

# Annual Drinking Water Quality Report

2017/18





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# Foreword from our Managing Director

I am pleased to present Lower Murray Water's 2017/2018 Annual Drinking Water Quality Report, which reports on the quality of drinking water and regulated water supplied by us across our 16 water supply systems.

The report has been prepared in accordance with the requirements of the Safe Drinking Water Act 2003 and the Safe Drinking Water Regulations 2015. Water quality, including the bacteriological, chemical and physical characteristics of the drinking water supplied by us to our customers is discussed in the report. This report demonstrates our continued high compliance with the water quality standards and highlights water quality challenges experienced and achievements during 2017/2018.

We have adopted a multiple barrier, catchment-to-tap approach to ensure high quality, safe drinking water. Under the Safe Drinking Water Act 2003, we are required to prepare and implement a Drinking Water Quality Management Plan (DWQMP) to ensure the safety of the drinking water supply systems. Our DWQMP is based on Hazard Analysis and Critical Control Point (HACCP) principles and the Australian Drinking Water Guidelines.

The Safe Drinking Water Act also requires Lower Murray Water, as specified by the Secretary to the Department of Health & Human Services, or their delegate, to undertake an audit of its Drinking Water Quality Management Plan in respect of a specified audit period by an approved auditor by a specified date.

The Secretary to the Department of Health and Human Services required LMW to undertake an audit of its Drinking DWQMP, I'm pleased to advise that our DWQMP, has been audited for the period of 28 June 2016 to 28 May 2018, and found to be compliant with the obligations imposed by section 7(1) of the Safe Drinking Water Act 2003 during the audit period.

For the 2017/18 year, I'm pleased to advise that we continued to produce high quality drinking water to our customers, and continued ongoing compliance with the water quality standards and requirements of the Safe Drinking Water Act 2003 and Safe Drinking Water Regulations 2015.

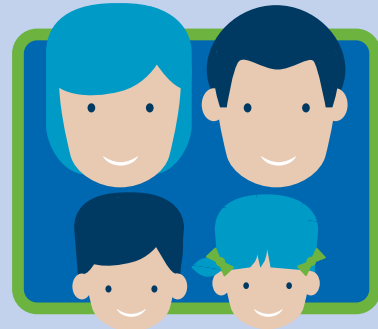


**Managing Director**  
Philip Endley

## **Acknowledgment of Traditional Owners**

Lower Murray Water proudly acknowledges the Traditional Owners within Northwest Victoria. We strongly respect their rich culture and connections the Traditional Owners have to their land and waterways.

# Our Profile - Region



PROVIDE WATER SERVICES TO OVER  
**71,000**  
CUSTOMERS

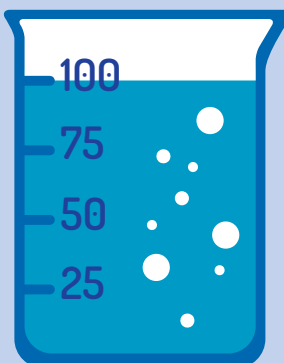


**91.5%**  
OF CUSTOMERS  
SATISFIED WITH  
**WATER  
QUALITY**



**15** PROJECTS AND  
UPGRADES

TO IMPROVE  
**WATER  
QUALITY**



WATER SAMPLE  
ANALYSIS  
**100%**  
COMPLIANCE  
WITH THE SAFE DRINKING  
WATER REGULATIONS 2015

# Area of Operations



# Objectives and Strategies

## Nature of Services Provided

### We provide:

- urban water services to 14 townships via nine treatment plants to approximately 74,000 customers along the Murray River in Victoria from Koondrook to Merbein;
- wastewater collection, treatment and effluent reuse and disposal services to 11 towns via 10 treatment plants;
- river quality water services to 4,979 customers in the four pumped irrigation districts of Merbein, Red Cliffs, Robinvale and Mildura, the Millewa rural district and some areas of the waterworks district of Yelta;
- the collection and disposal of subsurface drainage water from the four pumped irrigation districts, and Nangiloc, Robinvale and Boundary Bend private diverters;

In addition to security of supply, public health, water quality and environmental responsibilities, we recognise the crucial economic role of water from a regional and state context.



- oversight of irrigation and drainage design in new agricultural developments ensuring conformity with salinity management plan development guidelines;
- management of the private diversion licences of 1,179 water users along the Murray River in Victoria between Nyah and the South Australian border;
- the assessment and approval of licencing, water share and allocation trade applications;
- reclaimed water for third party use;
- water supply delivery to important environmental and recreational sites;
- management of the region's urban and bulk water entitlements



## Per Capita Daily Residential Drinking Water Consumption

Lower Murray Water provide drinking water to a population of around 74,000. The total annual consumption of water was 12,833 megalitres across this population in our region. This equates to an average of 488 litres per person, per day.

This calculation is based on the population figure provided by the 2016 Census – “average household population” multiplied by our water connections for each town.

# Our commitment to our environment and our region

## Collaboration with Stakeholders /Community

As a commitment to our region, we are regularly involved in a number of stakeholder groups to share information on customer relations, communications, care of the River Murray and environment, community and school education opportunities. We are pleased to be involved with other groups as required for specific event collaboration.

## Choose Tap Coalition

We have continued our collaboration with the Choose Tap Coalition, an initiative created by Yarra Valley Water. Choose Tap is a broad, community-based initiative promoting tap water as the best choice for the planet, people's health and their hip pocket. Being part of the coalition provides us with access to a strong common brand, including related support collateral and provides a platform for sharing related ideas across the water industry. The Choose Tap Coalition's vision of advocating the use of tap water is a positive fit with our commitment to be environmentally sustainable, encouraging refillable drink bottles over the use of plastic bottles.

## Partnerships within our Communities

We have created partnerships with groups and organisations within our communities to deliver community engagement projects which result in better outcomes for our customers and stakeholders. Groups partnered with in the 2017/18 year include Lions Clubs, Historical Societies, Cultivator Inc, LaTrobe University and SuniTAFE.

## Sunraysia Regional Algal Coordinating Committee

Lower Murray Water are one of the Victorian Convening Agencies within the region for Blue Green Algae (BGA) monitoring and reporting. The monitoring of the Murray River is undertaken by our staff and the NSW Department of Environment and Water and is reported back through the Sunraysia Regional Algal Coordination Committee (SRACC).



## Sunraysia River Watch Inc (SRW)

Lower Murray Water are proud to continue our association with SRW, a community program that aims to assist in the protection of the river and its environment. SRW is dedicated to increasing the appreciation of the river and the surrounding environment and ensuring its preservation for the benefit of current and future generations. In 2017/18 we continued our ongoing sponsorship and membership of SRW, joining other agencies and businesses in demonstrating ongoing commitment to this important community service.

## Water Refill Stations

We have a number of water refill stations operating across our service area. In addition to units fully funded by ourselves, we collaborate with local groups who contribute to funding. We utilise the 'Choose Tap App' to share the location of publicly available units.

# Committing to the Environment and Region

## SUSTAINABLE WATER USE

### Water Recycling

Lower Murray Water plan and manage our operations in an environmentally responsible and sustainable manner, while contributing to the economic, social and cultural development of the region.

We continue to encourage schemes that promote the sustainable reuse of treated and recycled water. Such schemes have a positive environmental impact by lowering the demand impact on the Murray River. Under the various schemes, water is initially treated according to the relevant EPA Guidelines and then supplied for a variety of beneficial uses.

- **Mildura Water Treatment Plant—** water used in the backwashing and treatment operations is diverted to a separate storage lagoon and then supplied to Mildura Rural City Council for irrigation of the Aerodrome Ovals sporting complex
- **West Mildura Water Treatment Plant—** reclaimed water from the backwashing and treatment operations is supplied to Mildura Golf Club for the irrigation of its fairways and greens.
- **Irrigation drainage—** water collected by our irrigation drainage system is utilised by a number of individuals for various purposes, ranging from pasture and crop production through to amenity supply.

## Lake Hawthorn Management Plan

Lake Hawthorn, a few kilometers northwest of the Mildura CBD is an important local water body. Lake Hawthorn is also part of our managed land parcels portfolio. The Lake receives its water mainly from MRCC's storm water system and our irrigation drainage system. The Lake also plays a role in the salinity inception scheme managed by Goulburn-Murray Water (GMW). In addition to these important functions, the Lake has ecological and social amenity values. We continue to work with our fellow agencies; MRCC, Mallee CMA and GMW to ensure the ecological and social amenity values of Lake Hawthorn are managed effectively.





## Victorian Biodiversity Strategy

Within Lower Murray Water's managed land parcels portfolio there are a number of sites that are in areas that have high conservation values. These sites are subject to ongoing works aimed at controlling pest plants and animals to ensure the native species populations remain viable and resilient. Sites that are currently being managed include:

- **Benetook Offset Site** – Located near Lake Koorlong, this 25-hectare site has been subject to intensive conservation over the last decade. In 2005 all major pest animal and weed species were removed to allow native species to re-establish. The site remains under ongoing management to ensure its conservation values are retained and showing signs of significant native species re-establishment which will be reassessed in 2018/19.
- **Koorlong Wastewater Treatment Plant** – a 21-hectare section of old-growth mallee located within the grounds of the Koorlong Wastewater Treatment Plant and secured under the Bushbroker scheme, this site is managed by us to ensure it remains free of weeds and animal pest species. This site also has an additional 14 hectares that has been assessed and can be added to the offset pool.
- **West Mildura Water Treatment Plant** – a 15-hectare area to the south of the plant facilities is home to a population of legless lizards (*Pygopus schraderi*), one of only six locations in Victoria where they are known to exist. In addition to ongoing weed control at the site we conduct feral animal control to reduce predatory pressure on the lizards.
- **Fosters Swamp, Kerang** – we release treated water into Fosters Swamp, a RAMSAR listed wetland. A study conducted in 2008 demonstrated that the water released from our operations has a positive effect on the wildlife in this area.

## Victorian Waterway Management Strategy (VWMS)

Lower Murray Water strive to achieve healthy rivers, streams and floodplains through our own works and by supporting our partner agencies. The VWMS provides an integrated framework for management and policy direction for waterway health across the state. The VWMS has informed the development of the Mallee Regional Waterway Strategy 2014-22, of which we are a partner in the delivery of the works program.



# Water Supply Systems

Lower Murray Water provides drinking water to 14 townships via nine water treatment plants to a population of approximately 74,000 along the Murray River in Victoria from Kerang to Mildura. We also have two regulated water supplies. The Minister for Health may declare a water supply system to be regulated water. Regulated water is water that is not drinking water but could be mistaken for drinking water and is discussed in more detail on page 24.

