>monthly	13	30	21	25

6.8.3. pH

The pH value is a measure of hydrogen ion concentration in water. A pH value of 7.0 is neutral, values lower than 7.0 are acidic, and values higher than 7.0 are basic. The ADWG guideline range for pH is based on management of assets and is not related to health. According to current literature, a direct relationship between pH and human health is difficult to determine, as pH is closely associated with other aspects of water quality. Consumption of food and

beverages with quite low or high pH is common and does not result in adverse health effects (ADWG, 2011). A guideline value for pH between 6.5 and 8.5* is desirable to reduce corrosion and encrustation of pipes and fittings.

- Range of detection = 0 of 14
- ADWG value = 6.5 to 8.5

Table 21 pH

Water quality locality	Frequency of sampling	Number of samples	Maximum	Minimum	Average
Aireys Inlet	> weekly	76	8.2	7.2	7.5
Aireys Inlet	> weekly	77	8.5	6.9	7.5
Anakie	> weekly	76	7.6	6.9	7.3
Anglesea	> weekly	82	8.4	7.1	7.5
Apollo Bay	> weekly	88	8.0	6.6	7.4
Bannockburn	> weekly	76	8.3	6.9	7.4
Batesford	> weekly	78	8.8*	6.8	7.4
Bellarine	> weekly	76	7.6	6.9	7.2
Birregurra	> weekly	81	8.5	7.3	7.9
Clifton Springs	> weekly	93	7.5	6.9	7.2
Colac	> weekly	181	8.3	6.5	7.2
Cressy	> weekly	77	9.1**	6.8	8.0
Forrest	> weekly	80	8.6*	7.2	7.8
Gellibrand	> weekly	76	7.8	7.0	7.5
Highton	> weekly	159	7.6	6.8	7.1
Highton HL	> weekly	76	7.5	6.7	7.1
Leopold	> weekly	105	7.9	6.8	7.1
Little River West	> weekly	74	9.2*	7.0	7.6
Lorne	> weekly	88	8.0	6.6	7.2
Lovely Banks	> weekly	254	8.7*	6.3*	7.3
Lovely Banks-Carrs Road	> weekly	72	7.4	6.8	7.2
Montpellier	> weekly	231	7.8	6.7	7.3
Moorabool	> weekly	101	9.7*	6.7	7.5
Moriac	> weekly	78	7.4	6.6	7.0
Ocean Grove	> weekly	126	7.9	6.7	7.2
Pettavel	> weekly	173	7.4	6.6	7.1
Portarlington	> weekly	106	7.8	6.9	7.3
Queenscliff	> weekly	86	7.6	6.7	7.1
Teesdale	> weekly	77	9.0*	7.0	7.9
Torquay	> weekly	148	7.6	6.7	7.2

* Based on the need to reduce corrosion and encrustation in pipes and fittings, the pH of drinking water should be between 6.5 and 8.5. New concrete tanks and cement or mortar-lined pipes can significantly increase pH and a value above 8.5 may be tolerated, provided monitoring indicates no deterioration in microbiological quality. Barwon Water maintains a scheduled preventative maintenance program to proactively flush more vulnerable systems.

** Low turnover and cement and mortar-lined pipes contribute to some elevated pH results in Cressy. A scheduled maintenance program is in place to flush the network in Cressy. This mitigates the development of an elevated pH in the network. Additional weekly chlorine dosing is used to maintain residual in the network.

6.8.4. Conductivity

The electrical conductivity of water, measured in EC units, increases with the concentration of dissolved solids. A general rule of thumb is that electrical conductivity (EC) may be converted to total dissolved solids (TDS) by halving the value (An EC of

1000 $\mu\text{S}/\text{cm}$ is equivalent to a TDS of 500mg/L). Based on taste, total dissolved solids in drinking water should not exceed 500 mg/L. No health effects have been associated specifically with high TDS concentrations (ADWG, 2011).

