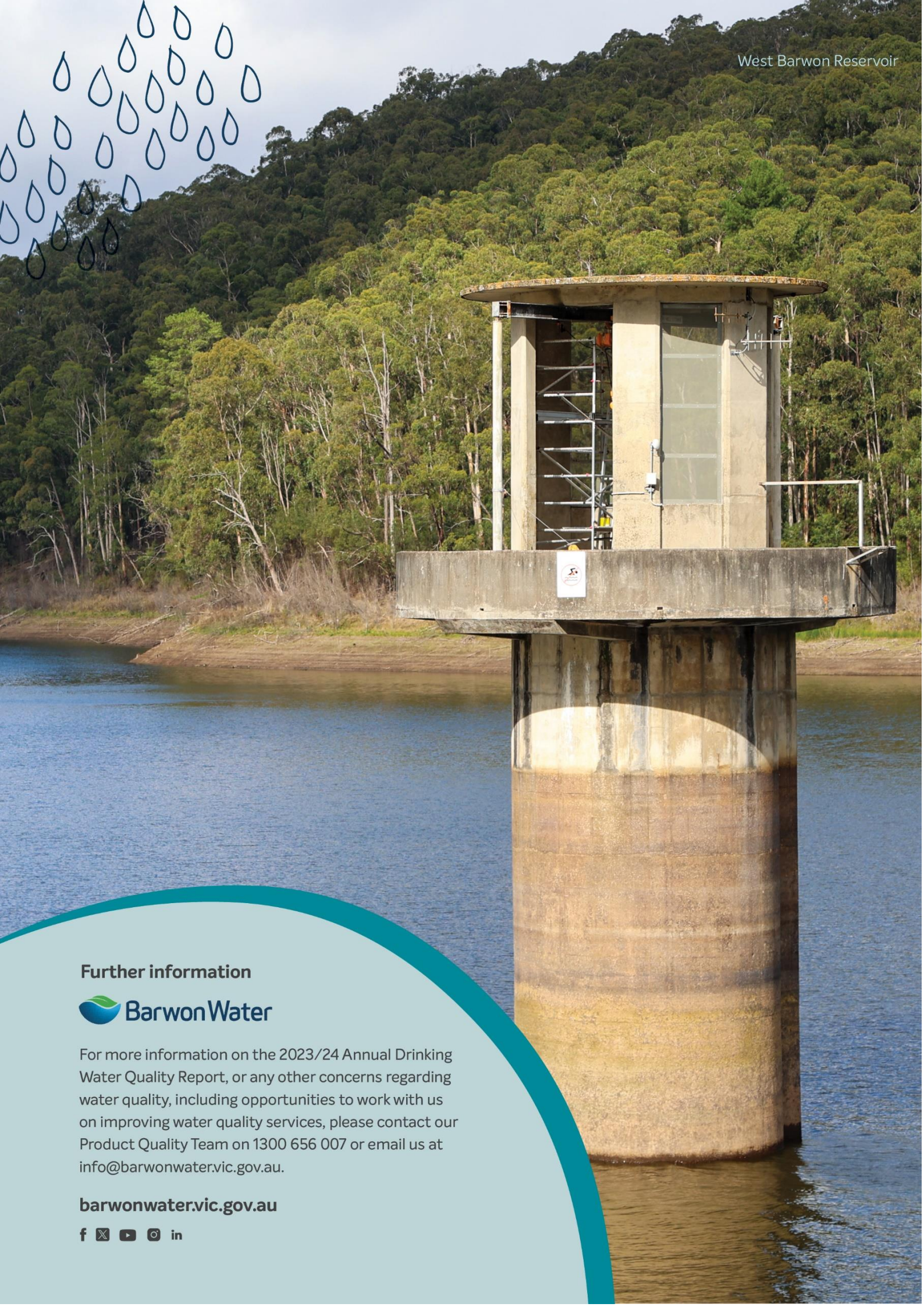
# Annual Drinking Water Quality Report

2023/24


Barwon Water



West Barwon Reservoir

## Further information

Barwon Water

For more information on the 2023/24 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.

**barwonwater.vic.gov.au**

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# Message from the Managing Director

**On behalf of Barwon Water, I am delighted to introduce our Annual Drinking Water Quality Report for 2023/24.**

We operate on the lands of Wadawurrung and Eastern Maar. We proudly acknowledge them as the Traditional Owners of the land and water on which we rely, and pay respects to their Elders, past, present and emerging. We also acknowledge that Wadawurrung and Eastern Maar never ceded this land or the water that flows through it. We thank them for their enduring care of the land, water and the natural environment over tens of thousands of years, a stewardship that continues to this day.

Our Annual Drinking Water Quality report outlines our ongoing commitment to provide safe, secure, high-quality drinking water to our community.

Over this financial year, we have taken significant steps towards fulfilling our vision set out in Strategy 2030 and our 2023-2028 Price Submission. This vision outlines our actions, in light of the challenges presented by a changing climate and growing region.

During this five-year pricing period, we have committed to investing nearly $95 million in improving drinking water quality, including through upgrades to water treatment plants, our asset renewals program, catchment management, and preventive asset management initiatives.

Central to our strategy is the understanding that a healthy environment is crucial to safeguarding drinking water quality. Our investment and partnerships in various initiatives not only improve the quality of water in our catchments, but also support the vitality of our waterways. By prioritising these initiatives, we prioritise the wellbeing of our customers, the community, and the natural environment.

Despite challenging environmental conditions in 2023/24, including an unprecedented blue-green algae bloom at Wurdee Boluc Reservoir, we maintained consistently high-quality drinking water.

While there was a slight increase in drinking water complaints in the financial year, we are proud that we have been able to maintain this number at near record lows. This is a testament to our continuous improvement focus and high levels of community trust.

Our commitment to the supply of safe, secure, sustainable water is outlined in our Drinking Water Quality Policy. We are also focused on being accountable, and this report provides a guide to our performance.

It is with pleasure that I present Barwon Water's 2023/24 Annual Drinking Water Quality Report.

**Shaun Cumming**
Managing Director
Barwon Water

## Key information

| | | |
|---|---|---|
| **12** major reservoirs | **8** surface water treatment plants | **1** pre-treatment plant for ground water operations |
| **22** secondary disinfection plants | **26** water distribution basins | **49** water distribution tanks |
| **7,597** kilometers of water mains | **8,100** square kilometers serviced | **30** water quality localities |
| **379,228** permanent population serviced | **579,300** peak population serviced | **181,844** 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 2023/24 financial year.

Barwon Water supplied approximately 37,229 million litres of drinking water during 2023/24 through a network of 12 reservoirs, 1 groundwater borefield, 8 water treatment plants, 22 disinfection sites and 7,597 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.

Throughout 2023/24, we delivered drinking water to all 30 water sampling localities in accordance with the required water quality standards in the Safe Drinking Water Regulations 2015.

# 2 Requirements for Drinking Water

## 2.1 Meeting customer expectations

Barwon Water is committed to managing its water supply effectively to provide safe, high quality drinking water to its customers and ensure public health. 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 of members of the community & Barwon Water customers.
- Customer feedback received during community panel workshops and community engagement events.

## 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, implement, review and revise 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 1973* 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 in Australia. These guidelines are intended to provide a framework for effective 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, 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 379,228 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.

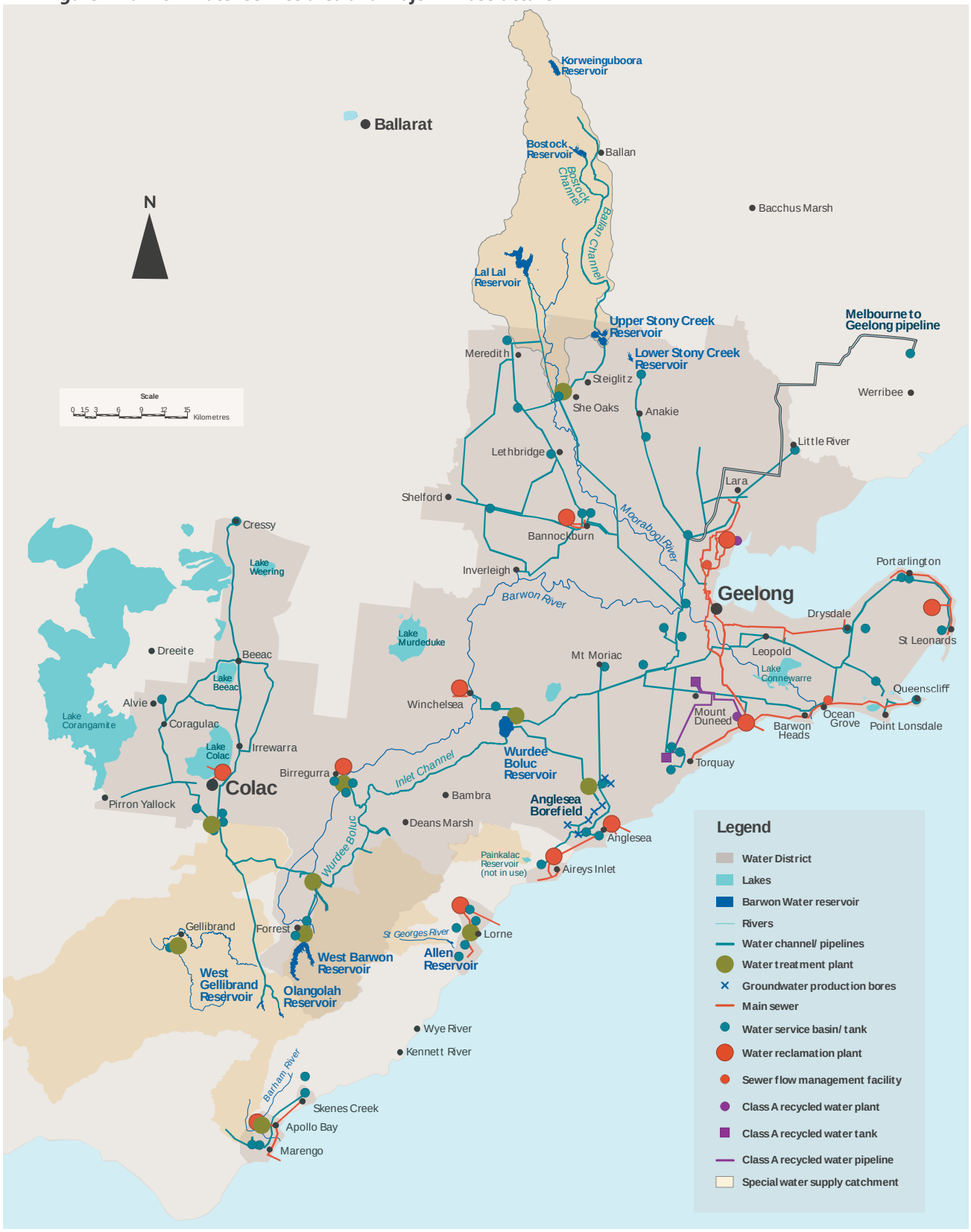
Source water is harvested from water supply catchments and is stored in reservoirs.

Additional water was also accessed from an interconnection between Geelong and Melbourne, the Melbourne to Geelong Pipeline.

Groundwater from the Anglesea borefield was not utilised during 2023/24.

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 stations.

**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-compliances should they arise. Table 1 summarises the 2023/24 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 | Source water | Storage | Treatment plant | Number of Connections[1] | Permanent Population[2] |
|---|---|---|---|---|---|
| Aireys Inlet | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 1,706 | 1,410 |
| Anakie | Moorabool catchments<br><br>Barwon catchments<br><br>Ground water (drought)* | Stony Creek Reservoir<br>Wurdee Boluc Reservoir | Moorabool<br><br>Wurdee Boluc | 302 | 650 |
| | Melbourne-Geelong Pipeline* | | | | |
| Anglesea | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 3,253 | 3,130 |
| Apollo Bay | Barham River | Marengo Basin | Apollo Bay | 2,513 | 2,530 |
| Bannockburn | Moorabool catchments** | Stony Creek Reservoir | Moorabool | 2,590 | 7,210 |
| Batesford | Moorabool catchments** | Stony Creek Reservoir | Moorabool | 422 | 1,420 |
| Bellarine | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 108 | 190 |
| Birregurra | West Barwon Reservoir | Birregurra Basins | Birregurra | 427 | 870 |
| Clifton Springs | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 6,460 | 13,490 |
| Colac | West Gellibrand and Olangolah Reservoirs | Colac basin no. 4<br>Colac basin no. 5 | Colac | 8,223 | 15,070 |
| Cressy | West Gellibrand and Olangolah Reservoirs | Colac basin no. 4<br>Colac basin no. 5 | Colac | 207 | 310 |
| Forrest | West Barwon Reservoir | Forrest Tank | Forrest | 150 | 200 |

**Table 1 continued**

| Water quality locality | Source water | Storage | Treatment plant | Number of Connections[1] | Permanent Population[2] |
|---|---|---|---|---|---|
| Gellibrand | Lardners Creek | Gellibrand tanks | Gellibrand | 73 | 300 |
| Highton | Moorabool catchments<br>Barwon catchments<br>Ground water (drought)* | Stony Creek Reservoir<br>Wurdee Boluc Reservoir | Moorabool<br>Wurdee Boluc | 22,227 | 39,260 |
| | Melbourne-Geelong Pipeline* | | | | |
| Highton High Level | Barwon catchments<br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 1,208 | 3,370 |
| Leopold | Barwon catchments<br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 7,993 | 19,320 |
| Little River West | Moorabool catchments<br>Barwon catchments<br>Ground water (drought)* | Stony Creek Reservoir<br>Wurdee Boluc Reservoir | Moorabool<br>Wurdee Boluc | 154 | 390 |
| | Melbourne-Geelong Pipeline* | | | | |
| Lorne | Lorne catchment | Allen Reservoir | Lorne | 2,458 | 2,000 |
| Lovely Banks | Moorabool catchments<br>Barwon catchments<br>Ground water (drought)* | Stony Creek Reservoir<br>Wurdee Boluc Reservoir | Moorabool<br>Wurdee Boluc | 28,442 | 64,770 |
| | Melbourne-Geelong Pipeline* | | | | |
| Lovely Banks - Carrs Road | Moorabool catchments<br>Barwon catchments<br>Ground water (drought)* | Stony Creek Reservoir<br>Wurdee Boluc Reservoir | Moorabool<br>Wurdee Boluc | 46 | 100 |
| | Melbourne-Geelong Pipeline* | | | | |
| Montpellier | Moorabool catchments<br>Barwon catchments<br>Ground water (drought)* | Stony Creek Reservoir<br>Wurdee Boluc Reservoir | Moorabool<br>Wurdee Boluc | 29,435 | 68,050 |
| | Melbourne-Geelong Pipeline* | | | | |
| Moorabool | Moorabool catchments | Stony Creek Reservoir | Moorabool | 696 | 1,910 |
| Moriac | Barwon catchments<br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 348 | 970 |
| Ocean Grove | Barwon catchments<br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 12,168 | 24,360 |
| Pettavel | Barwon catchments<br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 22,632 | 58,080 |