Our drinking water and regulated water supply systems, including the sampling localities, population supplied, source water and the water treatment plants are provided in Table 1 below.

The population figures have been calculated based on the number of water connections as of 30th June 2017 and multiplied by the 2016 census average household population for each region. Non-residential connections are not included.

Our drinking water supply systems are shown on the map page 3.

This report in accordance with the Safe Drinking Water Act 2003 (SDWA) provides an overview of Lower Murray Water's drinking water supply systems, the quality systems in place for the provision of safe drinking water and the drinking water test results for 2017/2018 financial year.

# Source of Water

The Murray River catchment (part of the Murray-Darling Basin) covers a large area that spans Victoria, New South Wales and Queensland (note water from Queensland catchment enters the Murray River downstream of Mildura so does not impact on our drinking water). We are responsible for supplying drinking water from Kerang through to Mildura as shown in Table – 1. There are also other water agencies located upstream of our offtakes that manage water treatment and provide drinking water to major towns along the Murray River including Albury, Wodonga, Cobram, Echuca and other smaller localities.

We have carried out a sanitary survey (a review of the water source catchment to evaluate pathogen sources arising from the presence of people activities and cattle) of the catchment within our area of operation. The results of the sanitary survey indicate the Murray River catchment is subject to various activities which impact on water quality. We do not have any control over the management of any of the identified activities undertaken in the catchment, including cattle grazing, human habitation, agriculture and industry. Dominant agricultural activities include extensive horticultural areas, the production of rice, dairy, wool, wheat, beef, lamb and forestry. An abundance of recreational activities is undertaken along the Murray River and its tributaries including camping, swimming, fishing, water skiing, canoeing, sightseeing and picnicking.

The Murray River is an open and unprotected catchment and therefore its water is subject to a high microbial risk from humans, stock and industry. To assess these risks, we have a water quality monitoring program which involves collecting of source water samples to be analysed for a range of parameters. In addition, the raw water turbidity is monitored online at all water treatment plants, which provides for initial alert to treatment plant operators of potential changes to the raw water quality, thus enabling them to undertake control measures to ensure adequate treatment is being applied to the raw water and reduce the potential for process deviation.



To quantify the microbial risks in the catchment and realising the similarities in each catchment and the microbial hazards, we have conducted detailed microbial hazard quantification on four of our drinking water supply systems.

This assessment involved the methodology outlined in the WSAA Manual for the Application of Health Based Targets (WSAA 2015).

We have been intermittently monitoring *Cryptosporidium* and *Giardia* since January 1998. The monitoring frequency has changed to fortnightly and includes *E.coli*, to enable ongoing quantification and assessment of the source water risks. In addition, Phosphorus and Nitrogen are also monitored to provide alert for potential Blue Green Algae (BGA) Blooms.

Seasonal Blue Green Algae (BGA) monitoring is undertaken by our water quality team including water treatment plant operators, to identify potential BGA presence in the source water, implement appropriate control measures when blooms are detected and ensure that produced water is safe to drink. BGA monitoring is undertaken on weekly basis and the frequency can increase subject to the volume of the BGA detected in the source water, which may trigger additional Algae toxins identification.

**Table 1 - LMW drinking water localities**

DRINKING WATER SAMPLING LOCALITY	SOURCE OF WATER	POPULATION	WATER TREATMENT PLANT
Irymple	Murray River	8,019	Mildura 7th street & Mildura West WTP's
Kerang	Murray River/Loddon River/14/2 Irrigation Channel	4,172	Kerang WTP
Koondrook	Murray River	937	Koondrook WTP
Lake Boga	Murray River	1,073	Swan Hill WTP
Merbein	Murray River	3,601	Mildura 7th street & Mildura West WTP's
Mildura	Murray River	35,222	Mildura 7th street & Mildura West WTP's
Murrabit	Murray River/Storage Dam	95	Murrabit WTP
Nyah	Murray River	697	Swan Hill WTP
Nyah West	Murray River	563	Swan Hill WTP
Piangil	Murray River	220	Piangil WTP
Red Cliffs	Murray River	3,863	Red Cliffs WTP
Robinvale	Murray River	2,147	Robinvale WTP
Swan Hill	Murray River	11,346	Swan Hill WTP
Woorinen South	Murray River	434	Swan Hill WTP
Millewa *	Lake Cullulleraine	169	Millewa Water Improvement Plant
Mystic Park *	Kangaroo Lake	29	N/A
<b>* Regulated Supplies</b>		<b>Total: 72,587</b>	

# Drinking Water Treatment Processes

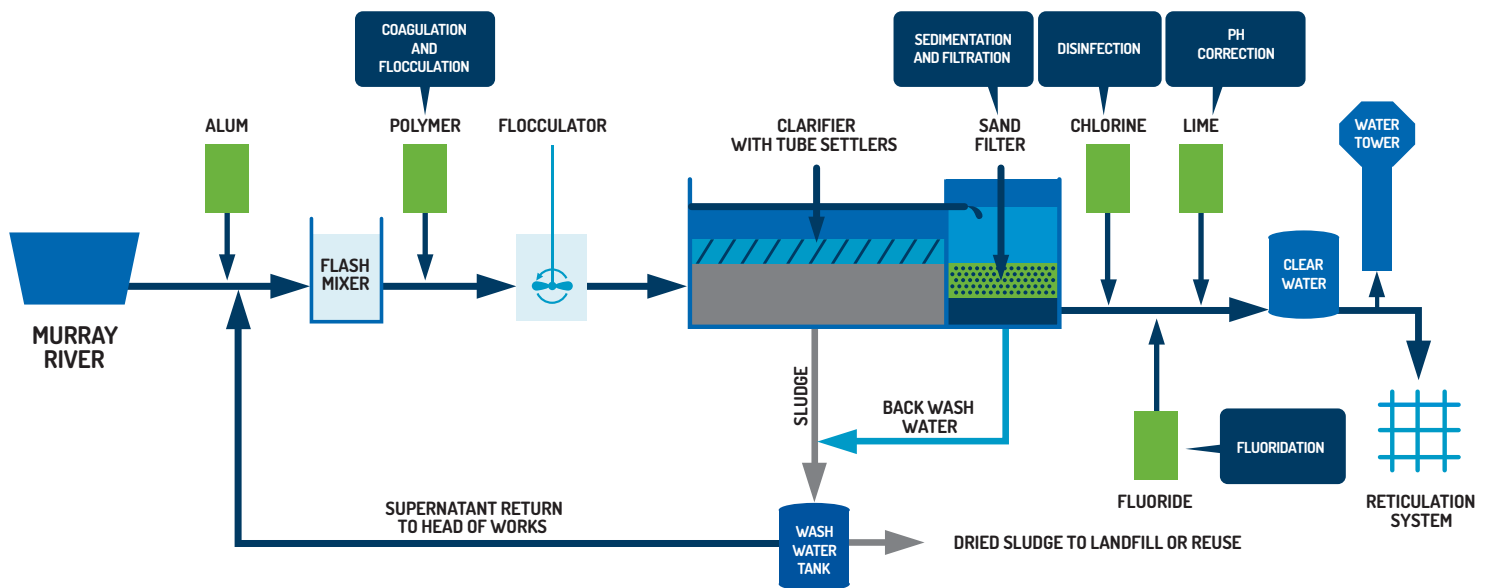
During the 2017/2018 financial year, we treated over 20,300 Megalitres of drinking water across nine water treatment plants. Our nine water treatment plants use Conventional and Dissolved Air Flotation water treatment systems, which involve the following process steps:

- Coagulation
- Flocculation
- Sedimentation / Dissolved Air Flotation
- Filtration
- Disinfection
- Fluoridation

We disinfect our drinking water using Chlorine. Chlorine is the most widely used drinking water disinfectant in the water industry. Chlorine dose rates are adjusted to provide adequate free Chlorine residual throughout the distribution system. This helps provide some protection against contamination and can limit biological regrowth problems.

Treatment processes may slightly differ at each water treatment plant due to plant capacity, technology type or raw water quality being sourced.

Table 2 below shows the water sampling localities, the treatment plants that supply water to those localities, treatment processes used to treat the water per locality, and the associated treatment chemicals.



**Table 2 - LMW Water Treatment Processes**

<b>WATER TREATMENT PLANT</b>	<b>WATER SUPPLY LOCALITY</b>	<b>TREATMENT PROCESS</b>	<b>ADDED SUBSTANCES</b>
Kerang	Kerang	Coagulation / flocculation Sedimentation / Clarification Granular media filtration Chlorination	Aluminium sulphate Hydrated lime / Sodium Hydroxide Chlorine gas / Powdered activated carbon/Fluorosilicic Acid
Koondrook	Koondrook	Coagulation / flocculation Sedimentation / Clarification Granular media filtration Chlorination	Aluminium sulphate Sodium hydroxide Chlorine gas Powdered activated carbon
Mildura	Merbein Irymple Mildura	Coagulation / flocculation Sedimentation / Clarification Slow sand filtration Chlorination	Aluminium sulphate Hydrated lime Polymer Chlorine gas Powdered activated carbon Fluorosilicic Acid Sodium Metabisulfite
Murrabit	Murrabit	Coagulation / flocculation Sedimentation / Clarification Granular media filtration Chlorination	Aluminium Chlorohydrate Sodium hydroxide Chlorine gas Powdered activated carbon
Piangil	Piangil	Coagulation / flocculation Sedimentation / Clarification Granular media filtration Chlorination	Aluminium Sulphate Sodium Hydroxide Chlorine gas Powdered activated carbon
Red Cliffs	Red Cliffs	Coagulation / flocculation Sedimentation / Clarification Granular media filtration Chlorination	Aluminium sulphate Sodium hydroxide Chlorine gas Powdered activated carbon Fluorosilicic Acid
Swan Hill	Lake Boga Nyah Nyah West Swan Hill Woorinen South	Coagulation / flocculation Sedimentation / Clarification Slow sand filtration Chlorination	Aluminium Chlorohydrate Sodium hydroxide Chlorine gas Powdered activated carbon Fluorosilicic Acid

## Coagulation and Flocculation

The first step of the conventional treatment process involves dosing a chemical coagulant to help gather suspended solids and organic material in the raw water. We use Aluminium Sulphate and Aluminium Chlorohydrate to bring about the coagulation process, which helps to form larger particles called 'flocs' which can be removed more readily by subsequent treatment steps. During flocculation the floc particles develop to a larger size. The larger size and weight of the floc then assists in the sedimentation process. Flocculant aids including polyelectrolytes are also commonly used to enhance the flocculation phase which further assists in the sedimentation process.