- Limit of detection = 1 $\mu\text{S}/\text{cm}$
- ADWG quality value < 1000 $\mu\text{S}/\text{cm}$

Table 22 Conductivity

Water quality locality	Source of supply	Frequency of sampling (min)	Number of samples	Maximum ($\mu\text{S}/\text{cm}$)	Minimum ($\mu\text{S}/\text{cm}$)	Average ($\mu\text{S}/\text{cm}$)
Anakie	Wurdee Boluc Reservoir, East and West Moorabool River	> twice monthly	25	290	200	231
Little River West						
Lovely Banks		twice monthly	24	750	240	401
Lovely Banks-Carrs Road						
Montpellier	Wurdee Boluc Reservoir	> twice monthly	25	290	200	231
Anglesea						
Aireys Inlet						
Bellarine						
Clifton Springs						
Highton						
Ocean Grove						
Leopold						
Pettavel						
Portarlinton						
Queenscliff						
Torquay						
Moriac						
Winchelsea						
Highton High Level						
Batesford	East and West Moorabool River	twice monthly	24	750	240	401
Bannockburn						
Lethbridge						
Teesdale						
Colac	Colac Basin No. 4 & No. 5	> twice monthly	25	240	200	186
Cressy						
Apollo Bay	Marengo Basin	> twice monthly	25	250	160	215
Birregurra	Birregurra Basin	> twice monthly	25	400	240	301
Forrest	Forrest Basin	twice monthly	24	500	150	368
Gellibrand	Lardners Creek	twice monthly	24	430	430	366
Lorne	Allen Reservoir	> twice monthly	25	230	130	158

6.8.5. Analysis of results

Trend over localities

The average colour reported across all localities was at an acceptable level, with all localities recording a 1–2 HU colour average value well below the <15HU ADWG quality value.

The average pH reported in each locality was within the targeted 6.5–8.5 pH range. However, a number of samples from several localities reported maximum levels that exceed the recommended pH range. One locality recorded a minimum pH level below the recommended pH range.

When these were identified, actions were implemented to correct pH levels within the network through increasing water turnover. The pH of the drinking water supply can become elevated due to natural leaching of calcium and hydroxide ions from cement linings in pipes and concrete in supply tanks.

All zones complied with the recommended hardness and conductivity levels.

Trend over time

The average colour, pH, hardness and conductivity, over each locality has followed a comparable pattern to previous year.

7. Emergency / incident management

7.1. Emergencies/events – Section 22 notifications

Table 23 Section 22 notifications

Date	Type	Water quality sampling locality	Nature of S22 Notification	Action
September 17, 2019	Detection of <i>Escherichia coli</i> in drinking water (3 MPN/100ml)	Birregurra	On 17 September, Barwon Water was notified of a detection of <i>E. coli</i> and notified DHHS under section 22 of the Act. The <i>E. coli</i> was detected in a water quality sample taken the previous morning from a reticulation point in the Birregurra locality.	An investigation was carried out in accordance with DHHS guidelines, along with corrective actions which included retesting of the original sample and obtaining a follow up sample at the same point in the system prior to flushing the main. All samples demonstrated a suitable level of free chlorine present and the follow up sample was free of <i>E. coli</i> and total coliforms. After reviewing the investigation and action taken, DHHS confirmed that BW had met the false positive criteria and that the original <i>E. coli</i> detection was not representative of the water supplied to the Birregurra locality.
September 30, 2020	Potential for widespread public complaint	Lovely Banks	On 30 September, Barwon Water was notified of social media discussion, indicating symptoms of skin irritation and rashes in the Lara area.	An investigation was carried out and found no evidence linking water quality to the skin irritation or rashes. A report on this matter was submitted to DHHS.

7.2. Emergencies/events – Section 18 notification

No Section 18 notifications have been made for the 2019/20 reporting period.