**Table 1 continued**

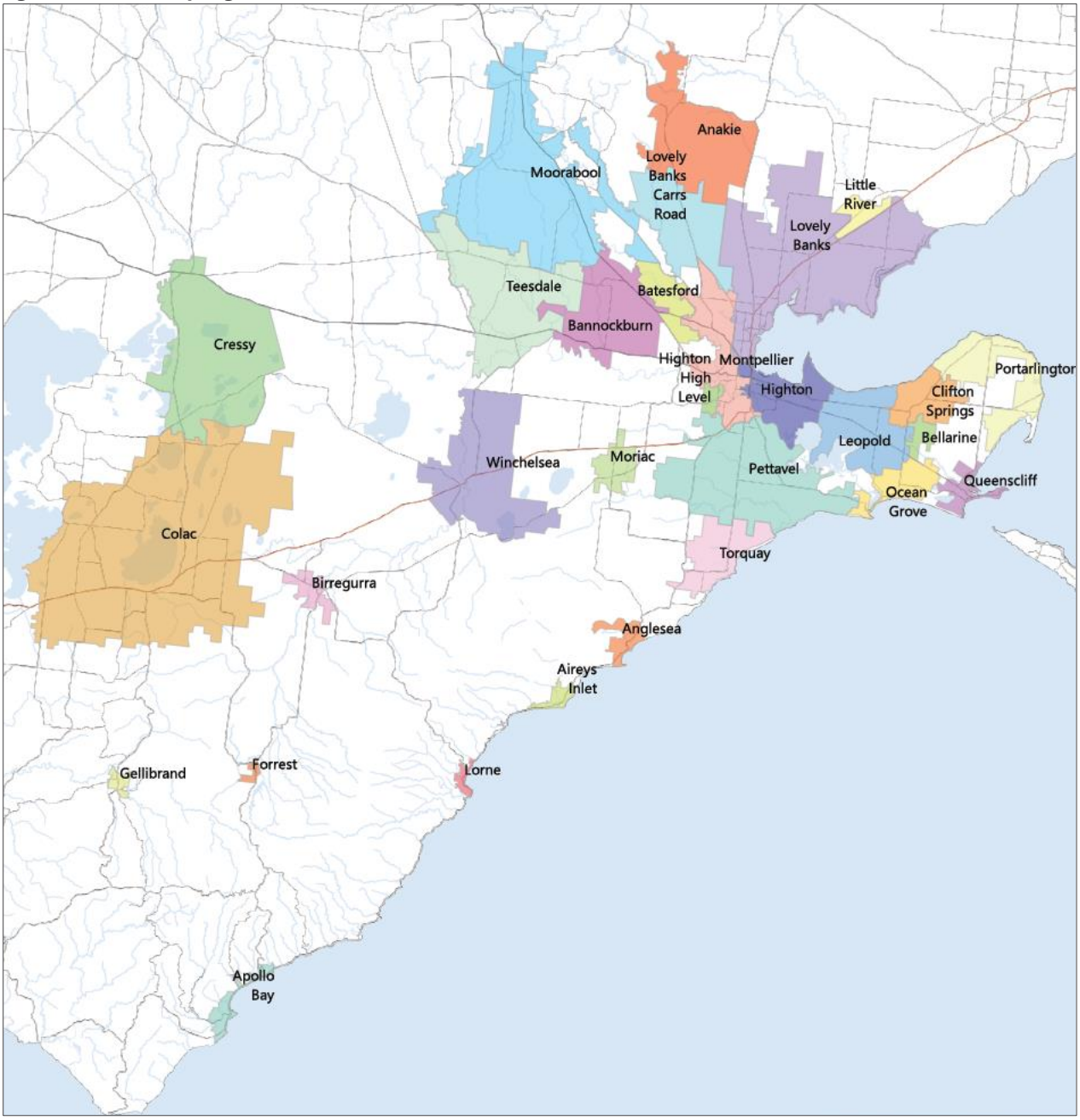
| Water quality locality | Source water | Storage | Treatment plant | Number of Connections[1] | Permanent Population[2] |
|---|---|---|---|---|---|
| Portarlington | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 8,489 | 10,680 |
| Queenscliff | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 4,631 | 5,820 |
| Teesdale | Moorabool catchments** | Stony Creek Reservoir | Moorabool | 1,531 | 4,810 |
| Torquay | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 11,758 | 24,460 |
| Winchelsea | Barwon catchments<br><br>Ground water (drought)* | Wurdee Boluc Reservoir | Wurdee Boluc | 1,267 | 2,710 |

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. Each estimate is made by multiplying the number of residential connections by the occupancy rate (number of persons per dwelling) in ABS census data and adding any non-private dwellings (hospitals, nursing homes etc.).

* 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 2023/24 reporting period.

** These localities can also be fed from Wurdee Boluc WTP, however received water from Moorabool WTP only during the 2023/24 reporting period.

**Figure 2 Water sampling localities 2023/24**




## 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. All surface water catchments are declared Special Water Supply Catchments under the *Catchment and Land Protection Act 1994*.

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

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.

Torquay, Anglesea, Aireys Inlet, Winchelsea, Moriac, and the Bellarine Peninsula are all supplied from the Barwon catchment and can be supplemented by groundwater from the Anglesea borefield during times of drought. Geelong, Batesford, Anakie, Lara and Little River West are supplied by water from both the Moorabool and Barwon catchments.

Bannockburn, Teesdale, and Moorabool are supplied from the Moorabool catchment.

The Melbourne to Geelong Pipeline was also utilised to supplement drinking water in the Lovely Banks, Little River West, Montpellier and Highton localities in 2023/24.

Catchment management and protection is the first defence 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.

While most of our catchment areas are within protected national parks, some are open to the public and subject to a variety of land uses, including townships, rural living, forestry, 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 in accordance with the priorities established in the Corangamite Regional Catchment Strategy, the Corangamite Waterway Strategy and the Victorian Waterway Management Strategy. We achieve this through several different strategies and initiatives prioritised within our Declared Special Water Supply Catchments, including:

- Planning and development controls
- Waterway protection and rehabilitation
- Fire management
- Prevention of soil erosion
- Community education
- Appropriate land management practices
- Restricting recreations activity
- Promoting awareness of the impact of human activity on our water quality.

## 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, 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 multiple 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 2023/24 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, Highton, Lovely Banks, Lovely Banks - Carrs Road, Bannockburn, Teesdale, Anakie, Little River West, Batesford.** | East and West Moorabool River<br><br>Barwon catchment (dependent on operational preference and time of year) | Moorabool | Dissolved Air Flotation Filtration (DAFF) | Aluminum Chlorohydrate<br>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) | Potassium Permanganate<br>Aluminum Chlorohydrate<br>Sodium Hydroxide<br>Polymer<br>Sodium Hexametaphosphate |
| | | | Chlorination | Sodium Hypochlorite |
| **Colac, Cressy** | West Gellibrand Reservoir & Olangolah Reservoir | Colac | Dissolved Air Flotation Filtration (DAFF) | Potassium Permanganate<br>Soda Ash<br>Aluminum Chlorohydrate<br>Polymer<br>Lime<br>Sodium Hexametaphosphate |
| | | | Chlorination | Sodium Hypochlorite<br>Chlorine Gas |
| | | | Fluoridation | Fluorosilicic Acid |
| **Birregurra** | West Barwon reservoir | Birregurra | Clarification | Aluminum Chlorohydrate |
| | | | pH Correction | Sulphuric Acid |
| | | | Microfiltration | *Sodium Hydroxide<br>*Citric Acid<br>(*used for cleaning membranes only) |
| | | | Chlorination | Sodium Hypochlorite |

**Table 2 continued**

| Water sampling locality | Main source | Water treatment plant | Treatment process | Treatment aids (Some aids only used seasonally) |
|---|---|---|---|---|
| **Forrest** | West Barwon Reservoir | Forrest | Clarification | Potassium Permanganate<br>Sodium Hydroxide<br>Polymer<br>Aluminum Sulphate<br>Sodium Hexametaphosphate |
| | | | Filtration | |
| | | | Chlorination | Sodium Hypochlorite |
| | | | UV disinfection | |
| **Apollo Bay** | Barham River (Marengo basin) | Apollo Bay | Dissolved Air Floatation (DAF) Clarification | Sulphuric Acid<br>Aluminum Chlorohydrate |
| | | | Ultrafiltration | *Sodium Hydroxide<br>*Citric Acid<br>(*used for cleaning membranes only) |
| | | | Chlorination | Sodium Hypochlorite |
| | | | GAC (Granular Activated Carbon) filtration | |
| **Aireys Inlet, Winchelsea, Moriac, Little River West, Highton High Level, Montpellier, Batesford, Pettavel, Highton, Lovely Banks, Lovely Banks - Carrs Road, 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<br><br>*Pre-treatment for Anglesea borefield | Direct enhanced filtration | Aluminum Chlorohydrate<br>Poly DADMAC<br>Polymer |
| | | | Chlorination | Chlorine Gas |
| | | | Fluoridation | Fluorosilicic Acid |
| | | | *Aeration, Oxidation and pH adjustment | *Sodium hypochlorite<br>*Lime<br>*Potassium Permanganate<br>*Polymer |
| **Gellibrand** | Lardners Creek | Gellibrand | Clarification | Aluminum Sulphate<br>Polymer<br>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 22 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**

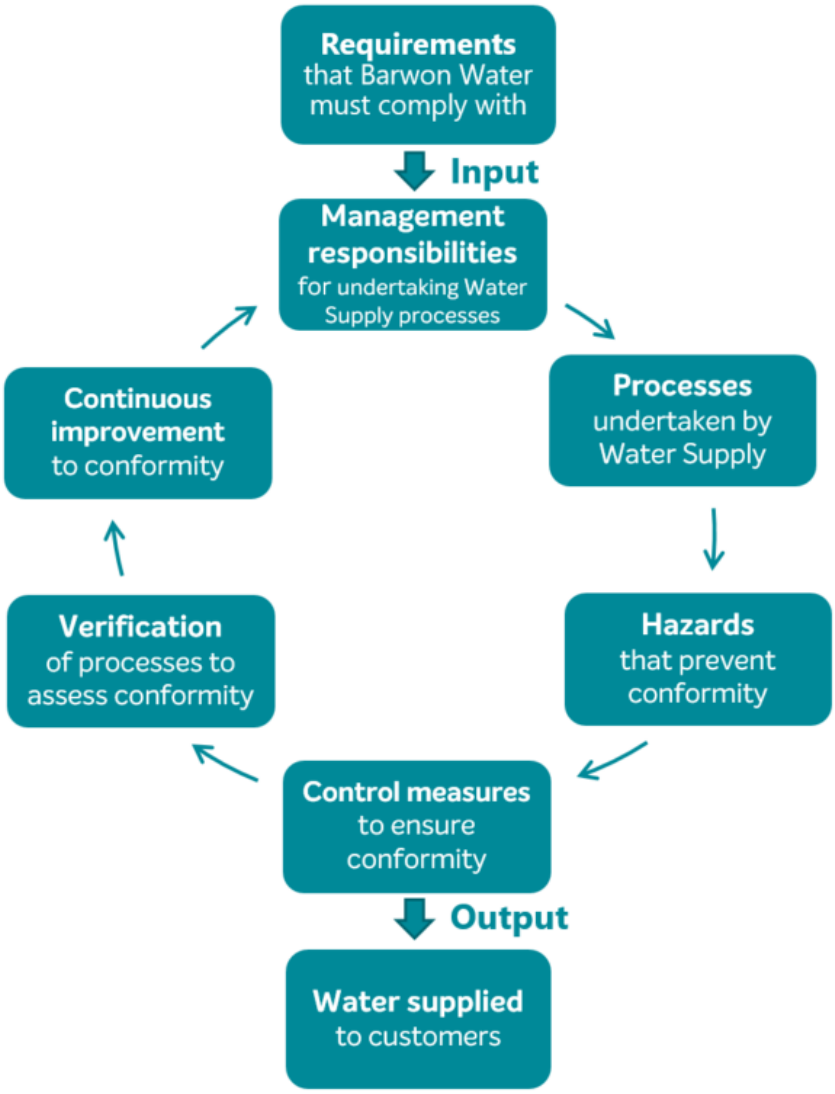
| Water disinfection plant | Disinfection mode |
|---|---|
| Aireys Inlet | Chloramination |
| Alvie | Chlorination |
| Anakie | Chloramination |
| Anglesea | Chloramination |
| Bannockburn | Chloramination |
| Bellarine | Chlorination |
| Clifton Springs | Chloramination |
| Highton | Chlorination (seasonal operation) |
| Little River | Chlorination |
| Lorne | 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 AS/NZS ISO 9001:2015 and HACCP principles in its Quality Management System for the supply of safe and aesthetically acceptable 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 acceptable 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, disinfection and fluoridation.

### 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 individual competency plans.

## 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 2023/24 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 Intertek SAI Global. This was a surveillance audit for our HACCP system. The audit was successfully passed and provides confidence that we continually identify, assess, and manage drinking water quality risks.

There was no regulatory audit scheduled under the *Safe Drinking Water Act 2023* during 2023/24. All actions and opportunities for improvement from the previous regulatory audit in 2022/23 were completed and closed out during the previous reporting period.

# 6 Water quality for 2023/24

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 early notice of changing upstream water quality and to verify catchment management plans are effective in minimising risks to source water quality.

Treated water is 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 relevant guidelines.

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

The monitoring results and performance assessments of drinking water are presented in this report. Results provided in this report include all regulatory sampling conducted during the 2023/24 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 - barwonwater.vic.gov.au/water-and-waste/water-quality/results-and-data.
This data is updated quarterly to provide up-to-date, representative information to our customers.

If there is further data of interest, in compliance with Section 23 of the Act, all results from Barwon Water's drinking water quality monitoring program are available on request to the public within 7 days of being compiled.

## 6.1 Escherichia coli (*E. coli*)

- Limit of detection = 0 cfu/100 mL.
- Regulatory standard: All samples of drinking water collected contain no *E. coli* per 100 mL of drinking water, with the exception of any false positive sample.