## Sedimentation

The purpose of sedimentation is to enhance the filtration process by removing particulates. Sedimentation is the process by which suspended particles are removed from the water by means of gravity or separation. In the sedimentation process, the water passes through a relatively quiet and still basin. In these conditions, the floc particles settle to the bottom of the basin while "clear" water passes out of the basin over an effluent baffle or weir. The solids collect on the basin bottom and are removed by a mechanical "sludge collection" device which scrapes the solids (sludge) to a collection point within the basin from which it is pumped to disposal or to a sludge treatment process.

## Solid Contact Clarification

The purpose of the solid contact clarification is the same as for the sedimentation process i.e. to enhance the filtration process by removing particulates. It involves mixing the influent flow with previously settled solids within a cylinder located in the centre of the clarifier. Gentle mixing within the reaction well promotes agglomeration of floc particles and/or chemical precipitates.

The aggregated solids settle out more rapidly in the clarification area. Even better clarity is achieved when particles become enmeshed in a sludge blanket layer. Rotating sludge scrapers transport settled solids to the centre of the basin for removal. Clarified overflow is removed through a circular launder system that draws water from the entire surface area to prevent solids carryover caused by uneven velocity currents.

## Diffused Air Flotation

The process of flotation consists of three steps:

- Bubble formation
- Attachment of bubbles to the solids
- Solids separation from the fluid

In DAF systems, air is pressurised under several atmospheres and then introduced into water, where it's mixed with pre-coagulated water just before it enters the flotation tank.

Upon attachment of air bubbles to the solid particles, the density of the solid becomes less than that of the surrounding fluid. In the process, the buoyant force lifts the solids to the surface to form a scum blanket, which is continuously swept to the periphery, automatically discharged into a scum trough by the skimming device.



## Filtration

Filtration occurs as the water passes through filters that help remove particles that have not settled in the sedimentation process. Sand filters are commonly used in the water treatment process and may contain layers of gravels, sands and filter coal. The sand filtration process removes fine suspended solid matter as well as some other particles including larger micro-organisms, resulting in clear water passing through.

## Disinfection

Water is disinfected to kill any pathogens (disease causing organisms) that remain in the treated water after filtration and provide protection within the distribution system. Without disinfection, the risk from waterborne disease is greatly increased. Disinfection is carried out by chlorination at all our water treatment plants in the form of Chlorine gas.

## Fluoridation

Water fluoridation is the adjustment of Fluoride in drinking water to a level that helps protect teeth against dental decay. We fluoridate 11 of our drinking water supplies. Fluoridation of the drinking water supplies is undertaken as per requirements of the Health (Fluoridation) Act 1973.

## pH Correction

Due to the addition of some coagulants and Chlorine, the pH of the water decreases, becoming more acidic. To inhibit corrosion and make the water suitable to use, the pH is adjusted to a neutral pH of around 7.0, by adding Lime or other alkaline chemicals such as Soda Ash or Sodium Hydroxide.

## Powdered Activated Carbon

PAC is derived from a variety of sources such as coal, wood and coconut. Due to its high adsorption capacity, i.e. ability to attract contaminants and bind them to its surface, PAC is used to assist in removing taste, odour compounds, blue green algae toxins and other impurities from water.

## Potassium Permanganate

Potassium Permanganate is used in cases where high concentrations of soluble Iron or Manganese is present in the source water. While dosing Potassium Permanganate is rarely required at our water treatment plants, this prevents potential nuisance stains and dirty water for customers.



# Drinking Water Quality Management

## Quality Management Systems

Lower Murray Water have a drinking water quality risk management plan based on the twelve elements of the 'Framework for Management of Drinking Water Quality', as described in the Australian Drinking Water Guideline (ADWG) 2011, and the requirements set out in the Safe Drinking Water Act 2003 (the Act). The plan identifies key water quality risks in the water supply system using a catchment to tap approach. Each key risk is assessed, and process put in place to manage those risks to provide safe drinking water to our customers.

## Verification Water Quality Monitoring

Water quality monitoring constitutes a significant part of our water supply activities. We have a water quality monitoring program that was designed based on the requirements of the Safe Drinking Water Regulations 2015, the Australian Drinking Water Guidelines 2011 (ADGW), including consideration of locality population numbers for bacterial monitoring.

We used the outcome of the sanitary survey to assist in identifying the source water quality hazards and risks, and reviewed the irrigation practices within the catchment area to identify the raw water quality parameters that potentially constitute health risks, and therefore require ongoing monitoring.

The ADWG 2011 provides a basis for assessing the quality of drinking water. The Microbiological assessment is based on *Escherichia coli* (E. coli), which is considered a definitive indicator for the presence of faecal contamination, and therefore, a health risk.

In terms of the physical and chemical monitoring, it's based on a combination of parameters that indicate the physical and aesthetic characteristics of water such as pH, colour and turbidity, as well as the chemical quality of the water, which include but not limited to free Chlorine levels, Iron and Manganese, Fluoride, Dissolved Salts, Aluminium, Copper, Lead, Chromium, Nickel, etc.

To comply with the water quality monitoring requirements set out in the Safe Drinking Water Act 2003 and Safe Drinking Water Regulations 2015, we use an external National Association of Testing Authorities (NATA) registered laboratory to perform all regulatory drinking water testing. Drinking water quality results are available in Appendix A (Attached).

During 2017/18 we collected over 1700 samples from our 16 water supply systems, and analysed for more than 40 parameters to assess water quality for health risks.

## Sampling Points

While the sampling points are representative of the water quality within their subsequent supply systems, which include customer taps, service reservoirs and the reticulation system, a review of the water sampling points was undertaken during 2015/2016 year to verify the locations of the current sampling points, ensure that they reflect the associated water quality risks within their distribution systems and assess the need to add in additional sampling points to reflect the expansion of the water supply localities.

## Issues

Regulation 14 of the Safe Drinking Water Regulations 2015 requires that water samples are analysed by an approved laboratory, that is, a laboratory that holds NATA accreditation in relation to testing drinking water for the specified parameters. The NATA accredited method for analysis of drinking water for E.coli requires that samples be processed within 24hrs of being collected, as a result of the samples not being delivered to the lab within the required timeframe, LMW conducted a review into the existing sampling and courier processes, resulting in splitting the so we have split our sample collection over to two days instead of one day and amended our sampling collection time to ensure sufficient time is available to deliver the samples, and process them before the maximum holding period of 24hrs has expired.



Lower Murray Water were found to be non-compliant with regulation 14, which was reported to the DHHS, and involves a requirement for samples collected as part of sampling program to be analysed.

The following issues related to the monitoring schedule have occurred during the 2017/2018 financial year:

- The regulatory water quality tests were not performed on the weekly reticulation samples collected on 28th December 2017. The missing parameters are shown in the following table.

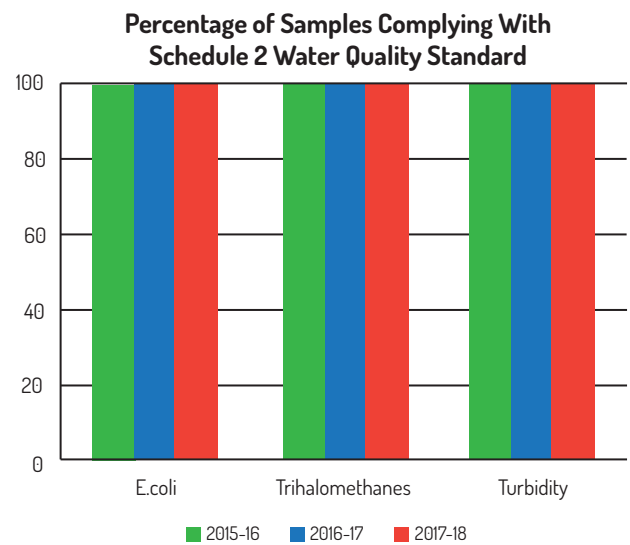
Date Sampled	Source of Sample	Testing Frequency	Water Quality Test Parameters	Locality
28 Dec 2017	Reticulation	Weekly	Turbidity, Microbiology (E.coli, Coliforms GPC)	Red Cliffs
28 Dec 2017	Reticulation	Weekly	Turbidity, Microbiology (E.coli, Coliforms GPC)	Irymple

The water quality tests for turbidity and Microbiology (E.coli and Coliforms GPC) were not performed on the weekly reticulation samples collected from Red Cliffs and Irymple on 28th December 2017. The investigation into this issue revealed that the samples were not delivered to the laboratory within the required 24 hour holding period for Microbial testing due to a courier error.

A comparison of test results of water samples collected in accordance with the sampling program set out in our Drinking Water Quality Management Plan (DWQMP) and percentage of complying samples over the last three financial years, based on the 2015 Drinking Water Regulations requirements, is shown in the below chart.

The high quality of the drinking water supplied by us continued for 2017/2018 reporting period, complying fully with all water quality standards detailed in Schedule 2 of the Safe Drinking Water Regulations, and the health guideline values specified in the Australian Drinking Water Guidelines (ADWG) 2011.

## Percentage of samples complying with schedule 2 water quality standard



This chart shows that Lower Murray Water continued its outstanding performance and achieved full compliance with the water quality standards for three consecutive years. In addition, the water quality test results of samples collected as part of Lower Murray Water’s drinking water quality monitoring program have also been compared to the previous two years results and found compliant with the water quality standards detailed in Schedule 2 of the Safe Drinking Water Regulations 2015.



## Water Quality Projects

Table 3 below shows the water quality improvement projects that were initiated in 2017/2018 financial year.

**Table 3 – Water Quality Improvement Projects**

Water Treatment Plant	Improvement Projects 2016/2017
All	ALL SITES Instrument Replacement
All	Urban ClearSCADA Program - STAGE 1 (Water)
Mildura 7th St	Inlet Pipe Work & Flow Splitting Upgrade
Mildura 7th St	Chlorine Analyser (14th St Tower)
Mildura West	Backwash de-chlorination
Red Cliffs	Alum Dosing Board Replacement
Robinvale	Construct filter to waste
Swan Hill	Water Treatment Plant Automation
Koondrook	Water Treatment Plant Programmable Logic Controller Automation
Koondrook	Install new Reduced Pressure Zone Valve (Backflow Prevention)
Murrabit	Water Treatment Plant Automation
Murrabit	Improve Flow Pacing of Package Plants
Kerang	Kerang Water Treatment Plant Programmable Logic Controller Automation
Kerang	Replace Treated Water Pump Station
Kerang	Install new Reduced Pressure Zone Valve (Backflow Prevention)

LMW achieved 100% compliance for all samples analysed in 2017/18 in accordance with the Safe Drinking Water Regulations requirements. During the financial year, there were no issues that could have affected the treated water quality, in spite of the upgrade projects that were completed. It was noted that the raw water quality has significantly improved, hence achieving high quality standards. Water treatment issues however may occasionally still occur due to a variety of factors, such as a change in raw water quality or asset breakdown. When these treatment issues occur, it may result in a change to the treatment process or a corrective action to ensure safe drinking water is maintained.