7.3. Other incidents

Table 24 Other events

Date	Type	Water quality sampling locality	Nature of event	Action
5 May, 2020	Missed samples in the water quality monitoring program	Batesford	<p>On 5 May 2020, Barwon Water identified through routine data analysis that some samples for the Batesford water sampling locality had not been collected or analysed.</p> <p>A gap analysis concluded that 10 sampling events were not completed as per the scheduled Water Quality Monitoring Program.</p> <p>Parameters missed during the 10 weeks included E.coli, Total Coliforms, pH, Turbidity, Colour and Chlorine.</p>	<p>An investigation was carried out and found that supply of safe drinking water was not compromised – this was verified via results from routine system entry point and treatment plant analysis over the same period.</p> <p>The investigation found the root cause of the event was related to change management, and a recent change in water quality sampling locality boundaries.</p> <p>The error was immediately rectified and improvement activities are being addressed via corrective actions.</p>

8. Water Quality Complaints

8.1. Complaints 2019/20

In accordance with our commitment to providing high quality drinking water, complaints regarding water quality are taken very seriously. Barwon Water records all complaints relating to drinking water quality.

The complaints are compared to the number of connected properties to enable comparison with other water suppliers. The number of complaints in 2019/20 was 1.19 per 1,000 properties. The three year rolling average continues to decline (Figure 10).

Table 25 Comparison of complaints for financial years 2019/20 and 2018/19

Type of complaints	Number of complaints			Comparison to 2018/19 reporting period	Comments
	2019/20	2018/19	2017/18		
Alleged diagnosed illness	0	0	0	0	Comparable figure to previous
Discoloured water	61	63	55	-2	Comparable figure to previous
Taste or odour	72	53	38	19	Related to supply system changes made to balance water storage levels across our different reservoir catchments, and a change to customer usage patterns due to the impact of COVID-19.
White water	16	25	13	-9	64% reduction in number of complaints compared with previous year.
Other	48	33	25	15	Related to a change to customer usage patterns due to the impact of COVID-19.
TOTAL	197	174	131	213	12% increase in number of complaints compared with previous year.

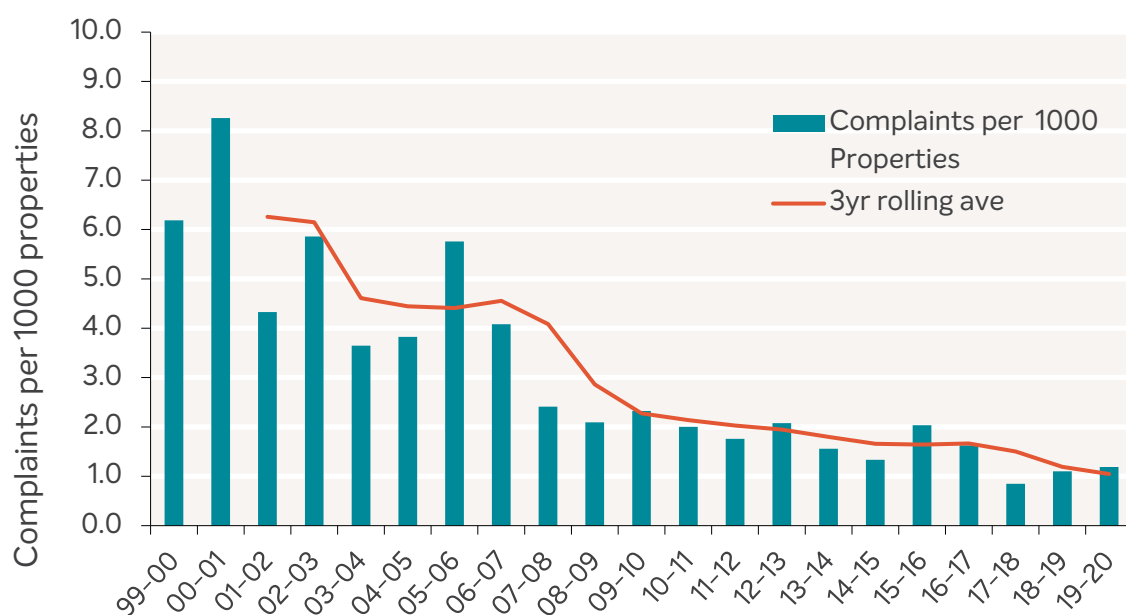
Table 26 Customer complaints summary for each sampling locality 2019/20