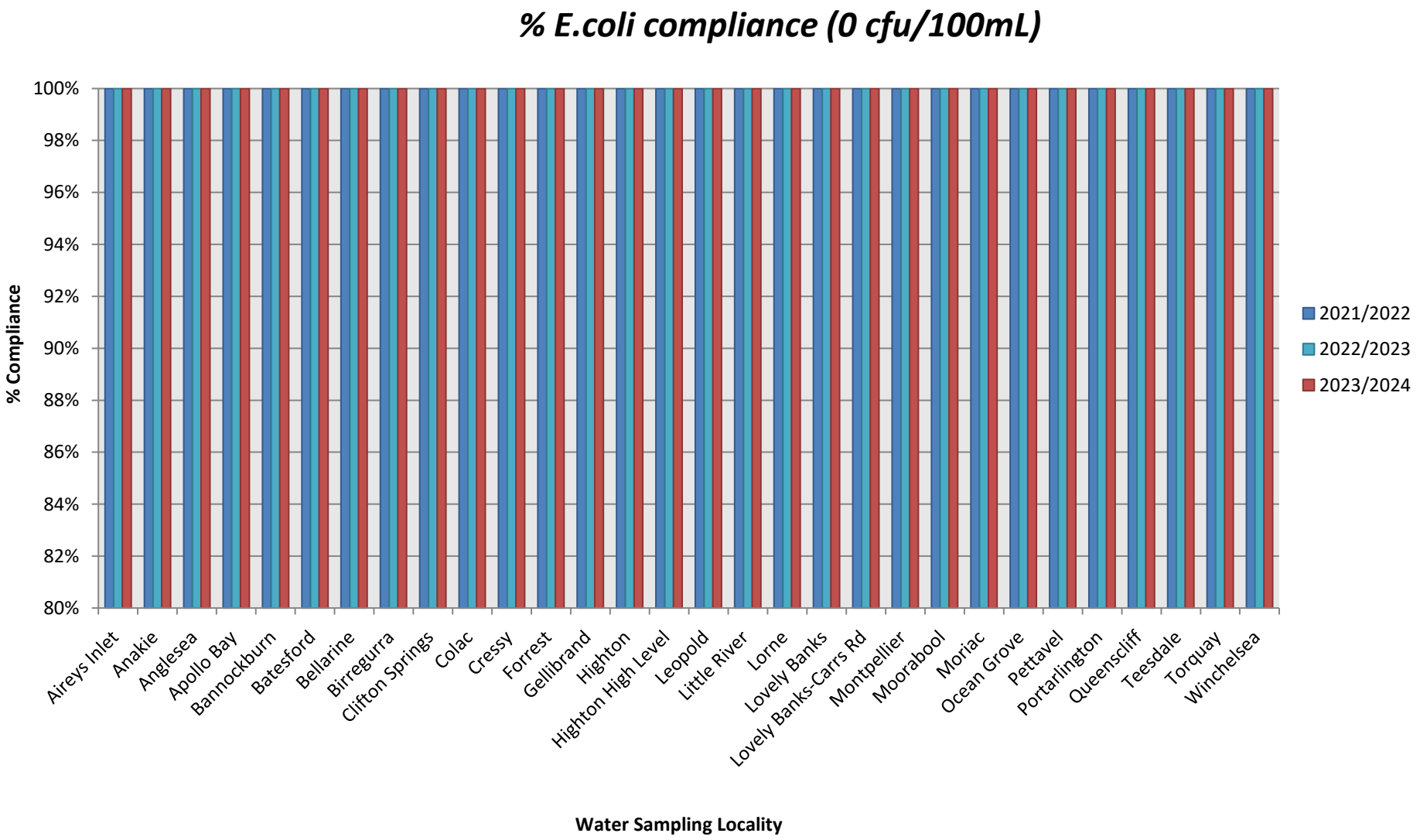
### 6.1.1 Results

**Table 4 *E. coli* compliance**

| Water Quality Locality | Frequency of sampling* | Number of samples | Maximum Result (organisms/100 mL) | Number of detections and investigations conducted (s22) | Number of samples where standard was not met (s18) |
|---|---|---|---|---|---|
| Aireys Inlet | > weekly | 76 | 0 | 0 | 0 |
| Anakie | > weekly | 76 | 0 | 0 | 0 |
| Anglesea | > weekly | 81 | 0 | 0 | 0 |
| Apollo Bay | > weekly | 86 | 0 | 0 | 0 |
| Bannockburn | > weekly | 75 | 0 | 0 | 0 |
| Batesford | > weekly | 75 | 0 | 0 | 0 |
| Bellarine | > weekly | 76 | 0 | 0 | 0 |
| Birregurra | > weekly | 75 | 0 | 0 | 0 |
| Clifton Springs | > weekly | 93 | 0 | 0 | 0 |
| Colac | > weekly | 201 | 0 | 0 | 0 |
| Cressy | > weekly | 75 | 0 | 0 | 0 |
| Forrest | > weekly | 75 | 0 | 0 | 0 |
| Gellibrand | > weekly | 75 | 0 | 0 | 0 |
| Highton | > weekly | 159 | 0 | 0 | 0 |
| Highton High Level | > weekly | 76 | 0 | 0 | 0 |
| Leopold | > weekly | 110 | 0 | 0 | 0 |
| Little River | > weekly | 76 | 0 | 0 | 0 |
| Lorne | > weekly | 91 | 0 | 0 | 0 |
| Lovely Banks | > weekly | 281 | 0 | 0 | 0 |
| Lovely Banks-Carrs Rd | > weekly | 76 | 0 | 0 | 0 |
| Montpellier | > weekly | 260 | 0 | 0 | 0 |
| Moorabool | > weekly | 99 | 0 | 0 | 0 |
| Moriac | > weekly | 74 | 0 | 0 | 0 |
| Ocean Grove | > weekly | 142 | 0 | 0 | 0 |
| Pettavel | > weekly | 205 | 0 | 0 | 0 |
| Portarlington | > weekly | 107 | 0 | 0 | 0 |
| Queenscliff | > weekly | 86 | 0 | 0 | 0 |
| Teesdale | > weekly | 75 | 0 | 0 | 0 |
| Torquay | > weekly | 149 | 0 | 0 | 0 |
| Winchelsea | > weekly | 75 | 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

#### 6.1.2.1 Trend over localities

In 2023/24 all of Barwon Water's water quality sampling localities complied with the *E. coli* water quality standard over the duration of the reporting period.

#### 6.1.2.2 Trend over time

In 2023/24 compliance with the *E. coli* water quality standard was maintained at 100%.

## 6.2 Trihalomethanes (THMs)

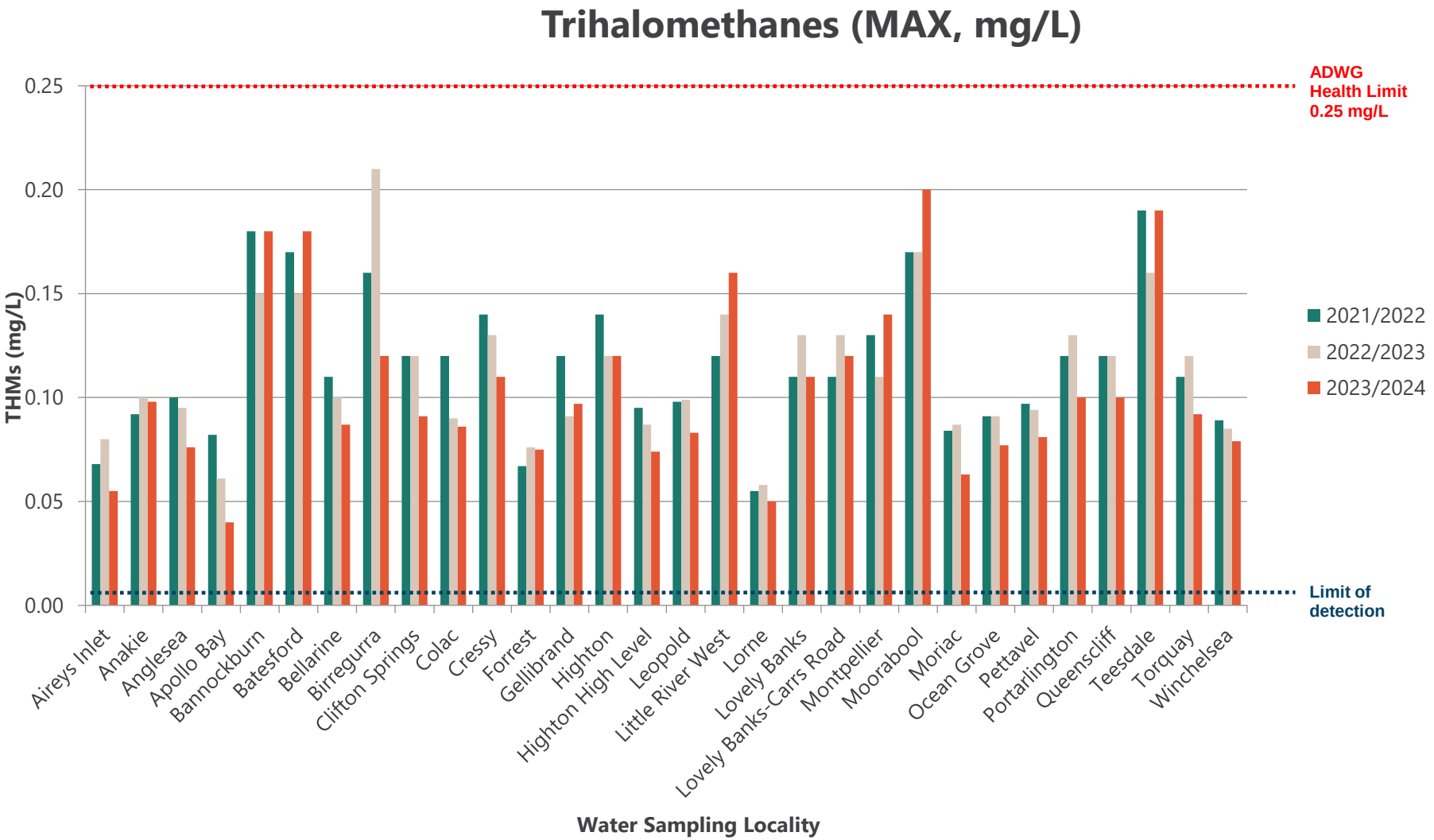
- Limit of detection = 0.004 mg/L
- Regulatory standard ≤0.250 mg/L

### 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 | 48 | 0.25 | 0.06 | 0.04 | 0 |
| Anakie | > monthly | 48 | 0.25 | 0.10 | 0.08 | 0 |
| Anglesea | > monthly | 48 | 0.25 | 0.08 | 0.07 | 0 |
| Apollo Bay | > monthly | 26 | 0.25 | 0.04 | 0.03 | 0 |
| Bannockburn | > weekly | 60 | 0.25 | 0.18 | 0.14 | 0 |
| Batesford | > weekly | 60 | 0.25 | 0.18 | 0.13 | 0 |
| Bellarine | > monthly | 48 | 0.25 | 0.09 | 0.07 | 0 |
| Birregurra | > monthly | 38 | 0.25 | 0.12 | 0.08 | 0 |
| Clifton Springs | > monthly | 48 | 0.25 | 0.09 | 0.08 | 0 |
| Colac | > weekly | 74 | 0.25 | 0.09 | 0.07 | 0 |
| Cressy | > weekly | 60 | 0.25 | 0.11 | 0.09 | 0 |
| Forrest | > monthly | 26 | 0.25 | 0.08 | 0.06 | 0 |
| Gellibrand | > monthly | 26 | 0.25 | 0.10 | 0.08 | 0 |
| Highton | > monthly | 48 | 0.25 | 0.12 | 0.08 | 0 |
| Highton High Level | > monthly | 48 | 0.25 | 0.07 | 0.06 | 0 |
| Leopold | > monthly | 48 | 0.25 | 0.08 | 0.07 | 0 |
| Little River | > weekly | 60 | 0.25 | 0.16 | 0.09 | 0 |
| Lorne | > monthly | 26 | 0.25 | 0.05 | 0.03 | 0 |
| Lovely Banks | > weekly | 118 | 0.25 | 0.11 | 0.08 | 0 |
| Lovely Banks-Carrs Rd | > monthly | 48 | 0.25 | 0.12 | 0.09 | 0 |
| Montpellier | > weekly | 72 | 0.25 | 0.14 | 0.09 | 0 |
| Moorabool | > weekly | 74 | 0.25 | 0.20 | 0.12 | 0 |
| Moriac | > monthly | 26 | 0.25 | 0.06 | 0.04 | 0 |
| Ocean Grove | > monthly | 48 | 0.25 | 0.08 | 0.06 | 0 |
| Pettavel | > weekly | 72 | 0.25 | 0.08 | 0.06 | 0 |
| Portarlington | > weekly | 60 | 0.25 | 0.10 | 0.09 | 0 |
| Queenscliff | > monthly | 48 | 0.25 | 0.10 | 0.08 | 0 |
| Teesdale | > weekly | 60 | 0.25 | 0.19 | 0.13 | 0 |
| Torquay | > weekly | 72 | 0.25 | 0.09 | 0.07 | 0 |
| Winchelsea | > monthly | 48 | 0.25 | 0.08 | 0.06 | 0 |

**Figure 5 Trihalomethanes**



### 6.2.2 Analysis of results

#### 6.2.2.1 Trend over localities

Full compliance was achieved across all water quality localities for Trihalomethanes (THMs). The highest result for the year was from the Moorabool water quality locality at 0.20 mg/L.

Elevated THMs results are common in water quality localities supplied by Moorabool Water Treatment Plant. This is due to the inherent characteristics of the supply catchment, seasonal higher level of organics in the source water and required chlorine disinfection dose.

#### 6.2.2.2 Trend over time

Across most systems, maximum THMs levels in 2023/24 were slightly lower than in previous years. This can be associated with reduced levels of organics entering source water brought about by reduced rainfall.

Average THM levels followed a similar pattern to previous years.