## Manganese Treatment

During the 2017/2018 financial year, we experienced moderate soluble Manganese levels in the raw water at Red Cliffs water treatment plant during the summer period, exacerbated by the accumulation of soluble Manganese in the recycling stream comprising the supernatant water from the drying beds, and backwash water from the backwash water tank. This problem was addressed by disposing of the recycled water stream into the Murray River after obtaining approval from the EPA. Whilst Manganese can lead to discolouration of treated water, which has a health guideline value of 0.5mg/L as per the ADWG 2011, all test results of samples collected from our water supply systems were compliant and the effect of Manganese on drinking water was limited to aesthetic issues and the water remained safe to drink.

Manganese has been an ongoing issue at Red Cliffs WTP and in previous years we used Potassium Permanganate as an oxidising agent to remove Manganese out of drinking water, and maintain the soluble Manganese levels below limits set within the Australian Drinking Water Guidelines 2011 (ADWG). In 2016/2017 financial year we used Calgon-T at all WTPs, which is a sequestering agent that prevents the oxidation of Manganese in the treated water, thus reducing the number of water quality complaints related to water discolouration. Due to the recurrent nature of this problem, we've liaised with the Environment Protection Authority (EPA) and submitted an application to obtain approval to discharge the recycled water with elevated Manganese levels back into the Murray River. The EPA has recently provided a permanent approval to discharge into the River after demonstrating that there is minimal environmental impact.

## Improvements

There have been a number of projects that contributed to improving water quality including upgrading the inlet works at Mildura seventh street, PLC automation at Swan Hill, Kerang and Murrabit, replacement of the treated water pump station at Kerang, installation of reduced pressure zone valves at Kerang and Koondrook for backflow protection, etc.

## Tank Cleaning

We have ongoing scheduled inspection and maintenance programs for clear water storage tanks and service reservoirs cleaning. Recent inspections of the storage reservoirs carried out in 2017/2018 financial year indicated no issues that require immediate actions. The works involved general inspections of the interior and exterior of the storages for sediment build-up, asset condition, and the roof area to prevent contamination that could result from rain water ingress, and desludging of water storages as required.

## Taste and Odour Treatment

Intermittent PAC dosing took place at some water treatment plants during times where elevated Blue Green Algae count were detected, or biovolume was above the trigger for PAC dosing. PAC was also dosed occasionally to remove taste and odour compounds.

## Fluoride Treatment

During the reporting period, the average optimal Fluoride concentration for dental decay recommended within the Code of practice for fluoridation of drinking water supplies – Health (Fluoridation) Act 1973, was mostly achieved within the main supply systems, and was slightly below the recommended concentration within the subsystems. The below the average optimum Fluoride result may be attributed to longer detention time, which may allow for the formation of insoluble Fluorides as a result of the reaction of Fluoride with calcium carbonate, and the fact that a number of Fluoride systems were taken offline for required reactive and scheduled repairs, and maintenance programs. Scheduled maintenance programs of fluoride equipment is carried out by the instrumentation suppliers, and professional technical staff. In line with the Fluoridation code of practice, LMW advises DHHS when any of the Fluoride plants are offline for greater than 72 hours.

## Emergency Management

### Section 18 & 22 Reporting

The Department of Health and Human Services (DHHS) must be notified under section 22 of the Act where drinking water is supplied such that it may pose a risk to human health or cause widespread public complaint.

Drinking water that does not meet a water quality standard is required to be notified to the Department of Health and Human Services (DHHS) under Section 18 and have ten days to do after becoming aware of the fact. During the reporting period we met all water quality standards and didn't need to report under s18 of the act.

## Reportable Incidents 2017-18

We are pleased to report that during the reporting period, there were no incidents that required reporting under section 18 or 22 of the Safe Drinking Water Act 2003.

## Undertakings under Section 30

During 2017/2018 we did not have any undertakings with the DHHS.

## Staff Training

All our water treatment plant operators have achieved Certificate III qualifications in water industry operations, apart from newly appointed operators. These operators are currently undertaking this training. In addition, our water treatment plant operators attend the Water Industry Operators Association conference in Bendigo on annual basis, visit other water authorities WTPs, attended Steve Hrudehy training workshop or watched the workshop DVD and other workshops and seminar events when available. We also engage instruments suppliers to conduct training on the operation and maintenance of the analysers. In 2017, we engaged Peter Mosse to run training on distribution system optimisation for the civil maintenance crews, operators, line managers and other staff members involved in water quality projects.

## Emergency Management Training

During 2017/2018 we did not carry out refresher training of our emergency management procedures. An Emergency Management Planning Committee (EMPC) was formed, which comprises a cross section of management representatives who have each been delegated specific emergency management responsibilities. The committee will aid and guide these representatives with their duties and provide direction for Emergency Management issues and tasks.

The Role of the EMPC is to provide direction to the custodians of the Emergency Management Plan, Crisis Management Plan and other related documents, and to the Corporation on priorities, risk appetite and budget. The relevant emergency procedure has been reviewed, updated and communicated to relevant staff members.



## Drinking Water Quality Standards

During 2017/2018 financial year we remained 100% compliant with water quality standards specified for drinking water in Schedule 2 of the Regulations and the ADWG 2011, for all samples collected as part of our drinking water quality monitoring program.

All drinking water quality results can be found in Appendix A of this report.

Lower Murray Water do not use Ozonation as part of water treatment processes and therefore does not test for its disinfection by-products.

**Table 4 - schedule 2 SDWR  
Drinking Water Quality Standards**

Parameter	Sampling frequency	Quality standards 2015
Escherichia coli	one sample per week *	All samples of drinking water collected are found to contain No Escherichia coli per 100 millilitres of drinking water, with the exception of any false positive sample.
Total Trihalomethanes	One sample per month	Less than or equal to 0.25 milligrams per litre of drinking water.
Turbidity	One sample per week	The 95th percentile of results for samples in any 12 month period must be less than or equal to 5.0 Nephelometric Turbidity Units.

## Water Quality Complaints

### Water Quality Complaint Management

A complaint is a written or verbal expression of dissatisfaction of the quality of the drinking water. We are committed to providing high quality, safe drinking water and continuously improving our services and communications to all customers. To ensure water quality complaints are resolved in appropriate timeframes, complaints are captured in the Corporation's customer management system 'Merit', which provides for workflow tracking of each complaint from registration to completion and produce reports as required. Merit directs the complaint to the relevant action officer to follow up with the complainants.

Complaints received after hours via our 1800 phone number are also directed to the relevant officer the next working day for follow up with the complainants if necessary.

If the issue cannot be resolved over the phone, an officer attends the property of concern to discuss the complaint with the complainant and take samples of water for testing/tasting. If necessary, water mains in the area of concern will be flushed.

Monthly complaint summary reports for Board meetings and quarterly reports for Essential Services Commission reporting are prepared from the Merit database.

## Water Quality Complaints

Over the reporting period, the main water quality complaint was for discolored water (17 complaints). Discolored water can be attributed to one or a combination of several factors which could include a burst water main within the area, change in the direction of water flow that could result in sloughing off sediment from the interior of mains, oxidised manganese or iron sediment, or potentially from a customer's internal plumbing.

Taste and odour was the other major water quality complaint for Lower Murray Water over the reporting period (15 complaints).

The taste and odour complaints can be generated by Blue Green Algae, soluble organics, chlorine residuals, extended detention times during low flows in the reticulation system. Algae blooms can result in the presence of taste and odour compounds such as Geosmin and 2-methylisoborneol (MIB). Reduced water consumption and extended retention of water in the reticulation system "long age" and dead ends, may also contribute to imparting taste and odour to the water.

LMW systematically undertake mains cleaning programs that assist in improving the quality, and reducing the number of water quality complaints to minimal. LMW monitors algae count/biovolume during the spring and summer season, where algae growth is accelerated due to optimal weather conditions. During Algae blooms, Lower Murray Water undertakes additional treatment measures involving dosing of activated carbon at water treatment plants to help absorb the taste and odour compounds. Whilst these compounds are not harmful at levels detected in drinking water, they do have a very low detection threshold.

The alleged sickness complaints decreased from seven in the previous year to two. This decrease may be attributed to better raw water quality extracted from the river system.

Table – 5A below shows a comparison between the number of water quality complaints received during 2017/2018 financial year, to those of the previous year.

**Table 5A - Types of Complaints Compared to Previous Reporting Period**

Type of Complaints	Number of Complaints		Comparison with previous reporting periods	Comments
	Current reporting period	Previous reporting period		
Colour	17	93	Decrease by seventy six complaints from previous reporting period.	The significant decrease may be attributed to better raw water quality in the river system, and improved process control.
Taste & Odour	15	26	Decrease by eleven complaints from previous reporting period.	The decrease may be attributed to reduced organics content in the raw water, and improved customers awareness of some typical water quality issues such as air in water, etc. that were not reported to LMW.
Blue water	0	0	No increase	
Alleged sickness	2	7	Decrease of seven complaints from previous reporting period.	The decrease may be attributed to better raw water quality in the river system, and improved process control.
Other	0	3	No increase	

Table – 5B shows the types of complaints received by each of LMW’s water sampling locality.

**Table 5B - Types of Complaints By Water Sampling Locality**

Water Sampling Locality	TYPE OF COMPLAINTS					
	Colour	Taste & odour	Blue water	Alleged sickness	Other	Total
Mildura	7	6	0	1	0	14
Irymple	4	1	0	0	0	5
Merbein	0	3	0	1	0	4
Red Cliffs	1	4	0	0	0	5
Robinvale	0	0	0	0	0	0
Nyah	0	0	0	0	0	0
Nyah West	0	0	0	0	0	0
Woorinen	0	0	0	0	0	0
Piangil	0	0	0	0	0	0
Swan Hill	3	1	0	0	0	4
Lake Boga	2	0	0	0	0	2
Wakool	0	0	0	0	0	0
Koondrook	0	0	0	0	0	0
Murrabit	0	0	0	0	0	0
Kerang	0	0	0	0	0	0
<b>Total</b>	17	15	0	2	0	34

Table 5C below shows the types of water quality complaints, total water quality complaints received during 2017/2018 financial year, and the number of complaints per 100 customers supplied. These complaints were individual isolated events.