Water quality locality	Type of complaint					Total complaints
	Alleged diagnosed illness	Discoloured water	Taste or odour	White water	Other	
Aireys Inlet	0	0	0	0	0	0
Anakie	0	0	0	0	0	0
Anglesea	0	0	1	0	0	1
Apollo Bay	0	0	3	2	1	6
Bannockburn	0	4	1	0	2	7
Batesford	0	1	0	0	0	1
Bellarine	0	0	0	0	0	0
Birregurra	0	0	0	0	0	0
Clifton Springs	0	2	4	2	2	10
Colac	0	1	3	0	2	6
Cressy	0	0	0	0	0	0
Forrest	0	0	0	0	0	0
Gellibrand	0	0	0	0	0	0
Highton	0	0	0	0	0	0
Highton HL	0	8	10	3	5	26
Leopold	0	6	0	1	2	9
Little River West	0	0	0	0	1	1
Lorne	0	0	0	0	0	0
Lovely Banks	0	13	4	2	12	31
Lovely Banks-Carrs Road	0	0	0	0	0	0
Montpellier	0	9	26	1	9	45
Moorabool	0	0	1	1	0	2
Moriac	0	0	0	0	0	0
Ocean Acres	0	0	0	0	0	0
Ocean Grove	0	4	2	1	2	9
Pettavel	0	7	9	1	5	22
Portarlinton	0	3	5	1	0	9
Queenscliff	0	2	0	0	0	2
Teesdale	0	0	1	0	2	3
Torquay	0	1	1	1	2	5
Winchelsea	0	0	1	0	1	2
					TOTAL	197

Table 27 Table of customer complaints by type for 2019/20

Type of complaint	Number of complaints 2019/20	Percentage of total complaints	Number of complaints per 1000 properties 2019/20
Alleged diagnosed illness	0.00	0.00	0.00
Discoloured water	61.00	0.31	0.37
Taste or odour	72.00	0.37	0.43
White water	16.00	0.08	0.10
Other	48.00	0.24	0.30
TOTAL	197.00	1.00	1.19

Figure 10 Complaints per 1000 properties 2019/20



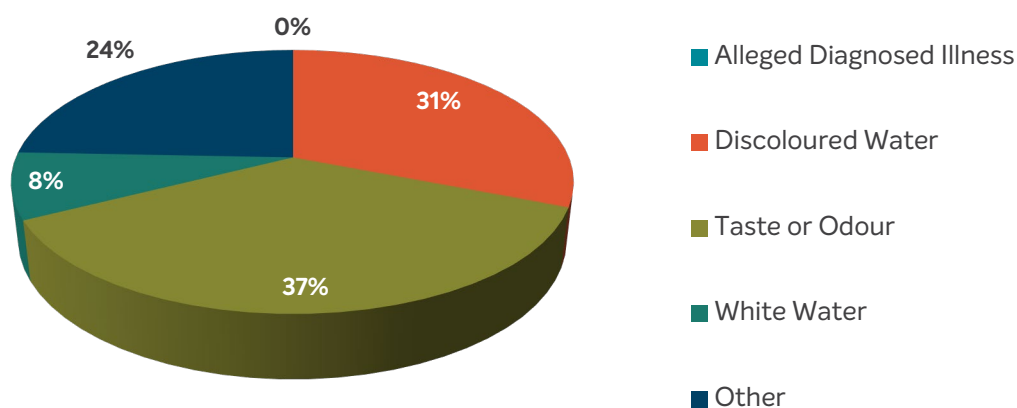
The majority of complaints for 2019/20 related to taste or odour followed by discoloured water (Figure 11).