## 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.

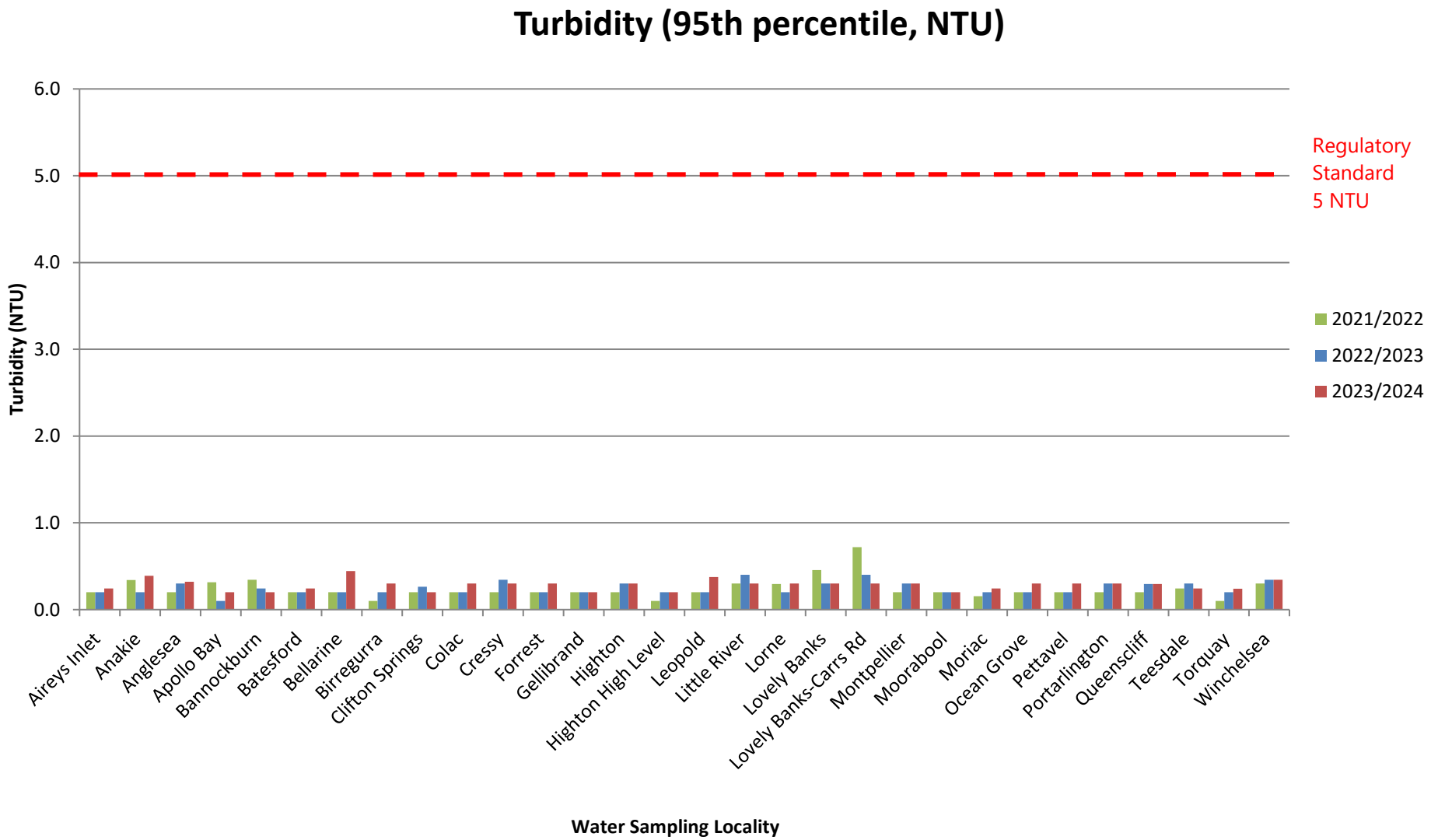
### 6.3.1 Results

**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 | 52 | 0.3 | 0.2 | 0 |
| Anakie | weekly | 52 | 0.5 | 0.4 | 0 |
| Anglesea | > weekly | 57 | 0.2 | 0.3 | 0 |
| Apollo Bay | > weekly | 62 | 0.4 | 0.2 | 0 |
| Bannockburn | weekly | 52 | 0.8 | 0.2 | 0 |
| Batesford | weekly | 52 | 0.6 | 0.2 | 0 |
| Bellarine | weekly | 52 | 8.7 | 0.4 | 0 |
| Birregurra | weekly | 52 | 0.4 | 0.3 | 0 |
| Clifton Springs | > weekly | 69 | 0.2 | 0.2 | 0 |
| Colac | > weekly | 74 | 0.3 | 0.3 | 0 |
| Cressy | weekly | 52 | 0.5 | 0.3 | 0 |
| Forrest | weekly | 52 | 0.6 | 0.3 | 0 |
| Gellibrand | weekly | 52 | 1.6 | 0.2 | 0 |
| Highton | > weekly | 135 | 3.3 | 0.3 | 0 |
| Highton High Level | weekly | 52 | 0.2 | 0.2 | 0 |
| Leopold | > weekly | 86 | 0.5 | 0.4 | 0 |
| Little River | weekly | 52 | 0.8 | 0.3 | 0 |
| Lorne | > weekly | 67 | 0.3 | 0.3 | 0 |
| Lovely Banks | > weekly | 187 | 1.0 | 0.3 | 0 |
| Lovely Banks-Carrs Rd | weekly | 52 | 7.5 | 0.3 | 0 |
| Montpellier | > weekly | 212 | 1.6 | 0.3 | 0 |
| Moorabool | weekly | 52 | 0.4 | 0.2 | 0 |
| Moriac | weekly | 52 | 0.5 | 0.2 | 0 |
| Ocean Grove | > weekly | 119 | 0.6 | 0.3 | 0 |
| Pettavel | > weekly | 157 | 7.1 | 0.3 | 0 |
| Portarlington | > weekly | 83 | 0.7 | 0.3 | 0 |
| Queenscliff | > weekly | 62 | 0.5 | 0.3 | 0 |
| Teesdale | weekly | 52 | 0.5 | 0.2 | 0 |
| Torquay | > weekly | 113 | 0.4 | 0.2 | 0 |
| Winchelsea | weekly | 52 | 15.0 | 0.3 | 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

#### 6.3.2.1 Trend over localities

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

#### 6.3.2.2 Trend over time

Turbidity results during 2023/24 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 (DH) directs that fluoride plants should achieve: a minimum average level greater than or equal to 0.6 mg/L (the lower action limit) 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 concentra-tion (mg/L) | Maxi-mum (mg/L) | Average (mg/L) | Number of samples where standard was not met (s. 18) |
|---|---|---|---|---|---|---|---|---|
| Anakie | Moorabool WTP | monthly | 12 | 1.5 | 0.9 | 0.88 | 0.80 | 0 |
| Bannockburn | | monthly | 12 | 1.5 | 0.9 | 0.89 | 0.74 | 0 |
| Batesford | | monthly | 12 | 1.5 | 0.9 | 0.94 | 0.76 | 0 |
| Little River West | | monthly | 12 | 1.5 | 0.9 | 0.89 | 0.80 | 0 |
| Lovely Banks | | > monthly | 42 | 1.5 | 0.9 | 0.88 | 0.72 | 0 |
| Lovely Banks-Carrs Road | | monthly | 12 | 1.5 | 0.9 | 0.86 | 0.78 | 0 |
| Montpellier | | > quarterly | 10 | 1.5 | 0.9 | 0.83 | 0.76 | 0 |
| Moorabool | | > monthly | 62 | 1.5 | 0.9 | 0.90 | 0.72 | 0 |
| Teesdale | | monthly | 12 | 1.5 | 0.9 | 0.92 | 0.75 | 0 |
| Aireys Inlet | Wurdee Boluc WTP | monthly | 12 | 1.5 | 0.9 | 0.88 | 0.79 | 0 |
| Anglesea | | monthly | 12 | 1.5 | 0.9 | 0.87 | 0.76 | 0 |
| Bellarine | | monthly | 12 | 1.5 | 0.9 | 0.88 | 0.75 | 0 |
| Clifton Springs | | monthly | 12 | 1.5 | 0.9 | 0.89 | 0.80 | 0 |
| Highton | | >monthly | 13 | 1.5 | 0.9 | 0.83 | 0.75 | 0 |
| Highton HL | | monthly | 12 | 1.5 | 0.9 | 0.88 | 0.76 | 0 |
| Leopold | | monthly | 12 | 1.5 | 0.9 | 0.85 | 0.75 | 0 |
| Moriac | | > weekly | 65 | 1.5 | 0.9 | 0.94 | 0.72 | 0 |
| Ocean Grove | | monthly | 12 | 1.5 | 0.9 | 0.89 | 0.79 | 0 |
| Pettavel | | monthly | 12 | 1.5 | 0.9 | 0.86 | 0.75 | 0 |
| Portarlington | | monthly | 12 | 1.5 | 0.9 | 0.86 | 0.79 | 0 |
| Queenscliff | | monthly | 12 | 1.5 | 0.9 | 0.84 | 0.77 | 0 |
| Torquay | | > quarterly | 11 | 1.5 | 0.9 | 0.87 | 0.79 | 0 |
| Winchelsea | | monthly | 12 | 1.5 | 0.9 | 0.88 | 0.77 | 0 |
| Colac | Colac WTP | > weekly | 101 | 1.5 | 0.9 | 0.91 | 0.71 | 0 |
| Cressy | | > weekly | 52 | 1.5 | 0.9 | 0.92 | 0.75 | 0 |

**Figure 7 Fluoride**

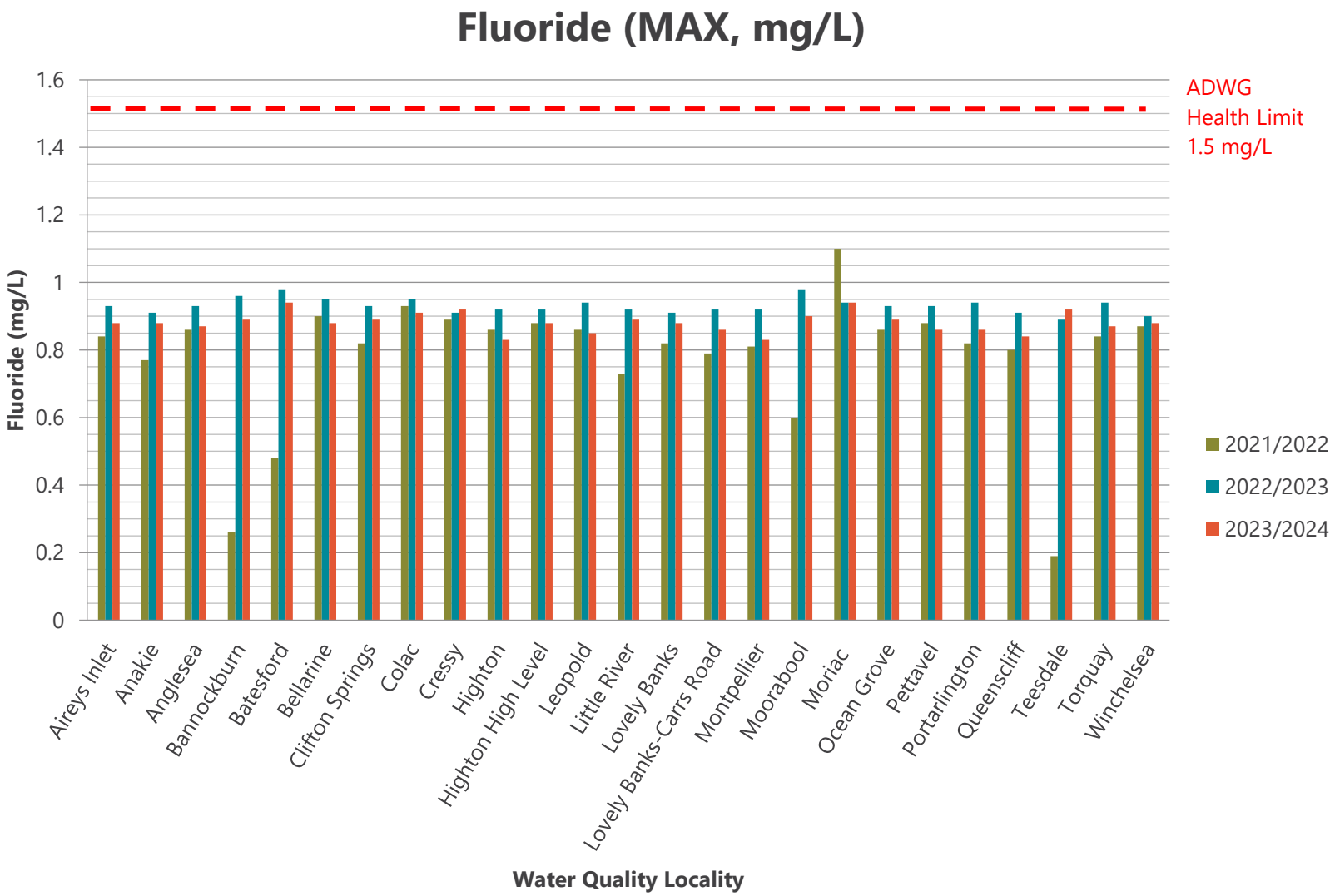
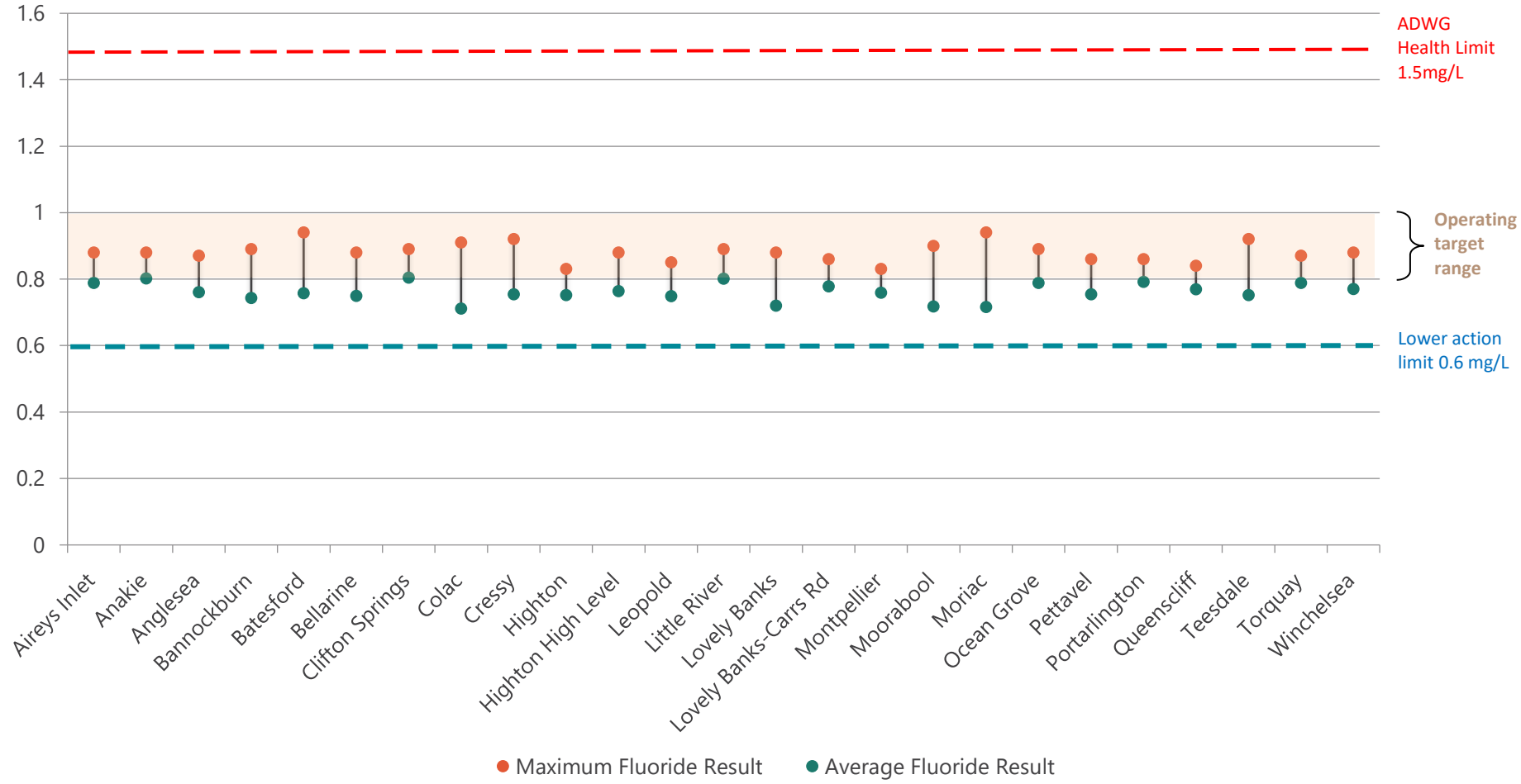


**Figure 8 Fluoride (target)**



### 6.4.2 Analysis of results

#### 6.4.2.1 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.

The fluoridation systems at Wurdee Boluc, Moorabool and Colac WTPs were upgraded during 2021/22. Since completion of the upgrades, all WTPs have been targeting the optimum dose of 0.9 mg/L.