**Table 5C - Water Quality Complaints**

Type of complaint	No. of complaint	No. of complaints per 100 customers supplied
Discoloured water	17	0.049
Taste/odour	15	0.043
Blue water	0	0.000
Air in water	0	0.000
Alleged Illness	2	0.006
Other	0	0.000

# Risk Management Plan Audit Findings

## Audit Process

The Department of Health requires Lower Murray Water to undertake an external audit of their risk management plan pursuant to the Safe Drinking Water Act 2003.

During the reporting period, The Secretary to the Department of Health and Human Services required Lower Murray Water to undertake an external audit of its risk management plan.

## A2017 - 2018 Audit Findings

The audit scope was developed based on the requirements under Section 10 of the Act. This requires a certified auditor by the Department of Health, to confirm Lower Murray Water has complied with the obligations imposed by Section 7(1) of the Act during the period from 28 June 2016 to 28 May 2018.

The external audit was completed in May 2018. Lower Murray Water (LMW) was found to be compliant with the obligations of the Safe Drinking Water Act 2003, with no non-conformances found.

The key findings of the audit are as follows:

- The LMW water quality management system complies with all aspects of SDWA 2003 and the associated regulation, SDWR 2015.
- Since the 2016 audit, the DWQMP has been substantially revised. The revised DWQMP features a logical and methodical approach to compliance with the SDWA.
- The Plants are maintained in a tidy condition and operate to specifications set by the Water Quality Management team to be consistent with the Australian Drinking Water Guidelines.
- The Water Quality Management Team has overseen substantial investigations and has achieved a high degree of integration with other teams within LMW.

Whilst LMW achieved full compliance with the Safe Drinking Water Act 2003 requirements, some Opportunities For Improvement (OFI) were identified, which Lower Murray Water has either implemented or is currently in the process of implementing. This includes:

**OFI 1:** We recommend that LMW ensure that all documents are dated and reviewed within the time required by the LMW Controlled Document Procedure.

LMW went through a restructure in late 2016 that resulted in significant changes to the roles and responsibilities of staff members, where all documents related to managing the water supply systems are attached to the position's duties, and due to the fact that it took some time for staff members to settle in and clarify their roles and responsibilities, some delays were inevitable. A comprehensive document review process is currently in place that involves authorising officers or custodians of controlled documents.

**OFI 2:** We recommend that LMW include a reference to the Sanitary Survey and the Source Vulnerability Assessment in the document Project Report – Health Based Target Trial in section 4.1 of the DWQMP, Water Supply System Analysis. The DWQMP has already a link to the “Health Based Targets – LMW’s implementation plan and associated timeframes”, which provides a link to the Health Based Target report that contains the sanitary survey and the source vulnerability assessment. However, to ease access to those documents, LMW will provide the proposed reference in the next DWQMP review that will be completed by June 2019.

**OFI 3:** We recommend that LMW include a specific reference to the document Drinking Water Quality Contingency Plans in section 8.2 of the DWQMP, Incident and Emergency Protocols.

A reference to the Emergency Response Plans is provided in the DWQMP. LMW will amend the wording to reflect the actual document title, i.e. Drinking Water Quality Contingency Plans in the next DWQMP review that will be completed by June 2019.

**OFI 4:** We recommend that LMW consider establishing a Water Quality Incident Notification System to the main stakeholders, and a Register to include all water quality events (working hours and after hours) which allows for management review and the identification and consideration of trends.

LMW’s SCADA system provides for the required register as it contains a log of all water quality events during working and after hours for all water supply systems. LMW will investigate options to establish a notification system for Critical Control Points’ breaches, which involves sending an email or SMS to relevant stakeholders.

**OFI 5:** We recommend that LMW consider improving the labelling of plant pipework, particularly on the dosing rigs. Over recent time, most of LMW's WTPs have undergone upgrade works, replacement or upgrade of dosing systems, which may have unintentionally resulted in removing previously labelled pipework. LMW will address this issue as soon as practicable due to some upgrade projects are being carried out at some of the plants.

**OFI 6:** We recommend that LMW include details of, or clear references to, secondary disinfection activities in the relevant Water Supply System Descriptions of the DWQMP. A full description of the water supply systems is provided in the DWQMP, including details of trim chlorination. LMW will summarise the details of trim chlorination in a dedicated table in the next DWQMP review that will be completed by June 2019.

## Regulated Water

### What is Regulated Water?

Section 6 of the Safe Drinking Water Act 2003 allows the Minister for Health to declare any water that is not drinking water, but that may be supplied to the public in circumstances in which it may be mistaken as being drinking water, to be 'regulated water' for the purposes of the Act.

Following consultation between the Department of Health and Human Services and us, the Minister for Health declared the water supplied by us to the Millewa area and Mystic Park water supply systems as regulated water as per Section 6 of the Act.

The declaration for the Millewa system was gazetted in the Victoria Government Gazette on 15 February 2007 and the Mystic Park system was gazetted in the Victoria Government Gazette Special Edition No. S135 on 19 May 2009.

Declaration as regulated water meant that we had to prepare and implement risk management plans for the Millewa and Mystic Park water supply systems. This was to minimise the risk that the water as supplied could be mistaken for drinking water.

We take all reasonable steps to ensure that residents and visitors to Meringur, Werrimull, Cullulleraine and Mystic Park are aware that the mains water supply to these towns is untreated and not suitable for consumption, this includes the following:

- Provide the "Living with an Untreated Water Supply" brochure and reminder notices to all our customers who are connected to an untreated water supply including private diverters, advising that untreated water is not suitable for drinking, food preparation and bathing.
- Supply the "Living with an Untreated Water Supply" brochure to accommodation facilities as requested to assist in informing guests that their supply is untreated and is not suitable for drinking, food preparation and bathing.
- Provide 'Do Not Drink' signs free of charge to the responsible managers of all publicly accessible taps connected to untreated water (e.g. parks, public toilets, schools, halls, caravan parks, etc.).
- Provide notification via information statements of the property's untreated water supply to the intending property purchasers.
- Provide new irrigation or domestic and stock customers with an information kit including this brochure – Living with an Untreated Water Supply.
- Make a copy of our customer charter available which details the respective rights and obligations of customers supplied with untreated water.
- Make this information available on our website: [www.lmw.vic.gov.au](http://www.lmw.vic.gov.au)





# Our Regulated Water Supplies

## Millewa Water Supply System

This is a non-potable water system that supplies an area which includes the towns of Meringur, Werrimull and Cullulleraine and also the surrounding rural properties in the Millewa district. The water is sourced from Lake Cullulleraine which is filled directly from the Murray River via an earthen channel. The population served by this supply is estimated to be less than 250.

The water supply system is primarily a domestic and stock water supply to dry-land farmers in the Millewa area located to the west of Mildura. Previously, the water from Lake Cullulleraine had been chlorinated as it was pumped into the system to control the nuisance growth *Plumatella*, which if allowed to become established within a pipeline system can cause severe ongoing operational problems. However, in 2013 we commissioned a Water Quality Plant at Lake Cullulleraine. The plant has improved water quality; provides clearer water for domestic uses such as washing and farmers can benefit as well by reducing the impact on the spraying equipment.

The treatment plant comprises two large lagoons that alternate as storages for removing turbidity. Aluminium Sulphate is used to aid in the precipitation of the suspended matter. Clarified water is chlorinated whilst gravitating into a clear water storage tank from which it is pumped into the Bambill water storage dam or into the Cullulleraine reticulation system.

The storage dam at Bambill is 182 ML earthen water storage within the Millewa system, located at Bambill South which supplies operating head for the system when the treated water pumps are not operating.

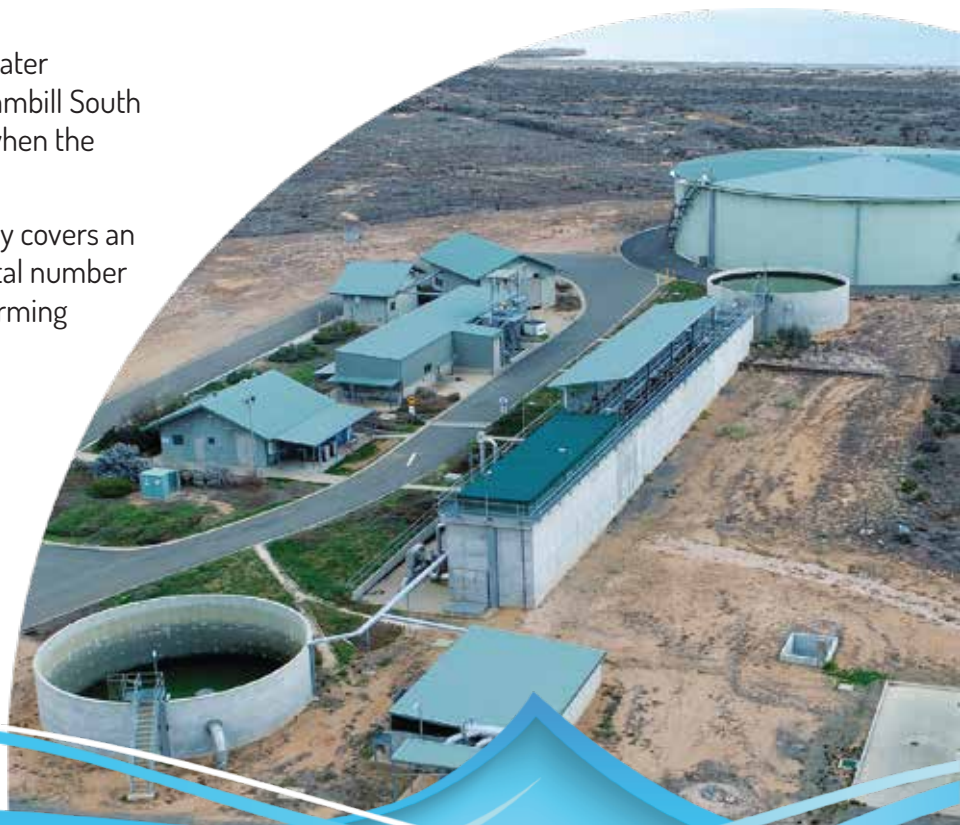
The dry-land area serviced by the Millewa supply covers an area of approximately 243,500 hectares. The total number of connections for the supply to the dry-land farming properties is 252.

## Mystic Park Water Supply System

This is a non-potable water system supplying the small township of Mystic Park which is located to the south of Swan Hill. In May 2008 we assumed responsibility for the Mystic Park untreated water supply, previously the responsibility of the Gannawarra Shire Council.