Table 26 shows a breakdown of complaints by complaint type. Source water changes, as well as a change to customer usage patterns due

to the impact of COVID-19, might have contributed to a slightly higher number of complaints registered in comparison to the previous couple of years.

However, the number of overall complaints is comparable to 2018/19.

Figure 11 Customer complaint summary by type 2019/20



8.2. Complaint response

Customer complaints are mostly received by Barwon Water's Customer Contact Centre and registered on our customer and complaints management system. Barwon Water also occasionally receives complaints via social media, or the enquiry function of the public website. This feedback is registered in the complaints and customer management system and managed in the same way as telephone complaints.

During business hours, the Product Quality team endeavour to respond as quickly as possible (within the same day) to liaise with the customer to resolve the problem. Outside business hours, the Duty Officer will respond to complaints and initiate corrective action immediately where required. These complaints are then assessed to determine if follow up contact is required by a member of the Product Quality team during the next business day.

8.2.1. Discoloured water

Discoloured water can be caused by a number of different factors, including burst main events, manganese and iron oxidation and problems which can relate to the plumbing of a customer's property. The response given to these complaints varies depending on the nature of the cause, but may include reactive mains cleaning, reviewing treatment processes or advising the customer to have their internal plumbing inspected by a licensed plumber.

Generally blue discolouration of water is caused by copper corrosion. As Barwon Water does not use copper fittings or pipes, the issue can be traced back to the internal plumbing on the customer's property. Advice is usually provided to customers to engage a licensed plumber to make an assessment.

8.2.2. Taste/odour

Taste and odour issues are usually related to chlorine in the water or a change in the raw water quality, such as an increase in organics or algae in the raw water. In responding to these complaints, treatment processes and recent monitoring results are reviewed and, where possible, alterations are made. In cases where a customer may be particularly sensitive to taste and odour, advice is given on methods to address the issue.

8.2.3. White water

When air becomes trapped in water supply, it has a white or "milky" appearance. This is generally caused by a burst main. Where possible, attempts are made to remove the affected water from the reticulation system by flushing the main at the location where air is gathering. However, as this is not always possible, customers are asked to wait for the air to be removed naturally, which can take two to three days. Customers are advised that the appearance of the water is caused by trapped air becoming entrained in the water supply when it is under pressure in the main.

When a white water complaint is received a number of factors are evaluated to determine if flushing is necessary including; investigating to verify the source to ensure the water supply remains safe, topography of the area (to determine where the air is likely to be collecting in the main), number of connections in the area (likelihood that the air will be flushed out via normal use), how long the problem has been occurring for, and other factors that may affect the customer.

If necessary, a flush will be arranged at the time of complaint, alternatively the customer is advised that the problem should clear naturally and to call back if it is persisting after 1-2 days. If a second call is received, a flush is arranged.

8.2.4. Alleged diagnosed illness

Illness complaints are generally received from customers who wish to confirm whether the water they have been drinking may have made them ill. To address this type of complaint a review of monitoring results is undertaken. If there is no evidence indicating the delivered water has been unsafe, the customer is advised to consult a doctor if they have further concerns.

A standard operating procedure developed by Barwon Water and approved by the Department of Health and Human Services (DHHS) has been adopted to ensure all illness complaints prompt a thorough investigation of the water supply system to confirm there

have been no system failures which could provide an opportunity for unsafe water to be supplied. If at any point in time Barwon Water believes there has been potential for unsafe water to be supplied, DHHS will be notified (via Section 22). If multiple illness complaints are received from the same water quality locality within a 7-day period, and investigations show there has been no potential for the water supply to be the cause, Barwon Water will notify DHHS as a courtesy to enable them to investigate further.