In 2023/24, Barwon Water met the annual average rolling target of 0.8 mg/L at all treatment plants (measured via online instrumentation), as per the Fluoridation Code of Practice.

Fluoride dosing at Colac WTP was offline for approximately four days during the 2023/24 reporting period as notified to the Department of Health.

#### 6.4.2.2 Trend over time

Average fluoride levels in the Colac and Cressy water quality localities improved in 2023/24. This was due to completion of optimisation works at the fluoridation plant to improve compliance with the rolling annual average target as specified in the Fluoridation Code of Practice.

Average fluoride levels across other fluoridated water quality localities were consistent with 2022/23 results.

## 6.5 Total chlorine

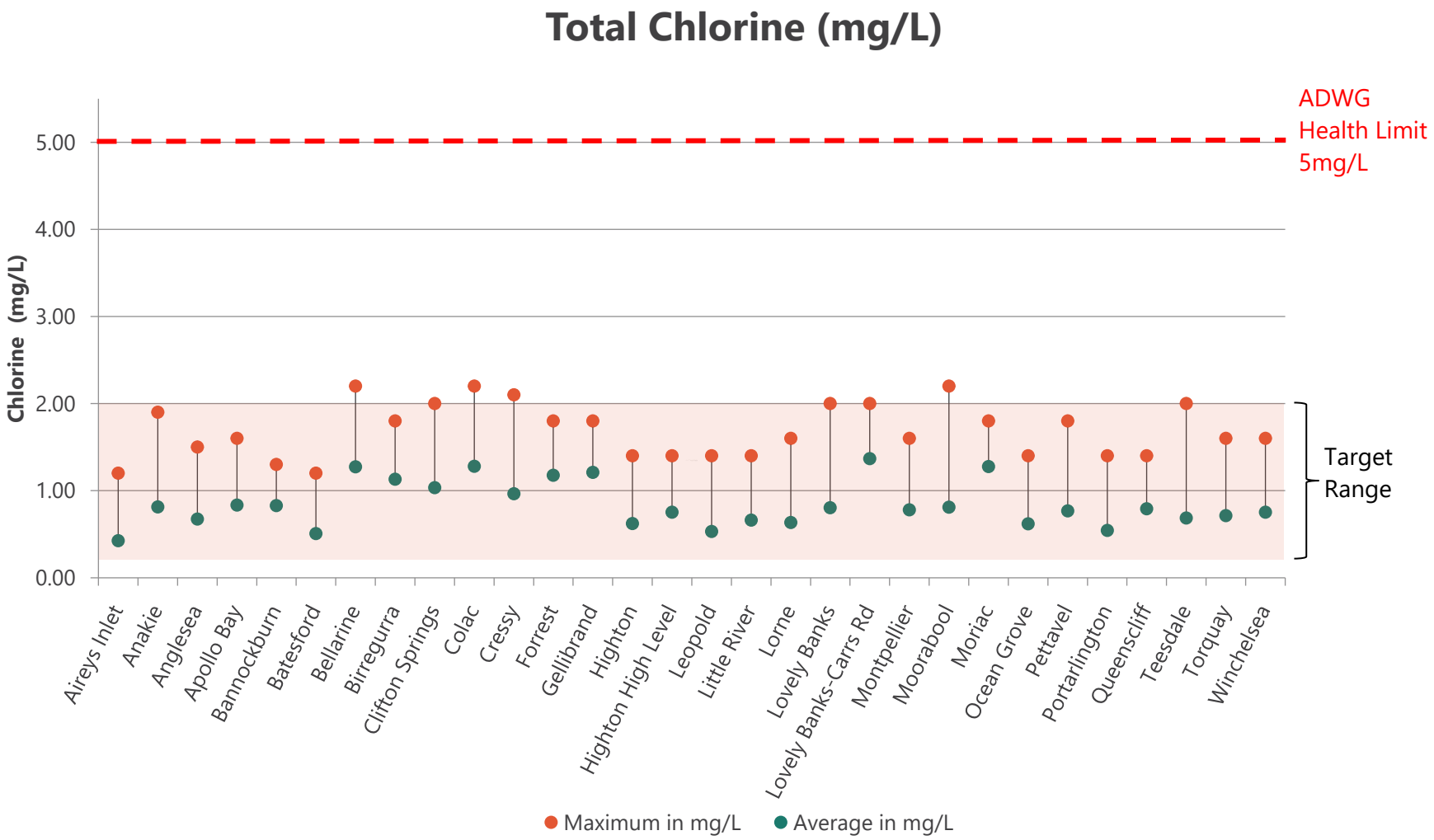
- Limit of detection = 0.1 mg/L
- ADWG health guideline value ≤ 5.0 mg/L

### 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 | 76 | 1.20 | 0.42 | Yes |
| Anakie | > weekly | 76 | 1.90 | 0.81 | Yes |
| Anglesea | > weekly | 81 | 1.50 | 0.67 | Yes |
| Apollo Bay | > weekly | 86 | 1.60 | 0.83 | Yes |
| Bannockburn | > weekly | 75 | 1.30 | 0.83 | Yes |
| Batesford | > weekly | 75 | 1.20 | 0.51 | Yes |
| Bellarine | > weekly | 76 | 2.20 | 1.27 | Yes |
| Birregurra | > weekly | 75 | 1.80 | 1.13 | Yes |
| Clifton Springs | > weekly | 93 | 2.00 | 1.04 | Yes |
| Colac | > weekly | 201 | 2.20 | 1.28 | Yes |
| Cressy | > weekly | 75 | 2.10 | 0.96 | Yes |
| Forrest | > weekly | 75 | 1.80 | 1.18 | Yes |
| Gellibrand | > weekly | 75 | 1.80 | 1.21 | Yes |
| Highton | > weekly | 159 | 1.40 | 0.62 | Yes |
| Highton High Level | > weekly | 76 | 1.40 | 0.75 | Yes |
| Leopold | > weekly | 110 | 1.40 | 0.53 | Yes |
| Little River | > weekly | 76 | 1.40 | 0.66 | Yes |
| Lorne | > weekly | 91 | 1.60 | 0.63 | Yes |
| Lovely Banks | > weekly | 281 | 2.00 | 0.80 | Yes |
| Lovely Banks-Carrs Rd | > weekly | 76 | 2.00 | 1.37 | Yes |
| Montpellier | > weekly | 260 | 1.60 | 0.78 | Yes |
| Moorabool | > weekly | 99 | 2.20 | 0.81 | Yes |
| Moriac | > weekly | 74 | 1.80 | 1.28 | Yes |
| Ocean Grove | > weekly | 142 | 1.40 | 0.62 | Yes |
| Pettavel | > weekly | 205 | 1.80 | 0.77 | Yes |
| Portarlington | > weekly | 107 | 1.40 | 0.54 | Yes |
| Queenscliff | > weekly | 86 | 1.40 | 0.79 | Yes |
| Teesdale | > weekly | 75 | 2.00 | 0.69 | Yes |
| Torquay | > weekly | 161 | 1.60 | 0.71 | Yes |
| Winchelsea | > weekly | 75 | 1.60 | 0.75 | Yes |

**Figure 9 Total Chlorine (target)**



### 6.5.2 Analysis of results

#### 6.5.2.1 Trend over localities

During 2023/24, the maximum and average total chlorine results for most localities were within Barwon Water's target range. Results from individual localities were 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.

#### 6.5.2.2 Trend over time

Average total chlorine results for the 2023/24 have seen a slight increase across most water quality localities compared against previous years.

This is primarily due to:

- An enhanced water mains preventative maintenance program which targets mains cleaning and flushing in poor performing areas of the network.
- An increased focus on end of system monitoring to achieve adequate chlorine residual, inform future water quality improvement plans and proactive system changes.

## 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 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | 2022/23 | 2023/24 |
| *E. coli* | 100 | 100 | 100 | 97 | 100 | 100 | 100 | 97 | 100 | 100 | 100 |
| *Trihalomethanes* | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| *Turbidity* | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

In 2023/24, results were compliant with the drinking water quality standards (Schedule 2 of the Safe Drinking Water Regulations 2015) in all 30 water sampling localities.

**Table 10 Compliance with regulatory standards outlined in Schedule 2 of the Safe Drinking Water Regulations (2015) over time – by percentage of population**

| Year | Percentage of population with complying water |
|---|---|
| 2013/14 | 100 |
| 2014/15 | 100 |
| 2015/16 | 100 |
| 2016/17 | 99.63 |
| 2017/18 | 100 |
| 2018/19 | 100 |
| 2019/20 | 100 |
| 2020/21 | 99.99 |
| 2021/22 | 100 |
| 2022/23 | 100 |
| 2023/24 | 100 |

In 2023/24, 100 percent of the serviced population received water compliant with the drinking water quality standards.

## 6.7 Other health related parameters

Other drinking water quality standards under regulation 12(b) of the Safe Drinking Water Regulations 2015.

### 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

| Water Quality Locality | Source of Supply | Frequency of sampling | Number of samples | Maximum Result (mg/L) | Minimum Result (mg/L) | Complying (Yes/No) |
|---|---|---|---|---|---|---|
| Anakie | Wurdee Boluc WTP | Quarterly | 4 | <0.001 | <0.001 | Yes |
| Little River West | | | | | | |
| Lovely Banks | | | | | | |
| Lovely Banks-Carrs Road | Moorabool WTP | | 4 | <0.001 | <0.001 | Yes |
| Montpellier | | | | | | |
| Highton | | | | | | |
| Highton High Level | Wurdee Boluc WTP | Quarterly | 4 | <0.001 | <0.001 | Yes |
| Aireys Inlet | | | | | | |
| Bellarine | | | | | | |
| Clifton Springs | | | | | | |
| Anglesea | | | | | | |
| Ocean Grove | | | | | | |
| Leopold | | | | | | |
| Pettavel | | | | | | |
| Portarlington | | | | | | |
| Queenscliff | | | | | | |
| Torquay | | | | | | |
| Moriac | | | | | | |
| Winchelsea | | | | | | |
| Batesford | Moorabool WTP | Quarterly | 4 | <0.001 | <0.001 | Yes |
| Bannockburn | | | | | | |
| 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 |

**Table 11 Arsenic**

### 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 | 12 | 0.019 | 0.005 | Yes |
| Anakie | monthly | 12 | 0.017 | 0.009 | Yes |
| Anglesea | monthly | 12 | 0.062 | 0.022 | Yes |
| Apollo Bay | > monthly | 16 | 0.010 | 0.007 | Yes |
| Bannockburn | monthly | 12 | 0.025 | 0.012 | Yes |
| Batesford | monthly | 12 | 0.036 | 0.014 | Yes |
| Bellarine | monthly | 12 | 0.040 | 0.017 | Yes |
| Birregurra | > monthly | 16 | 0.015 | 0.004 | Yes |
| Clifton Springs | monthly | 12 | 0.067 | 0.016 | Yes |
| Colac | > monthly | 16 | 0.009 | 0.004 | Yes |
| Cressy | monthly | 12 | <0.001 | <0.001 | Yes |
| Forrest | > monthly | 16 | 0.015 | 0.005 | Yes |
| Gellibrand | > monthly | 15 | 0.029 | 0.013 | Yes |
| Highton | monthly | 12 | 0.079 | 0.038 | Yes |
| Highton High Level | monthly | 12 | 0.023 | 0.013 | Yes |
| Leopold | monthly | 12 | 0.028 | 0.013 | Yes |
| Little River | monthly | 12 | 0.006 | 0.004 | Yes |
| Lorne | > monthly | 16 | 0.100 | 0.028 | Yes |
| Lovely Banks | monthly | 12 | 0.064 | 0.022 | Yes |
| Lovely Banks-Carrs Rd | monthly | 12 | 0.017 | 0.011 | Yes |
| Montpellier | monthly | 12 | 0.098 | 0.038 | Yes |
| Moorabool | > monthly | 15 | 0.082 | 0.018 | Yes |
| Moriac | > monthly | 16 | 0.022 | 0.009 | Yes |
| Ocean Grove | monthly | 12 | 0.065 | 0.022 | Yes |
| Pettavel | monthly | 12 | 0.099 | 0.021 | Yes |
| Portarlington | monthly | 12 | 0.084 | 0.026 | Yes |
| Queenscliff | monthly | 12 | 0.200 | 0.064 | Yes |
| Teesdale | monthly | 12 | 0.038 | 0.015 | Yes |
| Torquay | monthly | 12 | 0.054 | 0.019 | Yes |
| Winchelsea | monthly | 12 | 0.110 | 0.028 | Yes |