The water is sourced from nearby Kangaroo Lake before being screened and pumped to an earthen dam at the township. A small amount of coagulant is added as the water enters the dam. This dam provides some detention time assisting in the reduction of turbidity in the water, however no disinfection is provided.

The town population is currently 34 with 16 serviced properties, including a hotel, recreation reserve and cenotaph.



# Appendix A - Water Quality Tables

All samples were taken in reticulations unless otherwise noted.

Tables 1 to 3 contain results reporting against the standards listed in Schedule 2 of the *Safe Drinking Water Regulations 2015*.

**Table 1 E.coli**

Water Quality Standard: All samples of drinking water collected are found to contain no Escherichia coli per 100 millilitres of drinking water, with the exception of any false positive sample.

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum detected (orgs/100mL)	Number of detections and investigations conducted (s.22)	Number of samples where standard was not met (s.18)
Irymple	Weekly	51*	0	0	0
Kerang	Weekly	52	0	0	0
Koondrook	Weekly	52	0	0	0
Lake Boga	Weekly	52	0	0	0
Merbein	Weekly	52	0	0	0
Mildura	Weekly	116**	0	0	0
Murrabit	Weekly	52	0	0	0
Nyah	Weekly	52	0	0	0
Nyah West	Weekly	52	0	0	0
Piangil	Weekly	52	0	0	0
Red Cliffs	Weekly	51*	0	0	0
Robinvale	Weekly	52	0	0	0
Swan Hill	Weekly	76**	0	0	0
Woorinen South	Weekly	52	0	0	0

\*Missing results for Irymple and Red Cliffs for samples taken 28/12/2018. Samples arrived at the contractor laboratory outside of the maximum holding period for microbiology testing due to courier error. Protocols have been developed and implemented to prevent this recurring.

\*\*Additional number of samples were taken for Mildura & Swan Hill due to the larger populations serviced by these supplies.

## Table 2 Trihalomethanes

Water Quality Standard: Total Trihalomethanes less than or equal to 0.25 milligrams per litre of drinking water.

Water Sampling 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 (s.18)
Irymple	Monthly	12	0.25	0.060	0.038	0
Kerang	Monthly	12	0.25	0.059	0.032	0
Koondrook	Monthly	12	0.25	0.072	0.040	0
Lake Boga	Monthly	12	0.25	0.076	0.040	0
Merbein	Monthly	12	0.25	0.072	0.045	0
Mildura	Monthly	12	0.25	0.061	0.029	0
Murrabit	Monthly	12	0.25	0.081	0.039	0
Nyah	Monthly	12	0.25	0.089	0.057	0
Nyah West	Monthly	12	0.25	0.076	0.051	0
Piangil	Monthly	12	0.25	0.075	0.044	0
Red Cliffs	Monthly	12	0.25	0.074	0.045	0
Robinvale	Monthly	12	0.25	0.054	0.038	0
Swan Hill	Monthly	12	0.25	0.044	0.026	0
Woorinen South	Monthly	12	0.25	0.081	0.045	0

### Table 3 Turbidity

Water Quality Standard: The 95th percentile of results for samples in any 12 month period must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU).

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum turbidity in a sample (NTU)	Maximum 95th percentile of turbidity results in any 12 months (NTU)	Number of 95th percentile of results in of results in any 12 months above standard (s.18)
Irymple	Weekly	52	0.4	0.1	0
Kerang	Weekly	52	0.5	0.1	0
Koondrook	Weekly	52	0.4	0.1	0
Lake Boga	Weekly	52	0.2	0.1	0
Merbein	Weekly	52	0.5	0.2	0
Mildura	Weekly	52	2.0	0.3	0
Murrabit	Weekly	52	0.5	0.1	0
Nyah	Weekly	52	<0.1	0.1	0
Nyah West	Weekly	52	0.2	0.1	0
Piangil	Weekly	52	0.3	0.1	0
Red Cliffs	Weekly	52	0.4	0.1	0
Robinvale	Weekly	52	0.7	0.2	0
Swan Hill	Weekly	52	0.2	0.1	0
Woorinen South	Weekly	52	0.1	0.1	0

## Table 4 Fluoride

Water Quality Standard: The total concentration of fluoride in drinking water should not exceed 1.5 mg/L.

Water Sampling Locality	Frequency of Sampling	Number of Samples	Drinking water quality standard (mg/L)	Target optimum operating fluoride concentration (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s.18)
Irymple	Monthly	12	1.5	0.8	0.78	0.56	0
Kerang	Monthly	12	1.5	0.8	0.96	0.63	0
Lake Boga	Monthly	12	1.5	0.8	0.82	0.57	0
Merbein	Monthly	12	1.5	0.8	0.75	0.38	0
Mildura	Monthly	12	1.5	0.8	0.82	0.55	0
Nyah	Monthly	12	1.5	0.8	0.82	0.58	0
Nyah West	Monthly	12	1.5	0.8	0.80	0.57	0
Red Cliffs	Monthly	12	1.5	0.8	0.74	0.65	0
Robinvale	Monthly	12	1.5	0.8	0.90	0.74	0
Swan Hill	Monthly	12	1.5	0.8	0.88	0.56	0
Woorinen South	Monthly	12	1.5	0.8	0.80	0.54	0

Tables 5 to 38 inclusive are results reporting against the Australian Drinking Water Guidelines 2011 (ADWG), health & aesthetic guidelines.

Tables 9 to 20 & 35 to 41, inclusive, are entering reticulation samples at the treatment plants, these are indicative of the levels within the respective reticulations.

Tables 9 to 16 inclusive, which have 6 monthly scheduling, have 3 samples are reported for Mildura supply as both the Mildura & Mildura West WTP's were operating simultaneously for two of the sampling events.

Tables 17-20 inclusive, which have 3 monthly scheduling, have 6 samples are reported for Mildura supply as both the Mildura & Mildura West WTP's were operating simultaneously for two of the quarterly sampling events.

Tables 21 & 22, Gross Alpha Activity and Gross Beta Activity are conducted every 5 years on source water samples. 2015/16 results are shown.

## Table 5 Chloroacetic Acid

Health Guideline Value (ADWG) 0.15 mg/L.

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	Monthly	12	<0.005	Yes
Kerang	Monthly	12	<0.005	Yes
Koondrook	Monthly	12	<0.005	Yes
Lake Boga	Monthly	12	<0.005	Yes
Merbein	Monthly	12	<0.005	Yes
Mildura	Monthly	12	<0.005	Yes
Murrabit	Monthly	12	<0.005	Yes
Nyah	Monthly	12	<0.005	Yes
Nyah West	Monthly	12	<0.005	Yes
Piangil	Monthly	12	<0.005	Yes
Red Cliffs	Monthly	12	<0.005	Yes
Robinvale	Monthly	12	<0.005	Yes
Swan Hill	Monthly	12	<0.005	Yes
Woorinen South	Monthly	12	<0.005	Yes

## Table 6 Dichloroacetic Acid

Health Guideline Value (ADWG) 0.1 mg/L.

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	Monthly	12	0.014	Yes
Kerang	Monthly	12	0.016	Yes
Koondrook	Monthly	12	0.024	Yes
Lake Boga	Monthly	12	0.024	Yes
Merbein	Monthly	12	0.018	Yes
Mildura	Monthly	12	0.012	Yes
Murrabit	Monthly	12	0.024	Yes
Nyah	Monthly	12	0.011	Yes
Nyah West	Monthly	12	0.011	Yes
Piangil	Monthly	12	0.033	Yes
Red Cliffs	Monthly	12	0.015	Yes
Robinvale	Monthly	12	0.018	Yes
Swan Hill	Monthly	12	0.012	Yes
Woorinen South	Monthly	12	0.020	Yes

**Table 7 Trichloroacetic Acid**

Health Guideline Value (ADWG) 0.1 mg/L.

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Irymple</b>	Monthly	12	0.013	Yes
<b>Kerang</b>	Monthly	12	0.019	Yes
<b>Koondrook</b>	Monthly	12	0.024	Yes
<b>Lake Boga</b>	Monthly	12	0.022	Yes
<b>Merbein</b>	Monthly	12	0.016	Yes
<b>Mildura</b>	Monthly	12	0.012	Yes
<b>Murrabit</b>	Monthly	12	0.027	Yes
<b>Nyah</b>	Monthly	12	0.023	Yes
<b>Nyah West</b>	Monthly	12	0.025	Yes
<b>Piangil</b>	Monthly	12	0.034	Yes
<b>Red Cliffs</b>	Monthly	12	0.016	Yes
<b>Robinvale</b>	Monthly	12	0.016	Yes
<b>Swan Hill</b>	Monthly	12	0.012	Yes
<b>Woorinen South</b>	Monthly	12	0.020	Yes



**Table 8 Aluminium**

Aesthetic Guideline Value (ADWG) 0.2 mg/L (acid soluble)

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	Monthly	12	0.05	Yes
Kerang	Monthly	12	0.08	Yes
Koondrook	Monthly	12	0.09	Yes
Lake Boga	Monthly	12	0.02	Yes
Merbein	Monthly	12	0.04	Yes
Mildura	Monthly	12	0.05	Yes
Murrabit	Monthly	12	0.02	Yes
Nyah	Monthly	12	0.02	Yes
Nyah West	Monthly	12	0.02	Yes
Piangil	Monthly	12	0.14	Yes
Red Cliffs	Monthly	12	0.04	Yes
Robinvale	Monthly	12	0.01	Yes
Swan Hill	Monthly	12	0.01	Yes
Woorinen South	Monthly	12	0.08	Yes

**Table 9 2,4 Dichlorophenoxy acetic acid**

Health Guideline Value (ADWG) 0.03 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Kerang	6 Monthly	2	<0.01	Yes
Koondrook	6 Monthly	2	<0.01	Yes
Mildura	6 Monthly	3	<0.01	Yes
Murrabit	6 Monthly	2	<0.01	Yes
Piangil	6 Monthly	2	<0.01	Yes
Red Cliffs	6 Monthly	2	<0.01	Yes
Robinvale	6 Monthly	2	<0.01	Yes
Swan Hill	6 Monthly	2	<0.01	Yes

**Table 10 Benzene**

Health Guideline Value (ADWG) 0.001 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.001	Yes
<b>Mildura</b>	6 Monthly	3	<0.001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.001	Yes
<b>Piangil</b>	6 Monthly	2	<0.001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.001	Yes

**Table 11 Carbon Tetrachloride**

Health Guideline Value (ADWG) 0.003 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.001	Yes
<b>Mildura</b>	6 Monthly	3	<0.001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.001	Yes
<b>Piangil</b>	6 Monthly	2	<0.001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.001	Yes