9. Water quality improvement projects

In response to the challenging climate conditions experienced in 2018/19, in 2019/20 Barwon Water proactively turned on the alternate water supply source located at Anglesea Borefield and increased the volume of water drawn from the Melbourne to Geelong pipeline by building a new pump station. These projects assisted Barwon Water to balance our water storages across our different reservoir catchments, which ultimately helps us to maintain good quality drinking water. We also completed the below improvement projects.

9.1 Colac clear water storage basin #2

The Colac water treatment plant supplies drinking water to Colac all year round. In 2019/20 construction of a second clear water storage basin was completed, adding 4 ML storage capacity to the Colac system. The addition will significantly improve Colac's water security and add to the long term growth of regional Victoria.

9.2. Forrest clear water storage reconfiguration

The clear water storage tanks at Forrest Water Treatment Plant were reconfigured to operate in a series arrangement. This improvement will increase water quality and security of supply for the Forrest locality.

9.3. Catchment management and river health

In 2019/20, Barwon Water continued to work in partnership with the Corangamite Catchment Management Authority (CMA), through its river health agreement, and with Landcare to protect and enhance waterways within drinking water supply catchments, contributing \$120,000 in partnership funds to:

- Moorabool Catchment Landcare Group
- Southern Otway Landcare Network
- Upper Barwon Landcare Network.

Barwon Water contributes \$70,000 annually to on-ground work for river health projects in water supply catchments under the Barwon Water–Corangamite CMA River Health Partnership Agreement.

The Corangamite CMA's 2016–2020 Waterway Frontage Protection Program
Corangamite CMA's 2016–2020 Waterway Frontage Protection Program is drawing to a close and has delivered riparian restoration works at 81 sites across the catchment. Over 166 km's of waterway frontage and 860 ha of riparian vegetation has been under active management through activities such as pest plant and animal control, fencing for stock exclusion, revegetation and removal of willows along 24 km's of this frontage.

Additionally, Barwon Water has contributed \$130,000 towards year two of a four-year commitment to help fund The Living Moorabool project. This is one of 10 Flagship Waterways projects showcasing a large scale restoration approach. Partnerships established between the Corangamite CMA, Barwon Water, community groups and Traditional Owners are delivering activities that will include river back protection and riparian enhancement, removal of fish barriers, delivery of environmental flows and shared benefits for the community.

Barwon Water also provided \$28,000 toward ongoing operation of the Corangamite Citizen Science program. The program supports community groups to conduct water quality testing at monitoring sites and delivers education programs for students in the Corangamite region. Staff promote river health and catchment issues through presentations and attendance at these public events.

Barwon Water will continue to work collaboratively with key stakeholder that hold shared interests in sustainable water and catchment management through the 2020/21 financial year.



Appendices

Appendix A – Audit Certificate



BUREAU VERITAS
Certification



Certification

Awarded to

BARWON REGION WATER CORPORATION
61-67 RYRIE STREET, GEELONG, VIC, 3220
AUSTRALIA

Bureau Veritas certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards indicated below

STANDARD

CODEX HACCP
CAC/RCP 1-1969, REV4, 2003

SCOPE OF SUPPLY

THE REGISTRATION COVERS THE FOOD SAFETY MANAGEMENT SYSTEM FOR THE HARVESTING, TREATMENT AND DISTRIBUTION OF DRINKING WATER TO A BROAD RANGE OF CUSTOMERS

Original Approval Date: **16 July 2004**
Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until: **13 November 2021**

To check the validity of this certificate please call tel. 1800 855 190
Further clarification regarding the scope of this certificate and the applicability of the Management System requirements may be obtained by consulting the organisation.

Certificate Number: **AU003386-1**



Andrew Mortimore
Vice President – ISF Pacific Region

Date: **12 December 2018**



Managing office: Bureau Veritas Pty Ltd, 3435 Williamstown Road, Port Melbourne, Victoria, 3207
Issuing office: Bureau Veritas Pty Ltd, 3435 Williamstown Road, Port Melbourne, Victoria, 3207





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