### 6.7.3 Natural background 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 background 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 | 12 | 0.18 | 0.06 | 0.10 |
| Little River West | | | | | | |
| Lovely Banks | | | | | | |
| Lovely Banks-Carrs Road | | | 12 | 0.18 | 0.07 | 0.11 |
| Highton | | | | | | |
| Montpellier | | | | | | |
| Bellarine | Wurdee Boluc Reservoir | Monthly | 12 | 0.18 | 0.06 | 0.10 |
| Clifton Springs | | | | | | |
| Anglesea | | | | | | |
| Ocean Grove | | | | | | |
| Leopold | | | | | | |
| Aireys Inlet | | | | | | |
| Pettavel | | | | | | |
| Portarlington | | | | | | |
| Queenscliff | | | | | | |
| Torquay | | | | | | |
| Moriac | | | | | | |
| Winchelsea | | | | | | |
| Highton High Level | | | | | | |
| Batesford | East and West Moorabool River | Monthly | 12 | 0.18 | 0.07 | 0.11 |
| Bannockburn | | | | | | |
| Moorabool | | | | | | |
| Teesdale | | | | | | |
| Colac | Colac Basin No. 4 & 5 | Monthly | 12 | 0.09 | 0.06 | 0.07 |
| Cressy | | | | | | |
| Apollo Bay | Marengo Basin | Monthly | 12 | 0.12 | 0.07 | 0.09 |
| Birregurra | Birregurra Basin | Monthly | 12 | 0.16 | 0.07 | 0.13 |
| Forrest | Forrest Basin | Monthly | 12 | 0.09 | 0.05 | 0.07 |
| Gellibrand | Lardners Creek | Monthly | 12 | 0.10 | 0.06 | 0.08 |
| Lorne | Allen Reservoir | Monthly | 12 | 0.08 | 0.06 | 0.07 |

### 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 | 12 | <0.001 | <0.001 | Yes |
| Anakie | monthly | 12 | <0.001 | <0.001 | Yes |
| Anglesea | monthly | 12 | 0.002 | 0.001 | Yes |
| Apollo Bay | > monthly | 16 | 0.001 | <0.001 | Yes |
| Bannockburn | monthly | 12 | 0.005 | 0.001 | Yes |
| Batesford | monthly | 12 | 0.001 | <0.001 | Yes |
| Bellarine | monthly | 12 | 0.006 | 0.001 | Yes |
| Birregurra | > monthly | 16 | <0.001 | <0.001 | Yes |
| Clifton Springs | monthly | 12 | <0.001 | <0.001 | Yes |
| Colac | > monthly | 16 | <0.001 | <0.001 | Yes |
| Cressy | monthly | 12 | <0.001 | <0.001 | Yes |
| Forrest | > monthly | 16 | <0.001 | <0.001 | Yes |
| Gellibrand | > monthly | 15 | <0.001 | <0.001 | Yes |
| Highton | monthly | 12 | 0.001 | <0.001 | Yes |
| Highton High Level | monthly | 12 | <0.001 | <0.001 | Yes |
| Leopold | monthly | 12 | 0.001 | <0.001 | Yes |
| Little River | monthly | 12 | <0.001 | <0.001 | Yes |
| Lorne | > monthly | 16 | 0.004 | 0.001 | Yes |
| Lovely Banks | monthly | 12 | 0.002 | 0.001 | Yes |
| Lovely Banks-Carrs Rd | monthly | 12 | 0.001 | <0.001 | Yes |
| Montpellier | monthly | 12 | 0.004 | 0.001 | Yes |
| Moorabool | > monthly | 15 | 0.001 | <0.001 | Yes |
| Moriac | > monthly | 16 | 0.001 | <0.001 | Yes |
| Ocean Grove | monthly | 12 | <0.001 | <0.001 | Yes |
| Pettavel | monthly | 12 | <0.001 | <0.001 | Yes |
| Portarlington | monthly | 12 | <0.001 | <0.001 | Yes |
| Queenscliff | monthly | 12 | 0.007 | 0.002 | Yes |
| Teesdale | monthly | 12 | <0.001 | <0.001 | Yes |
| Torquay | monthly | 12 | 0.001 | <0.001 | Yes |
| Winchelsea | monthly | 12 | <0.001 | <0.001 | Yes |

### 6.7.5 Manganese

- Limit of detection = 0.01 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 | 24 | <0.01 | <0.01 | Yes |
| Anakie | > monthly | 24 | <0.01 | <0.01 | Yes |
| Anglesea | > monthly | 24 | <0.01 | <0.01 | Yes |
| Apollo Bay | > monthly | 48 | <0.01 | <0.01 | Yes |
| Bannockburn | > monthly | 24 | <0.01 | <0.01 | Yes |
| Batesford | > monthly | 24 | <0.01 | <0.01 | Yes |
| Bellarine | > monthly | 24 | <0.01 | <0.01 | Yes |
| Birregurra | > monthly | 47 | <0.01 | <0.01 | Yes |
| Clifton Springs | > monthly | 23 | <0.01 | <0.01 | Yes |
| Colac | > monthly | 47 | 0.020 | <0.01 | Yes |
| Cressy | > monthly | 23 | <0.01 | <0.01 | Yes |
| Forrest | > monthly | 48 | 0.170 | 0.038 | Yes |
| Gellibrand | > monthly | 46 | <0.01 | <0.01 | Yes |
| Highton | > monthly | 24 | <0.01 | <0.01 | Yes |
| Highton High Level | > monthly | 24 | <0.01 | <0.01 | Yes |
| Leopold | > monthly | 24 | <0.01 | <0.01 | Yes |
| Little River | > monthly | 24 | <0.01 | <0.01 | Yes |
| Lorne | > monthly | 48 | <0.01 | <0.01 | Yes |
| Lovely Banks | > monthly | 24 | <0.01 | <0.01 | Yes |
| Lovely Banks-Carrs Rd | > monthly | 24 | 0.040 | <0.01 | Yes |
| Montpellier | > monthly | 23 | <0.01 | <0.01 | Yes |
| Moorabool | > monthly | 47 | <0.01 | <0.01 | Yes |
| Moriac | > monthly | 46 | <0.01 | <0.01 | Yes |
| Ocean Grove | > monthly | 23 | <0.01 | <0.01 | Yes |
| Pettavel | > monthly | 23 | <0.01 | <0.01 | Yes |
| Portarlington | > monthly | 24 | <0.01 | <0.01 | Yes |
| Queenscliff | > monthly | 24 | <0.01 | <0.01 | Yes |
| Teesdale | > monthly | 24 | <0.01 | <0.01 | Yes |
| Torquay | > monthly | 23 | <0.01 | <0.01 | Yes |
| Winchelsea | > monthly | 23 | <0.01 | <0.01 | Yes |

### 6.7.6 Other

The complete list of other health-related parameters analysed in 2023/24 are listed in Table 16, Table 17 and Table 18.

**Table 16 Other health-related parameters for 2023/24**

| Analytes | Frequency of sampling | Health guideline compliance (Yes/No) |
|---|---|---|
| Antimony | Quarterly | Yes |
| Barium | Quarterly | Yes |
| Boron[1] | Quarterly | Yes |
| Cadmium | Quarterly | Yes |
| Chloral Hydrate (Trichloroacetaldehyde) | Annually | Yes |
| Chlorophenols[1 2] | Annually | Yes |
| Chlorine | Weekly | Yes |
| Chromium | Monthly | Yes |
| Cyanide[1] | Quarterly | Yes |
| Iodide[1] | Annually | Yes |
| Mercury | Annually | Yes |
| Molybdenum[1] | Annually | Yes |
| Monochloramine | Weekly | Yes |
| Nickel | Quarterly | Yes |
| Nitrate | Monthly | Yes |
| Nitrite | Monthly | Yes |
| Pesticides/herbicides[1] | Quarterly/monthly | Yes |
| Radioactive constituents | Annually | Yes |
| Selenium | Annually | 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. Measurement in source water is relevant to drinking water quality since it confirms that levels are below ADWG health guideline values prior to 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 2023/24 in source water**

| | | |
|---|---|---|
| 4,4-DDD | CHLOROPYRIFOS | 2,4-DB |
| 4,4-DDE | COUMPHANOS | 2,4-DP |
| 4,4-DDT | DEMETON-S | 2,4-D |
| ALDRIN | DIAZINON | 2,6-D |
| ATRAZINE | DICHLORVOS | 4-Chlorophenoxyaceticacid |
| BHC (ALPHA ISOMER) | CHLORFENVINPHOS | Clopyralid |
| BHC (BETA ISOMER) | CHLOROTHALONIL | Dicamba |
| BHC (DELTA ISOMER) | EPN | MCPA |
| CIS-CHLORDANE | FENSULFONTHION | MCPB |
| DIQUAT | FENTHION | PHENOLS |
| DIELDRIN | MALATHION | TRICHLOPYR |
| ENDOSULPHAN I | METHYL PARATHION | HEXAZINONE |
| ENDOSULPHAN II | MONOCROTOPHOS | MOLINATE |
| ENDOSULPHAN | PARATHION | PICLORAM |
| ENDOSULPHAN SULPHATE | PHORATE | TEMEPHOS |
| ENDRIN ALDEHYDE | PROPHOS | PROPICONAZOLE |
| HEPTACHLOR EPOXIDE | RONNEL | PARAQUAT |
| HEPTACHLOR | TETRACHLORVINPHOS | SIMAZINE |
| HEXACHLOROBENZENE | TETRAETHYLDITHIOPYRPHOS | QUINTOZENE |
| LINDANE | TRICHLORINATE | PIRIMICARB |
| METHOXYCHLOR | TUKUTHION | DIURON |
| MECOPROP | 2,4,5-T | PROPACHLOR |
| TRANS-CHLORDANE | 2,4,5-TP | ENDRIN |
| GLYPHOSATE | 2,4,6-T | AMITROL |

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 2023/24**

| | | |
|---|---|---|
| VINYL CHLORIDE | 2,2-DICHLOROPROPANE | P-XYLENE |
| 1,1,1,2-TETRACHLORETHANE | 2-CHLOROTOLUENE | NAPHTHALENE |
| 1,1,1-TRICHLOROETHANE | 4-CHLOROTOLUENE | N-BUTYLBENZENE |
| 1,1,2,2-TETRACHLOROETHANE | BENZENE | N-PROPYLBENZENE |
| 1,1,2-TRICHLOROETHANE | BROMOBENZENE | O-XYLENE |
| 1,1-DICHLOROETHANE | BROMOCHLOROMETHANE | P-ISOPROPYLTOLUENE |
| 1,1-DICHLOROETHENE | BROMODICHLOROMETHANE | SEC-BUTYLBENZENE |
| 1,1-DICHLOROPROPENE | BROMOFORM | STYRENE |
| 1,2,3-TRICHLOROBENZENE | CARBON DISULPHIDE | TERT-BUTYLBENZENE |
| 1,2,3-TRICHLOROPROPANE | CARBON TETRACHLORIDE | TETRACHLOROETHENE |
| 1,2,4-TRICHLOROBENZENE | CHLOROBENZENE | TOLUENE |
| 1,2,4-TRIMETHYLBENZENE | CHLOROFORM | TRANS-1,2-DICHLOROETHENE |
| 1,2-DIBROMO-3-CHLOROPROPANE | CIS-1,2-DICHLOROETHENE | TRANS-1,3-DICHLOROPROPENE |
| 1,2-DIBROMOETHANE | CIS-1,2-DICHLOROPROPENE | TRICHLOROETHENE |
| 1,2-DICHLOROBENZENE | DIBROMOCHLOROMETHANE | DICHLOROMETHANE |
| 1,2-DICHLOROETHANE | DIBROMOMETHANE | BROMOMETHANE |
| 1,2-DICHLOROPROPANE | ETHYLBENZENE | CHLOROETHANE |
| 1,3,5-TRIMETHYLBENZENE | HEXACHLORO-1,3-BUTADIENE | DICHLORODIFLUOROMETHANE |
| 1,3-DICHLOROBENZENE | ISOPROPYLBENZENE | TRICHLOROFLUOROMETHANE |
| 1,3-DICHLOROPROPANE | METHYLENECHLORIDE | |
| 1,4-DICHLOROBENZENE | M-XYLENE | |

## 6.7.7 Analysis of results

### 6.7.7.1 Trend over localities

There were no non-compliances relating to other health-related water quality parameters, herbicides/pesticides or volatile organic compounds during 2023/24 in any locality. All results for these parameters were well below their respective health guideline value.

### 6.7.7.2 Trend over time

The results for these parameters in the 2023/24 period are consistent with those experienced in previous years.

## 6.8 Other aesthetic (not health-related)

### 6.8.1 True Colour

Based on aesthetic considerations, true colour in drinking water should not exceed 15 HU.

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

**Table 19 True Colour**

| Water Quality Locality | Frequency of sampling* | Number of samples | Maximum (HU) | Minimum (HU) | Average (HU) |
|---|---|---|---|---|---|
| Aireys Inlet | > weekly | 76 | 3 | <1 | 1.03 |
| Anakie | > weekly | 76 | 1 | <1 | <1 |
| Anglesea | > weekly | 81 | 1 | <1 | <1 |
| Apollo Bay | > weekly | 86 | <1 | <1 | <1 |
| Bannockburn | > weekly | 75 | 3 | <1 | 1.56 |
| Batesford | > weekly | 75 | 3 | <1 | 1.69 |
| Bellarine | > weekly | 76 | 1 | <1 | <1 |
| Birregurra | > weekly | 75 | 1 | <1 | <1 |
| Clifton Springs | > weekly | 93 | 1 | <1 | <1 |
| Colac | > weekly | 201 | 1 | <1 | <1 |
| Cressy | > weekly | 75 | <1 | <1 | <1 |
| Forrest | > weekly | 75 | 3 | <1 | 1.23 |
| Gellibrand | > weekly | 75 | 1 | <1 | <1 |
| Highton | > weekly | 159 | 2 | <1 | 1.01 |
| Highton High Level | > weekly | 76 | 2 | <1 | 1.01 |
| Leopold | > weekly | 110 | 2 | <1 | 1.01 |
| Little River | > weekly | 76 | 3 | <1 | 1.08 |
| Lorne | > weekly | 91 | 1 | <1 | <1 |
| Lovely Banks | > weekly | 281 | 5 | <1 | 1.05 |
| Lovely Banks-Carrs Rd | > weekly | 76 | 2 | <1 | 1.04 |
| Montpellier | > weekly | 260 | 2 | <1 | 1.01 |
| Moorabool | > weekly | 99 | 3 | <1 | 1.57 |
| Moriac | > weekly | 74 | 1 | <1 | <1 |
| Ocean Grove | > weekly | 143 | 2 | <1 | 1.01 |
| Pettavel | > weekly | 205 | 1 | <1 | <1 |
| Portarlington | > weekly | 107 | 1 | <1 | <1 |
| Queenscliff | > weekly | 86 | <1 | <1 | <1 |
| Teesdale | > weekly | 75 | 4 | <1 | 1.77 |
| Torquay | > weekly | 161 | 1 | <1 | <1 |
| Winchelsea | > weekly | 75 | 3 | <1 | 1.04 |