**Table 12 1,2 Dichloroethane**

Health Guideline Value (ADWG) 0.003 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.001	Yes
<b>Mildura</b>	6 Monthly	3	<0.001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.001	Yes
<b>Piangil</b>	6 Monthly	2	<0.001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.001	Yes

**Table 13 1,1 Dichloroethene**

Health Guideline Value (ADWG) 0.03 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.0001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.0001	Yes
<b>Mildura</b>	6 Monthly	3	<0.0001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.0001	Yes
<b>Piangil</b>	6 Monthly	2	<0.0001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.0001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.0001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.0001	Yes

**Table 14 Pentachlorophenol**

Health Guideline Value (ADWG) 0.01 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.001	Yes
<b>Mildura</b>	6 Monthly	3	<0.001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.001	Yes
<b>Piangil</b>	6 Monthly	2	<0.001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.001	Yes

**Table 15 Tetrachloroethene**

Health Guideline Value (ADWG) 0.05 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.001	Yes
<b>Mildura</b>	6 Monthly	3	<0.001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.001	Yes
<b>Piangil</b>	6 Monthly	2	<0.001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.001	Yes

**Table 16 2,4,6 Trichlorophenol**

Health Guideline Value (ADWG) 0.02 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	6 Monthly	2	<0.001	Yes
<b>Koondrook</b>	6 Monthly	2	<0.001	Yes
<b>Mildura</b>	6 Monthly	3	<0.001	Yes
<b>Murrabit</b>	6 Monthly	2	<0.001	Yes
	6 Monthly	2	<0.001	Yes
<b>Red Cliffs</b>	6 Monthly	2	<0.001	Yes
<b>Robinvale</b>	6 Monthly	2	<0.001	Yes
<b>Swan Hill</b>	6 Monthly	2	<0.001	Yes

**Table 17 Sulphate**

Aesthetic Guideline Value (ADWG) 250 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	52	Yes
<b>Koondrook</b>	3 Monthly	4	36	Yes
<b>Mildura</b>	3 Monthly	6	32	Yes
<b>Murrabit</b>	3 Monthly	4	4	Yes
<b>Piangil</b>	3 Monthly	4	26	Yes
<b>Red Cliffs</b>	3 Monthly	4	30	Yes
<b>Robinvale</b>	3 Monthly	4	22	Yes
<b>Swan Hill</b>	3 Monthly	4	11	Yes

**Table 18 Arsenic**

Health Guideline Value (ADWG) 0.01 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	<0.001	Yes
<b>Koondrook</b>	3 Monthly	4	<0.001	Yes
<b>Mildura</b>	3 Monthly	6	<0.001	Yes
<b>Murrabit</b>	3 Monthly	4	<0.001	Yes
<b>Piangil</b>	3 Monthly	4	<0.001	Yes
<b>Red Cliffs</b>	3 Monthly	4	<0.001	Yes
<b>Robinvale</b>	3 Monthly	4	<0.001	Yes
<b>Swan Hill</b>	3 Monthly	4	<0.001	Yes

**Table 19 Selenium**

Health Guideline Value (ADWG) 0.01 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	<0.001	Yes
<b>Koondrook</b>	3 Monthly	4	<0.001	Yes
<b>Mildura</b>	3 Monthly	6	<0.001	Yes
<b>Murrabit</b>	3 Monthly	4	<0.001	Yes
<b>Piangil</b>	3 Monthly	4	<0.001	Yes
<b>Red Cliffs</b>	3 Monthly	4	<0.001	Yes
<b>Robinvale</b>	3 Monthly	4	<0.001	Yes
<b>Swan Hill</b>	3 Monthly	4	<0.001	Yes

**Table 20 Mercury**

Health Guideline Value (ADWG) 0.001 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	<0.0001	Yes
<b>Koondrook</b>	3 Monthly	4	<0.0001	Yes
<b>Mildura</b>	3 Monthly	6	<0.0001	Yes
<b>Murrabit</b>	3 Monthly	4	<0.0001	Yes
<b>Piangil</b>	3 Monthly	4	<0.0001	Yes
<b>Red Cliffs</b>	3 Monthly	4	<0.0001	Yes
<b>Robinvale</b>	3 Monthly	4	<0.0001	Yes
<b>Swan Hill</b>	3 Monthly	4	<0.0001	Yes

**Table 21 Gross Alpha Activity**

Health Guideline Value (ADWG) 0.5 Bq/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (Bq/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	5 yearly	1	<0.05	Yes
<b>Koondrook</b>	5 yearly	1	<0.05	Yes
<b>Mildura</b>	5 yearly	2	<0.05	Yes
<b>Murrabit</b>	5 yearly	1	<0.05	Yes
<b>Piangil</b>	5 yearly	1	<0.05	Yes
<b>Red Cliffs</b>	5 yearly	1	<0.05	Yes
<b>Robinvale</b>	5 yearly	1	<0.05	Yes
<b>Swan Hill</b>	5 yearly	1	<0.05	Yes

2015 results, samples are taken every 5 years

**Table 22 Gross Beta Activity**

Health Guideline Value (ADWG) 0.5 Bq/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (Bq/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	5 yearly	1	<0.1	Yes
<b>Koondrook</b>	5 yearly	1	<0.1	Yes
<b>Mildura</b>	5 yearly	2	<0.1	Yes
<b>Murrabit</b>	5 yearly	1	<0.1	Yes
<b>Piangil</b>	5 yearly	1	<0.1	Yes
<b>Red Cliffs</b>	5 yearly	1	<0.1	Yes
<b>Robinvale</b>	5 yearly	1	<0.1	Yes
<b>Swan Hill</b>	5 yearly	1	<0.1	Yes

2015 results, samples are taken every 5 years

**Table 23 Lead**

Health Guideline Value (ADWG) 0.01 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Irymple</b>	3 Monthly	4	<0.001	Yes
<b>Kerang</b>	3 Monthly	4	<0.001	Yes
<b>Koondrook</b>	3 Monthly	4	<0.001	Yes
<b>Lake Boga</b>	3 Monthly	4	<0.001	Yes
<b>Merbein</b>	3 Monthly	4	<0.001	Yes
<b>Mildura</b>	3 Monthly	4	<0.001	Yes
<b>Murrabit</b>	3 Monthly	4	<0.001	Yes
<b>Nyah</b>	3 Monthly	4	<0.001	Yes
<b>Nyah West</b>	3 Monthly	4	<0.001	Yes
<b>Piangil</b>	3 Monthly	4	<0.001	Yes
<b>Red Cliffs</b>	3 Monthly	4	<0.001	Yes
<b>Robinvale</b>	3 Monthly	4	<0.001	Yes
<b>Swan Hill</b>	3 Monthly	4	<0.001	Yes
<b>Woorinen South</b>	3 Monthly	4	<0.001	Yes



**Table 24 Nickel**

Health Guideline Value (ADWG) 0.02 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	<0.001	Yes
Kerang	3 Monthly	4	<0.001	Yes
Koondrook	3 Monthly	4	<0.001	Yes
Lake Boga	3 Monthly	4	<0.001	Yes
Merbein	3 Monthly	4	<0.001	Yes
Mildura	3 Monthly	4	<0.001	Yes
Murrabit	3 Monthly	4	<0.001	Yes
Nyah	3 Monthly	4	<0.001	Yes
Nyah West	3 Monthly	4	<0.001	Yes
Piangil	3 Monthly	4	<0.001	Yes
Red Cliffs	3 Monthly	4	<0.001	Yes
Robinvale	3 Monthly	4	<0.001	Yes
Swan Hill	3 Monthly	4	<0.001	Yes
Woorinen South	3 Monthly	4	<0.001	Yes

**Table 25 Zinc**

Aesthetic Guideline Value (ADWG) 3 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	0.008	Yes
Kerang	3 Monthly	4	0.015	Yes
Koondrook	3 Monthly	4	0.017	Yes
Lake Boga	3 Monthly	4	0.006	Yes
Merbein	3 Monthly	4	0.007	Yes
Mildura	3 Monthly	4	0.008	Yes
Murrabit	3 Monthly	4	0.006	Yes
Nyah	3 Monthly	4	0.008	Yes
Nyah West	3 Monthly	4	0.012	Yes
Piangil	3 Monthly	4	0.007	Yes
Red Cliffs	3 Monthly	4	0.006	Yes
Robinvale	3 Monthly	4	0.008	Yes
Swan Hill	3 Monthly	4	0.007	Yes
Woorinen South	3 Monthly	4	0.036	Yes

**Table 26 Nitrate Nitrogen**

Health Guideline Value (ADWG) 50 mg/L (as Nitrate)

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum mg/L (as Nitrate)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	0.03	Yes
Kerang	3 Monthly	4	0.05	Yes
Koondrook	3 Monthly	4	0.02	Yes
Lake Boga	3 Monthly	4	0.01	Yes
Merbein	3 Monthly	4	0.04	Yes
Mildura	3 Monthly	4	0.02	Yes
Murrabit	3 Monthly	4	0.05	Yes
Nyah	3 Monthly	4	0.17	Yes
Nyah West	3 Monthly	4	0.06	Yes
Piangil	3 Monthly	4	0.04	Yes
Red Cliffs	3 Monthly	4	0.03	Yes
Robinvale	3 Monthly	4	0.06	Yes
Swan Hill	3 Monthly	4	0.13	Yes
Woorinen South	3 Monthly	4	0.06	Yes

**Table 27 Cyanide**

Health Guideline Value (ADWG) 0.08 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Irymple</b>	3 Monthly	4	<0.005	Yes
<b>Kerang</b>	3 Monthly	4	<0.005	Yes
<b>Koondrook</b>	3 Monthly	4	<0.005	Yes
<b>Lake Boga</b>	3 Monthly	4	<0.005	Yes
<b>Merbein</b>	3 Monthly	4	<0.005	Yes
<b>Mildura</b>	3 Monthly	4	<0.005	Yes
<b>Murrabit</b>	3 Monthly	4	<0.005	Yes
<b>Nyah</b>	3 Monthly	4	<0.005	Yes
<b>Nyah West</b>	3 Monthly	4	<0.005	Yes
<b>Piangil</b>	3 Monthly	4	<0.005	Yes
<b>Red Cliffs</b>	3 Monthly	4	<0.005	Yes
<b>Robinvale</b>	3 Monthly	4	<0.005	Yes
<b>Swan Hill</b>	3 Monthly	4	<0.005	Yes
<b>Woorinen South</b>	3 Monthly	4	<0.005	Yes