* 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 | Frequency of sampling* | Number of samples | Maximum (mg/L) | Minimum (mg/L) | Average (mg/L) |
|---|---|---|---|---|---|
| Aireys Inlet | monthly | 12 | 52 | 34 | 41 |
| Anakie | monthly | 12 | 67 | 20 | 47 |
| Anglesea | monthly | 12 | 51 | 31 | 39 |
| Apollo Bay | monthly | 12 | 71 | 27 | 48 |
| Bannockburn | monthly | 12 | 130 | 55 | 91 |
| Batesford | monthly | 12 | 140 | 52 | 89 |
| Bellarine | monthly | 12 | 51 | 32 | 41 |
| Birregurra | monthly | 12 | 57 | 22 | 36 |
| Clifton Springs | monthly | 12 | 47 | 23 | 37 |
| Colac | monthly | 12 | 27 | 12 | 22 |
| Cressy | monthly | 12 | 27 | 18 | 23 |
| Forrest | monthly | 12 | 37 | 18 | 29 |
| Gellibrand | monthly | 12 | 85 | 18 | 44 |
| Highton | monthly | 12 | 61 | 20 | 40 |
| Highton High Level | monthly | 12 | 44 | 19 | 35 |
| Leopold | monthly | 12 | 41 | 23 | 36 |
| Little River | monthly | 12 | 78 | 17 | 48 |
| Lorne | monthly | 12 | 33 | 15 | 26 |
| Lovely Banks | monthly | 156 | 89 | 15 | 47 |
| Lovely Banks-Carrs Rd | monthly | 12 | 74 | 22 | 49 |
| Montpellier | monthly | 24 | 73 | 23 | 49 |
| Moorabool | monthly | 24 | 140 | 53 | 89 |
| Moriac | monthly | 12 | 53 | 26 | 37 |
| Ocean Grove | monthly | 12 | 47 | 30 | 38 |
| Pettavel | monthly | 24 | 51 | 18 | 36 |
| Portarlington | monthly | 12 | 51 | 24 | 39 |
| Queenscliff | monthly | 12 | 44 | 23 | 35 |
| Teesdale | monthly | 12 | 140 | 59 | 92 |
| Torquay | monthly | 24 | 54 | 29 | 37 |
| Winchelsea | monthly | 12 | 38 | 19 | 34 |

### 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 to 14
- ADWG value = 6.5 to 8.5

**Table 21 pH**

| Water Quality Locality | Frequency of sampling | Number of samples | Maximum | Minimum | Average | Aesthetic operating range |
|---|---|---|---|---|---|---|
| Aireys Inlet | > weekly | 76 | 8.3 | 6.9 | 7.4 | 6.5 - 8.5 |
| Anakie | > weekly | 76 | 7.8 | 6.8 | 7.3 | 6.5 - 8.5 |
| Anglesea | > weekly | 81 | 7.9 | 6.5 | 7.3 | 6.5 - 8.5 |
| Apollo Bay | > weekly | 86 | 7.8 | 6.7 | 7.3 | 6.5 - 8.5 |
| Bannockburn | > weekly | 75 | 7.9 | 6.6 | 7.2 | 6.5 - 8.5 |
| Batesford | > weekly | 75 | 7.9 | 6.6 | 7.2 | 6.5 - 8.5 |
| Bellarine | > weekly | 76 | 7.8 | 6.7 | 7.2 | 6.5 - 8.5 |
| Birregurra | > weekly | 75 | 8.2 | 6.4 | 7.5 | 6.5 - 8.5 |
| Clifton Springs | > weekly | 93 | 7.6 | 6.6 | 7.1 | 6.5 - 8.5 |
| Colac | > weekly | 201 | 7.8 | 6.2 | 7.0 | 6.5 - 8.5 |
| Cressy | > weekly | 75 | 8.8** | 6.7 | 7.5 | 6.5 - 8.5 |
| Forrest | > weekly | 75 | 8.4 | 6.9 | 7.5 | 6.5 - 8.5 |
| Gellibrand | > weekly | 75 | 8.0 | 6.7 | 7.6 | 6.5 - 8.5 |
| Highton | > weekly | 159 | 7.5 | 6.6 | 7.1 | 6.5 - 8.5 |
| Highton High Level | > weekly | 76 | 7.5 | 6.5 | 7.1 | 6.5 - 8.5 |
| Leopold | > weekly | 110 | 7.5 | 6.6 | 7.0 | 6.5 - 8.5 |
| Little River | > weekly | 76 | 9.1* | 6.8 | 7.5 | 6.5 - 8.5 |
| Lorne | > weekly | 91 | 8.2 | 6.6 | 7.2 | 6.5 - 8.5 |
| Lovely Banks | > weekly | 281 | 7.9 | 6.4 | 7.1 | 6.5 - 8.5 |
| Lovely Banks-Carrs Rd | > weekly | 76 | 7.8 | 6.6 | 7.2 | 6.5 - 8.5 |
| Montpellier | > weekly | 260 | 7.9 | 6.3 | 7.1 | 6.5 - 8.5 |
| Moorabool | > weekly | 99 | 8.2 | 6.6 | 7.2 | 6.5 - 8.5 |
| Moriac | > weekly | 74 | 7.8 | 6.6 | 7.0 | 6.5 - 8.5 |
| Ocean Grove | > weekly | 143 | 8.2 | 6.5 | 7.1 | 6.5 - 8.5 |
| Pettavel | > weekly | 205 | 7.4 | 6.6 | 7.0 | 6.5 - 8.5 |
| Portarlington | > weekly | 107 | 7.6 | 6.7 | 7.2 | 6.5 - 8.5 |
| Queenscliff | > weekly | 86 | 7.7 | 6.6 | 7.1 | 6.5 - 8.5 |
| Teesdale | > weekly | 75 | 9.0* | 6.8 | 7.5 | 6.5 - 8.5 |
| Torquay | > weekly | 161 | 7.5 | 6.3 | 7.1 | 6.5 - 8.5 |
| Winchelsea | > weekly | 75 | 7.6 | 6.5 | 7.0 | 6.5 - 8.5 |

* 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 1000uS/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 µS/cm
- ADWG quality value < 1000 µS/cm

**Table 22 Conductivity**

| Water Quality Locality | Source of supply | Frequency of sampling (min) | Number of samples | Maximum (µS/cm) | Minimum (µS/cm) | Average (µS/cm) |
|---|---|---|---|---|---|---|
| Anakie | Wurdee Boluc Reservoir, East & West Moorabool River, Melbourne-Geelong Pipeline | twice monthly | 24 | 300 | 220 | 235 |
| Little River West | | | | | | |
| Lovely Banks | | twice monthly | 24 | 600 | 330 | 440 |
| Lovely Banks-Carrs Road | | | | | | |
| Montpellier | | >twice monthly | 48 | 140 | 76 | 110 |
| Highton | | | | | | |
| Aireys Inlet | Wurdee Boluc Reservoir | twice monthly | 24 | 300 | 220 | 235 |
| Bellarine | | | | | | |
| Clifton Springs | | | | | | |
| Anglesea | | | | | | |
| Ocean Grove | | | | | | |
| Leopold | | | | | | |
| Pettavel | | | | | | |
| Portarlington | | | | | | |
| Queenscliff | | | | | | |
| Torquay | | | | | | |
| Moriac | | | | | | |
| Winchelsea | | | | | | |
| Highton High Level | | | | | | |
| Batesford | East and West Moorabool River | twice monthly | 24 | 600 | 330 | 440 |
| Bannockburn | | | | | | |
| Lethbridge | | | | | | |
| Teesdale | | | | | | |
| Colac | Colac Basins No. 4 & No. 5 | twice monthly | 24 | 160 | 130 | 142 |
| Cressy | | | | | | |
| Apollo Bay | Marengo Basin | twice monthly | 24 | 300 | 240 | 268 |
| Birregurra | Birregurra Basin | twice monthly | 24 | 310 | 200 | 244 |
| Forrest | Forrest Basin | twice monthly | 24 | 400 | 150 | 314 |
| Gellibrand | Lardners Creek | twice monthly | 24 | 460 | 320 | 413 |
| Lorne | Allen Reservoir | twice monthly | 24 | 190 | 140 | 170 |

### 6.8.5 Analysis of results

#### 6.8.5.1 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 and minimum results outside 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.

#### 6.8.5.2 Trend over time

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

# 7 Emergency/ incident management

## 7.1 Emergencies/events – Section 22 notifications

There were two Section 22 notifications made to the Department of Health during the 2023/24 reporting period, as summarised in Table 23 below.

**Table 23: Section 22 Notifications 2023/24**

| Date | Type | Water Quality Locality | Nature of s22 Notification | Corrective Actions Taken | Preventative Actions Taken |
|---|---|---|---|---|---|
| 13 Oct 2023 | Incorrect connection of drinking water service line to Class A recycled water main | Pettavel | Following a dirty water complaint, Barwon Water identified a colour discrepancy between the drinking water and recycled water taps at the property's meter. An investigation confirmed that the single dwelling's drinking water service line had been incorrectly connected to the Class A recycled water main. This error occurred during construction by the developer's contractors. | Rectified the incorrect connection so that the drinking water service line is connected to the drinking water main and verified water quality through sampling | Letter sent to all developer's consultants and contractors on importance of correct connection and associated obligations and responsibilities with respect to relevant processes.<br><br>Put in place additonal auditing of developer's contractors when constructing dual pipe assets.<br><br>Put in place additional downstream tests to detect this issue in the next phases of construction, prior to commissioning. |
| 21 May 2024 | Incorrect connection of potable service line to Class A recycled water main | Pettavel | Following a taste & odour complaint, Barwon Water investigated and identified a discrepency in the Total Dissolved Solids (TDS) measured at the drinking water and recycled water taps at the property's meter. The investigation confirmed that the single dwelling's drinking water service line had been incorrectly connected to the Class A recycled water main. This error occurred during construction by the developer's contractors. | Rectified the incorrect connection so that the drinking water service line is connected to the drinking water main and verified water quality through sampling | Engaged directly with the developer's consultant and contractor, on further uplifts to their quality assurance processes.<br><br>(The relevant assets were constructed prior to those described in the row above, so action had already been otherwise taken to reduce future likelihood of reoccurance). |

## 7.2 Emergencies/events – Section 18 notifications

No Section 18 notifications were made during the 2023/24 reporting period.

# 8 Water Quality Complaints

## 8.1 Complaints 2023/2024

In accordance with our commitment to providing high quality drinking water, complaints regarding drinking 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 2023/2024 was 1.47 per 1,000 properties. This is a slight increase compared to last year's complaints trend (1.17 complaints per 1,000 properties), however is consistent with the 3-year rolling average.

The largest complaints category was for Taste and Odour. This can be associated with operational changes to balance water resources due to raw water challenges created by a blue green algae bloom at Wurdee Boluc reservoir. These operational changes resulted in some customers experiencing taste profile changes. Customers were kept informed via a proactive communication campaign.

Although there was an increase in discoloured water and other complaints. These were not attributed to specific events, and many were associated with corrosion of customer plumbing beyond the point of supply (the water meter).

White water complaints also increased, and where possible, opportunities to reduce these have been sought.

**Table 24 Comparison of complaints for financial years 2023/24 and 2022/23**

| Type of complaints | Number of complaints | | | Comparison to 2022/23 reporting period | Comments |
|---|---|---|---|---|---|
| | 2023/24 | 2022/23 | 2021/22 | | |
| Alleged Diagnosed Illness | 0 | 0 | 0 | 0 | Comparable figure to previous year. |
| Discoloured Water | 88 | 80 | 66 | +8 | 10% increase in number of complaints compared to previous year. |
| Taste or Odour | 91 | 62 | 70 | +29 | 47% increase in number of complaints compared to previous year. |
| White Water | 36 | 19 | 26 | +17 | 89% increase in number of complaints compared to previous year. |
| Other | 52 | 48 | 39 | +4 | 8% increase in number of complaints compared to previous year. |
| **TOTAL** | **267** | **209** | **201** | **+58** | 28% increase in number of complaints compared with previous year (see Figure 10). |

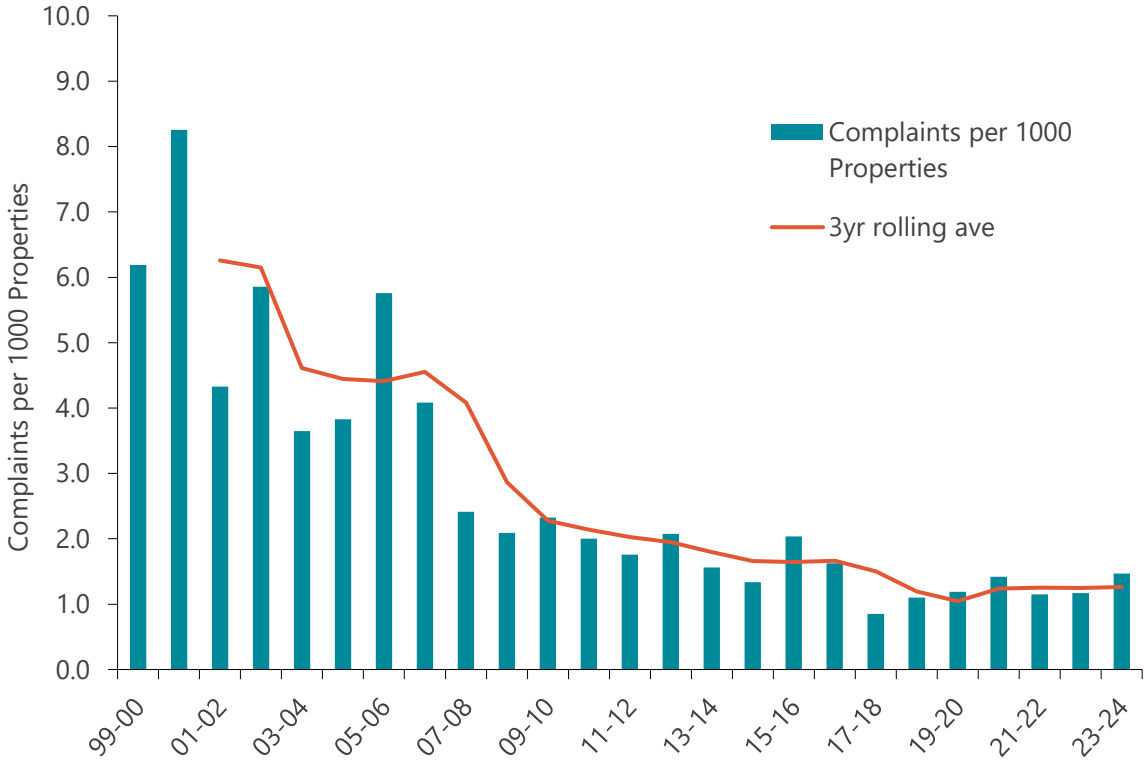
**Table 25 Customer complaints summary for each sampling locality 2023/24**

| Water Quality Locality | Type of complaint | | | | | Total |
|---|---|---|---|---|---|---|
| | Alleged Diagnosed Illness | Discoloured Water | Taste or odour | White water | Other | Total |
| Aireys Inlet | 0 | 1 | 2 | 0 | 0 | 3 |
| Anakie | 0 | 0 | 0 | 0 | 0 | 0 |
| Anglesea | 0 | 0 | 1 | 2 | 1 | 4 |
| Apollo Bay | 0 | 0 | 2 | 0 | 0 | 2 |
| Bannockburn | 0 | 1 | 0 | 2 | 1 | 4 |
| Batesford | 0 | 3 | 1 | 0 | 0 | 4 |
| Bellarine | 0 | 0 | 0 | 0 | 0 | 0 |
| Birregurra | 0 | 0 | 0 | 0 | 1 | 1 |
| Clifton Springs | 0 | 5 | 2 | 0 | 4 | 11 |
| Colac | 0 | 9 | 2 | 2 | 3 | 16 |
| Cressy | 0 | 0 | 0 | 0 | 0 | 0 |
| Forrest | 0 | 4 | 1 | 0 | 1 | 6 |
| Gellibrand | 0 | 0 | 0 | 0 | 0 | 0 |
| Highton | 0 | 12 | 21 | 5 | 10 | 48 |
| Highton HL | 0 | 0 | 0 | 0 | 0 | 0 |
| Leopold | 0 | 1 | 2 | 3 | 0 | 6 |
| Little River West | 0 | 0 | 0 | 4 | 0 | 4 |
| Lorne | 0 | 2 | 1 | 1 | 0 | 4 |
| Lovely Banks | 0 | 13 | 9 | 2 | 4 | 28 |
| Lovely Banks-Carrs Road | 0 | 0 | 0 | 0 | 0 | 0 |
| Montpellier | 0 | 12 | 14 | 0 | 12 | 38 |
| Moorabool | 0 | 3 | 0 | 0 | 0 | 3 |
| Moriac | 0 | 0 | 0 | 0 | 0 | 0 |
| Ocean Grove | 0 | 3 | 1 | 0 | 2 | 6 |
| Pettavel | 0 | 14 | 12 | 10 | 7 | 43 |
| Portarlington | 0 | 0 | 5 | 2 | 1 | 8 |
| Queenscliff | 0 | 0 | 1 | 1 | 0 | 2 |
| Teesdale | 0 | 1 | 3 | 2 | 1 | 7 |
| Torquay | 0 | 4 | 8 | 0 | 1 | 13 |
| Unknown locality - no address provided | 0 | 0 | 3 | 0 | 3 | 6 |
| Winchelsea | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **0** | **88** | **91** | **36** | **52** | **267** |

**Table 26 Table of customer complaints by type for 2023/24**

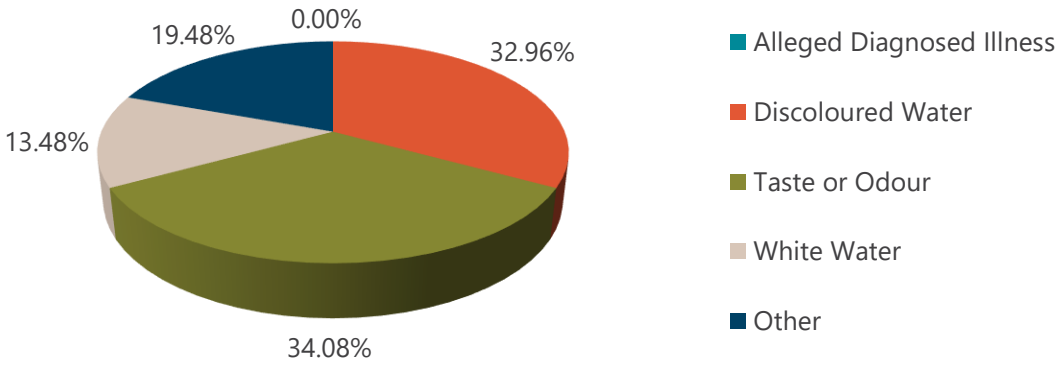
| Type of Complaint | Number of Complaints 2023/24 | Percentage of Total Complaints | Number of complaints per 1000 properties 2023/24 |
|---|---|---|---|
| Alleged Diagnosed Illness | 0 | 0% | 0.00 |
| Discoloured Water | 88 | 33% | 0.48 |
| Taste or Odour | 91 | 34% | 0.50 |
| White Water | 36 | 13% | 0.20 |
| Other | 52 | 19% | 0.29 |
| **TOTAL** | **267** | **100%** | **1.47** |

**Figure 10 Complaints per 1000 properties 2023/24**




Most complaints for 2023/24 related to taste or odour and discoloured water (Figure 11). Table 25 shows a breakdown of complaints by complaint type. This is a similar breakdown to that recorded in previous years.

**Figure 11 Customer complaint summary by type 2023/24**



## 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, email, or the enquiry function of the public website. This feedback is also 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 multiple different factors, including burst main events, manganese and iron oxidation and problems which may relate to the internal plumbing at 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 performance or advising the customer to have their internal plumbing inspected by a licensed plumber.

If a customer reports blue discolouration, this is usually caused by copper corrosion. When investigated, the issue is often traced back to the internal plumbing on the customer's property as Barwon Water does not use copper pipes or fittings. 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 repairs/replacements of water mains. 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 may be 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:

- verifying the source to ensure the water supply remains safe,
- topography of the area (to determine where the air is likely to be accumulating 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,
- any other factors that may affect the customer.

If necessary, a flush will be arranged at the time of complaint. Alternatively the customer may be 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. In some cases, independent water quality testing at the customer's meter may also be arranged.

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 has been developed by Barwon Water which is aligned with Department of Health (DH) guidance. The procedure 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, DH will be notified (via a Section 22 notification).

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 DH as a courtesy to enable them to investigate further.

# 9 Water quality improvement projects

## 9.1 Forrest and Gellibrand WTP upgrade project

In 2023/24 construction was completed on the upgraded Forrest Water Treatment Plant, replacing the previous plant which was approaching the end of its service life.

Construction has also commenced on the upgraded Gellibrand WTP, with the new plant expected to be completed in 2024/25.

Both upgraded plants are within existing site footprints and have been designed to increase resilience against variable raw water quality.

## 9.2 Completion of Lorne WDP

In 2023/24 we constructed and commissioned a new secondary disinfection plant supplying Lorne Tank No.3. The project will improve water quality for the Lorne area by providing reliable and consistent chlorine residual through the network.

## 9.3 Installation of aerators and ultrasonic units in Wurdee Boluc Reservoir

In 2023/24 we installed aerators and two ultrasonic units in Wurdee Boluc Reservoir. The aeration and ultrasonic units will improve raw water quality supplied to Wurdee Boluc WTP by improving mixing and disrupting the growth potential of blue-green algae in the reservoir.

## 9.4 Catchment management and river health

Barwon Water harvests water from declared drinking water supply catchments on the Barham, Upper Barwon, Gellibrand, Moorabool and St George Rivers and their tributaries. While these are largely contained within publicly managed national parks and reserves, significant areas of private land are also present within some catchments.

We have a keen interest in ensuring the protection and rehabilitation of land and waterways within these catchments. This is undertaken in partnership with key stakeholders and in accordance with the priorities established in the Corangamite Regional Catchment Strategy, the Corangamite Waterway Strategy and the Victorian Waterway Management Strategy.

In 2023/24, we invested more than $2.6M to protect and improve catchment and waterway health. This included continuation of our ongoing partnership with the Corangamite Catchment Management Authority through our River Health Agreement and the Living Moorabool and Upper Barwon Flagship Projects. We also continued our long-standing partnerships with the Moorabool Catchment Landcare Group, Southern Otway Landcare Network and Upper Barwon Landcare Network to support a coordinated approach to deliver on-ground protection and improvement works within drinking water supply catchments.

As part of these works, we also completed on-ground works for Stage 2 of a $4.3 million project to remove invasive willows, stabilise stream banks, and revegetate streamside buffers along a 4 km reach of the East Barwon River. This is a significant project and is critical for improving flows in the river and reducing waterlogging of adjacent land. Stock exclusion fencing and revegetation will also improve and protect water quality.

In collaboration with the Corangamite CMA and Landcare, we also continued ongoing maintenance of large river restoration projects on Dewing Creek (a tributary of the Barwon River), and the East Moorabool River at Bolwarra Weir. These projects included willow removal, fencing for stock exclusion and revegetation to improve water quality.

In collaboration with the Conservation Ecology Centre and Parks Victoria, we also monitored and supported the management of feral pig and deer populations at a number of locations within drinking water supply catchments.

In 2023/24 we also continued our support for the ongoing operation of the Corangamite Citizen Science program. This program supports community groups to conduct water quality testing at monitoring sites and delivers education programs for students in the Corangamite region. Barwon Water staff have also been involved in presentations and public events promoting river health and catchment issues. The program also includes water quality testing at Waterwatch sites selected and monitored by the Wadawurrung Traditional Owners Aboriginal Corporation, with results published in a water quality report produced in partnership with Wadawurrung Traditional Owners.

Barwon Water

# Appendices

# Appendix A – Current HACCP Certification

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

## HACCP as defined by

## 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 2024**

*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:* **AU004804-1**

*Date:* **13 November 2021**

Andrew Mortimore
Vice President – I&F Pacific Region

Managing office: Bureau Veritas Pty Ltd, 3/435 Williamstown Road, Port Melbourne, Victoria, 3207

Issuing office: Bureau Veritas Pty Ltd, 3/435 Williamstown Road, Port Melbourne, Victoria, 3207

BUREAU VERITAS

# Appendix B – 2022/23 Safe Drinking Water Audit Certificate & Correction Letter

RISK EDGE
STRATEGY PLANNING CONTROL
ABN 43 143 242 399 m +61 411 049 544 e contact@riskedge.com.au www.riskedge.com.au

## Risk Management Plan Audit Certificate

**Safe Drinking Water Regulations 2015**

| | |
|---|---|
| **Certificate Number:** | BW-346 |
| **Auditor Notice of Approval Conditions #:** | 181 |
| **Audit period:** | 1 January 2021 to 31 December 2022 |
| **To:** | Ms Komal Dalal<br>Product Quality Lead Asset, Systems & Environment<br>Barwon Water<br>55-67 Ryrie Street (PO Box 659) Geelong VIC 3220 |
| **Australian Business Number (ABN):** | 86 348 316 514 |

I, Dr Annette Davison, after conducting a risk management plan audit of the water supplied by Barwon Water, am of the opinion that Barwon Water has not complied with the obligations imposed by section 8(1) of the *Safe Drinking Water Act 2003* during the audit period.

The details of the reasons for noncompliance (all minor) are detailed in the table below.

**Signed:**  **Date:** 2023-04-22

| Auditable Area | Noncompliances | OFIs |
|---|---|---|
| 1 Activities Conducted to Manage Risk | The Act requires development and implementation of preventative strategies (including appropriate control and monitoring measures). (s. 9(1)(d)). While minor, a GAC Filtration CCP was identified as part of the Apollo Bay WTP Process Control, but not listed on the CCP Locations list, creating potential for a gap in process understanding. OFIs (OFI 1D-1 and OFI 1D-3) have been captured to address this gap.<br>The Act requires implementation and compliance with the requirements of the risk management plan (s. 7(1)(b), s. 8(1)(b)). Some minor noncompliances in implementation were observed including gaps in completion of chemical deliveries record requirements, omission of one test on PAC23 (Colac WTP), raw and treated water turbidity meters at Colac WTP not been externally calibrated when due and instrument numbers on calibration stickers at Colac WTP did not always align with the instrument number in SCADA (instrument numbers that do not match in the field and on SCADA can result in incorrect assumptions regarding the location of the instrument). OFIs (OFI 1E-1 and OFI 1E-2) have been captured to address these noncompliances. | OFI 1D-1: For completeness, add Apollo Bay WTP GAC Filtration CCP to the CCP Locations list.<br>OFI 1D-3: Undertake a review, and revision as necessary, of all CCPs, and implement the revisions.<br>OFI IE-1: Develop and implement processes to improve understanding of and adherence to the chemical delivery requirements by operational staff, including the importance of record keeping.<br>OFI 1E-2: Undertake a systems-wide review of the annual calibration and implement the findings. |
| 2 Risk Management Plan Contents | Regulation 8(1)(i) requires the development and maintenance of appropriate critical control points, and procedures for their implementation to ensure protection of public health outcomes.<br>Colac WTP fluoridation critical limit was inconsistent between CCP documentation (1.5 mg/L) and SCADA (1.6 mg/L). This is considered a minor noncompliance as there are more conservative shutdown processes prior to the CCP limit. While an OFI (OFI 2M-3) has been captured for this noncompliance, it is noted that the limit has already been changed in SCADA. | OFI 2M-3: The Colac fluoridation CCP limit in the SCADA should be corrected to 1.5 mg/L (this was advised as completed on 2023-03-22). |
| 3 Identification and Management of Risks to Water Supply | None | None |
| 4 Risk Management Plan Documents | Based on a review of all supporting documentation including at the site visits, we were largely able to confirm compliance for all requirements of s. 10(2) of the Act, with the exception of an isolated incident for chemical receivals. Chemical delivery records were not available for the entire audit period at Colac WTP (older records had been thrown out as part of a tidy-up). This fact meant that the auditors were unable to confirm the audit guidance component: "During the audit **all documentation** must be available for inspection." [our emphasis]. This outcome is considered minor, because it was not found to be a systemic issue. An OFI captured under Area 1 (OFI 1E-1) covers the identified noncompliance. | See OFI IE-1. |

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Ms Suzie Sarkis
Manager Water
Victorian Public Health Division
Department of Health
14 / 50 Lonsdale Street
Melbourne Victoria 3000

2023-06-06

Dear Ms Sarkis

## Audit Correction

I confirm that the submitted risk management plan audit certificate for Barwon Water dated 22 April 2023 contained an incorrect section reference to the *Safe Drinking Water Act 2003* (Vic).

The incorrect section reference was: **section 8(1)**

The corrected section reference should be: **section 7(1)**

Please treat the certificate as having been amended accordingly.

Yours sincerely

Dr Annette Davison
HND, BSc(Hons), MEnvLGovLaw, PhD, PMAWA

Barwon Water

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