**Table 28 Chromium**

Health Guideline Value (ADWG) 0.05 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	<0.001	Yes
Kerang	3 Monthly	4	<0.001	Yes
Koondrook	3 Monthly	4	<0.001	Yes
Lake Boga	3 Monthly	4	<0.001	Yes
Merbein	3 Monthly	4	<0.001	Yes
Mildura	3 Monthly	4	<0.001	Yes
Murrabit	3 Monthly	4	<0.001	Yes
Nyah	3 Monthly	4	<0.001	Yes
Nyah West	3 Monthly	4	<0.001	Yes
Piangil	3 Monthly	4	<0.001	Yes
Red Cliffs	3 Monthly	4	<0.001	Yes
Robinvale	3 Monthly	4	<0.001	Yes
Swan Hill	3 Monthly	4	<0.001	Yes
Woorinen South	3 Monthly	4	<0.001	Yes

## Table 29 Cadmium

Health Guideline Value (ADWG) 0.002 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	<0.0002	Yes
Kerang	3 Monthly	4	<0.0002	Yes
Koondrook	3 Monthly	4	<0.0002	Yes
Lake Boga	3 Monthly	4	<0.0002	Yes
Merbein	3 Monthly	4	<0.0002	Yes
Mildura	3 Monthly	4	<0.0002	Yes
Murrabit	3 Monthly	4	<0.0002	Yes
Nyah	3 Monthly	4	<0.0002	Yes
Nyah West	3 Monthly	4	<0.0002	Yes
Piangil	3 Monthly	4	<0.0002	Yes
Red Cliffs	3 Monthly	4	<0.0002	Yes
Robinvale	3 Monthly	4	<0.0002	Yes
Swan Hill	3 Monthly	4	<0.0002	Yes
Woorinen South	3 Monthly	4	<0.0002	Yes

**Table 30 Copper**

Health Guideline Value (ADWG) 2 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	0.005	Yes
Kerang	3 Monthly	4	0.016	Yes
Koondrook	3 Monthly	4	0.015	Yes
Lake Boga	3 Monthly	4	0.030	Yes
Merbein	3 Monthly	4	0.006	Yes
Mildura	3 Monthly	4	0.017	Yes
Murrabit	3 Monthly	4	0.016	Yes
Nyah	3 Monthly	4	0.026	Yes
Nyah West	3 Monthly	4	0.068	Yes
Piangil	3 Monthly	4	0.006	Yes
Red Cliffs	3 Monthly	4	0.004	Yes
Robinvale	3 Monthly	4	0.017	Yes
Swan Hill	3 Monthly	4	0.023	Yes
Woorinen South	3 Monthly	4	0.014	Yes

**Table 31 Manganese**

Health Guideline Value (ADWG) 0.5 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	0.008	Yes
Kerang	3 Monthly	4	0.003	Yes
Koondrook	3 Monthly	4	0.003	Yes
Lake Boga	3 Monthly	4	<0.001	Yes
Merbein	3 Monthly	4	0.007	Yes
Mildura	3 Monthly	4	0.006	Yes
Murrabit	3 Monthly	4	<0.001	Yes
Nyah	3 Monthly	4	<0.001	Yes
Nyah West	3 Monthly	4	<0.001	Yes
Piangil	3 Monthly	4	0.003	Yes
Red Cliffs	3 Monthly	4	0.006	Yes
Robinvale	3 Monthly	4	0.007	Yes
Swan Hill	3 Monthly	4	<0.001	Yes
Woorinen South	3 Monthly	4	<0.001	Yes



**Table 32 pH**

Aesthetic Guideline Range (ADWG) 6.5-8.5 pH Units

Water Sampling Locality	Frequency of Sampling	Number of Samples	Minimum pH Units	Maximum pH Units	Aesthetic operating range
Irymple	Weekly	52	7.0	7.6	6.5-8.5
Kerang	Weekly	52	7.1	7.4	6.5-8.5
Koondrook	Weekly	52	6.8	8.2	6.5-8.5
Lake Boga	Weekly	52	7.2	7.6	6.5-8.5
Merbein	Weekly	52	6.9	7.6	6.5-8.5
Mildura	Weekly	52	7.0	7.5	6.5-8.5
Murrabit	Weekly	52	6.7	7.3	6.5-8.5
Nyah	Weekly	52	6.9	7.3	6.5-8.5
Nyah West	Weekly	52	6.9	7.5	6.5-8.5
Piangil	Weekly	52	6.9	7.8	6.5-8.5
Red Cliffs	Weekly	52	7.3	7.7	6.5-8.5
Robinvale	Weekly	52	7.2	7.7	6.5-8.5
Swan Hill	Weekly	52	6.8	7.5	6.5-8.5
Woorinen South	Weekly	52	6.9	7.4	6.5-8.5

**Table 33 Colour**

Aesthetic Guideline Value (ADWG) 15 HU\*

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum Pt/Co Units*	Met ADWG guideline value (Yes/No)
<b>Irymple</b>	Monthly	12	2	Yes
<b>Kerang</b>	Monthly	12	2	Yes
<b>Koondrook</b>	Monthly	12	2	Yes
<b>Lake Boga</b>	Monthly	12	2	Yes
<b>Merbein</b>	Monthly	12	2	Yes
<b>Mildura</b>	Monthly	12	2	Yes
<b>Murrabit</b>	Monthly	12	2	Yes
<b>Nyah</b>	Monthly	12	2	Yes
<b>Nyah West</b>	Monthly	12	2	Yes
<b>Piangil</b>	Monthly	12	2	Yes
<b>Red Cliffs</b>	Monthly	12	4	Yes
<b>Robinvale</b>	Monthly	12	2	Yes
<b>Swan Hill</b>	Monthly	12	2	Yes
<b>Woorinen South</b>	Monthly	12	2	Yes

\*Pt-Co Units = Hazen Units (HU) = PCU = Platinum Cobalt Color

**Table 34 Iron**

Aesthetic Guideline Value (ADWG) 0.3 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
Irymple	3 Monthly	4	0.04	Yes
Kerang	3 Monthly	4	<0.01	Yes
Koondrook	3 Monthly	4	0.02	Yes
Lake Boga	3 Monthly	4	0.02	Yes
Merbein	3 Monthly	4	0.02	Yes
Mildura	3 Monthly	4	0.03	Yes
Murrabit	3 Monthly	4	<0.01	Yes
Nyah	3 Monthly	4	<0.01	Yes
Nyah West	3 Monthly	4	0.01	Yes
Piangil	3 Monthly	4	<0.01	Yes
Red Cliffs	3 Monthly	4	<0.01	Yes
Robinvale	3 Monthly	4	<0.01	Yes
Swan Hill	3 Monthly	4	<0.01	Yes
Woorinen South	3 Monthly	4	<0.01	Yes

**Table 35 Hardness**Aesthetic Guideline Value (ADWG) 200 mg/L (as CaCO<sub>3</sub>)

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	67	Yes
<b>Koondrook</b>	3 Monthly	4	23	Yes
<b>Mildura</b>	3 Monthly	6	63	Yes
<b>Murrabit</b>	3 Monthly	4	44	Yes
<b>Piangil</b>	3 Monthly	4	24	Yes
<b>Red Cliffs</b>	3 Monthly	4	43	Yes
<b>Robinvale</b>	3 Monthly	4	37	Yes
<b>Swan Hill</b>	3 Monthly	4	45	Yes

**Table 36 Chloride**

Aesthetic Guideline Value (ADWG) 250 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	16	Yes
<b>Koondrook</b>	3 Monthly	4	11	Yes
<b>Mildura</b>	3 Monthly	6	39	Yes
<b>Murrabit</b>	3 Monthly	4	24	Yes
<b>Piangil</b>	3 Monthly	4	17	Yes
<b>Red Cliffs</b>	3 Monthly	4	37	Yes
<b>Robinvale</b>	3 Monthly	4	24	Yes
<b>Swan Hill</b>	3 Monthly	4	56	Yes

**Table 37 Sodium**

Aesthetic Guideline Value (ADWG) 180 mg/L

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	20	Yes
<b>Koondrook</b>	3 Monthly	4	22	Yes
<b>Mildura</b>	3 Monthly	6	32	Yes
<b>Murrabit</b>	3 Monthly	4	16	Yes
<b>Piangil</b>	3 Monthly	4	18	Yes
<b>Red Cliffs</b>	3 Monthly	4	34	Yes
<b>Robinvale</b>	3 Monthly	4	26	Yes
<b>Swan Hill</b>	3 Monthly	4	31	Yes

**Table 38 Conductivity**

Aesthetic Guideline Value (ADWG) 830 uS/cm\*

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)	Met ADWG guideline value (Yes/No)
<b>Kerang</b>	3 Monthly	4	230	Yes
<b>Koondrook</b>	3 Monthly	4	150	Yes
<b>Mildura</b>	3 Monthly	6	250	Yes
<b>Murrabit</b>	3 Monthly	4	170	Yes
<b>Piangil</b>	3 Monthly	4	160	Yes
<b>Red Cliffs</b>	3 Monthly	4	240	Yes
<b>Robinvale</b>	3 Monthly	4	200	Yes
<b>Swan Hill</b>	3 Monthly	4	240	Yes

\*Total dissolved solids 600 mg/L

### Table 39 Calcium

No Guideline Value

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)
Kerang	3 Monthly	4	20
Koondrook	3 Monthly	4	3.9
Mildura	3 Monthly	6	15
Murrabit	3 Monthly	4	8.3
Piangil	3 Monthly	4	4.4
Red Cliffs	3 Monthly	4	7.5
Robinvale	3 Monthly	4	6.6
Swan Hill	3 Monthly	4	6.9

### Table 40 Alkalinity (as CaCO<sub>3</sub>)

No Guideline Value

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)
Kerang	3 Monthly	4	28
Koondrook	3 Monthly	4	19
Mildura	3 Monthly	6	27
Murrabit	3 Monthly	4	39
Piangil	3 Monthly	4	19
Red Cliffs	3 Monthly	4	25
Robinvale	3 Monthly	4	33
Swan Hill	3 Monthly	4	24

## Table 41 Magnesium

No Guideline Value

Water Sampling Locality	Frequency of Sampling	Number of Samples	Maximum (mg/L)
<b>Kerang</b>	3 Monthly	4	3.8
<b>Koondrook</b>	3 Monthly	4	3.2
<b>Mildura</b>	3 Monthly	6	6.8
<b>Murrabit</b>	3 Monthly	4	5.8
<b>Piangil</b>	3 Monthly	4	3.3
<b>Red Cliffs</b>	3 Monthly	4	5.9
<b>Robinvale</b>	3 Monthly	4	4.9
<b>Swan Hill</b>	3 Monthly	4	6.7

For further information please contact us

**03 5051 3400**

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