# 2021/2022 Water Outlook









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Cover image: Murray River

#### Acknowledgement of Country

'Lower Murray Water acknowledges the Traditional Owners of the land on which we work and reside. We recognise their continuing connection to land, waterways and community. We pay our respects to Elders past, present and future.

The Traditional Owner groups within Lower Murray Water's service region lie within the traditional lands of First Nations Peoples, from upstream at Koondrook moving downstream along the Murray River (Mil) through to the western edge of our region at the South Australian border.

They are the Barapa Barapa Peoples, Wamba Wemba Peoples, Wadi Wadi Peoples, Tatti Tatti Peoples, Latji Latji Peoples, Nyeri Nyeri Peoples, Ngintait Peoples and the Wergaia Peoples.

The First Nation Peoples' connection to land and water is the living cultural knowledge that is passed down from generation to generation. The stories that connected the ancestors to their culture still live through the First Nations Peoples of today.'

- Acknowledgement of Country written by Stephanie Sloane.



Stephanie works at Lower Murray Water as a People and Safety Trainee. She is a proud Ngiyampaa woman and has a strong connection to her culture, history, and the land. Stephanie has brought not only her experience and passion for people to this role but also a commitment to inspire and mentor others wishing to pursue a career at LMW.





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# WATER OUTLOOK 2021-22

#### 100% Seasonal allocation

(all Northern Victorian water systems - as of 15 October 2021)

#### Water Supply storage position

#### Dartmouth Dam

- Current level (as of 15 October 2021): 81%
- This time last year: 58%

#### Hume Dam

- Current level (as of 15 October 2021): 97%
- This time last year: 73%

### Urban demand is set to increase steadily over time



#### Likelihood of Water Restrictions Permanent Water Saving Rules in place

Urban usage is mostly residential and almost all rural usage is by irrigators





Strategy	LMW actions to balance Supply and Demand
Heightened awareness	• Community interaction - Public information and water-wise events where COVID restrictions allowed
Reduce demand for potable water	<ul> <li>"Target Your Water Use" campaign</li> <li>Deliver Schools Education Program (where COVID restrictions allowed)</li> <li>Deliver the Community Housing Retrofit Program</li> </ul>
Improved use of existing supplies	<ul> <li>Invest in metering and analytics to better understand water usage</li> <li>Manage carryover of water to maximise system reliability</li> </ul>
Alternative water sources	<ul> <li>Continue to explore opportunities to supplement potable water. We are currently reviewing our urban water and wastewater long-term augmentation strategies, which will look at alternative supply sources in line with integrated water management principles.</li> </ul>
Water Efficiency	• LMW in collaboration with our rural customers, state and commonwealth governments, is working on a project to reduce water losses in the irrigation water supply systems (in progress).

#### Executive Summary

Annual Water Outlook for 2021/22 has been prepared by Lower Murray Water (LMW) to support the needs of its customers and the Department of Environment, Land, Water and Planning (DELWP). The report provides an eight to twelve-month outlook of security of water supply to LMW's urban and rural customers, which are almost entirely delivered from the Murray River Regulated System. LMW's service area extends from Kerang to the South Australian Border, spanning the municipalities of Mildura, Swan Hill and Gannawarra.

The table below summarises the details of the urban water supply systems and the level of security of supply during 2021/22.

System	Towns supplied	The primary source of supply	Level of Restrictions	Comments			
Mildura	Mildura, Irymple and Merbein	River Murray (97%)	The permanent water savings rules (PWSR)	The last water year (June 2020—May 2021) was drier than average, inflows were well below the long-term median. From June 2021, a shift to			
Swan Hill	Swan Hill, Nyah/Nyah West, Lake Boga and	Loddon River, a GMW Channels (3%)	GMW Channels since June (3%) 2020	wetter conditions resulted in some significant inflows into the Murray River System. This climate shift has created a more positive			
	Woorinen			last season.			
Kerang	Kerang			Second allocation of MW/s Rulk Water			
Red Cliffs	Red Cliffs			Entitlement (BE) is 100% as of 15 October 2021.			
Piangil	Piangil			The PWSR will remain effective for the 2021/22 season.			
Robinvale	Robinvale			Maintaining adequate security of supply for our current and future customers is one of the			
Koondrook	Koondrook						challenges as strong regional growth continues. LMW is currently reviewing our Urban Water
Murrabit	Murrabit			Strategy to plan for balancing water supply and demand in the longer term.			

LMW provides river quality water to 2,666 irrigation and 2,240 stock and domestic customers in the four pumped irrigation districts of Mildura, Merbein, Red Cliffs and Robinvale, and to 297 Millewa waterworks district customers and 12 Yelta waterworks district customers. Raw water is drawn from the Murray River via a number of offtake pump stations and distributed to the customers via combination of channels and piped networks except for Robinvale Irrigation District, which is supplied through a pressurised piped system.

Historical water usage data indicates that rural demand is relatively constant. However, spare capacity created due to the Sunraysia Rural Modernisation Projects, is expected to be utilised by the rural customers connected to the Red Cliffs and Merbein irrigation districts in the coming years, with an anticipated increase in demand. On the other hand, there is a possibility of reduction in demand due to wet climate outlook for 2021/22 season. Therefore, the rural demand in 2021/22 is likely to be similar to previous years.

As per the seasonal determination on 15 October 2021, rural customers received 100 % High Reliability Water Shares for the Murray system. Given the positive climate outlook, rural customers likely to have enough allocation to meet their irrigation and stock and domestic demand.

> Anthony Couroupis Managing Director





In 2020/21, the total volume of water supplied to irrigation districts was 118,731 ML. Of the total volume of water supplied, 99.2% was supplied to the primary entitlement holders and a small portion (0.8%) was supplied to the Victorian Environmental Water Holder (VEWH).

### Introduction

Lower Murray Water is one of the few hybrid water utilities in Victoria and is the most remote water corporation from Melbourne, combining an urban water business with an irrigation water business, plus other support functions delivered for private diverters and the Mallee Catchment Management Authority. We have around 200 staff to provide services to approximately 74,000 urban customers, 5,000 irrigation, stock and domestic water customers and 1,313 private diverters.

Our services include provision of safe drinking water, collection and treatment of wastewater, supply of river quality water for stock and irrigation and collection and disposal of subsurface irrigation drainage, which support the economic, social, and cultural development of our region and its communities. We are involved in several initiatives to promote sustainable water use and support catchment and river management practices to improve water quality. This report provides an eight to the twelve-month outlook of security of water supply to LMW's urban and rural customers.

#### LMW's Services

LMW provides several services across the northwest of Victoria, but our core business is centred on providing:

- Potable drinking water to the urban and regional centres;
- Wastewater collection and treatment services to the urban and regional centres;
- Irrigation water supply and irrigation drainage services;
- Domestic and stock water supply to rural areas; and
- Reclaimed water re-use.

### Our Service Region

Figure 1 below shows the service area of LMW, which includes regional centres and towns within three local government areas. They are Mildura Rural City Council, Swan Hill Rural City Council and Gannawarra Shire Council.



The table below shows the connection numbers and volume of potable water supplied to each water supply system in 2020/21.

District	Number of Urban Customer Connections	Volume of potable water supplied (ML)
Kerang	2,167	906
Koondrook	532	199
Lake Boga	500	254
Mildura	21,896	12,516
Murrabit	56	27
Mystic Park	15	9
Nyah	348	220
Nyah West	291	147
Piangil	121	120
Red Cliffs	1,782	1,240
Robinvale	1,002	554
Swan Hill	5,900	2,825
Woorinen South	174	110
Total	34,784	19,127

In 2020/21, the total volume of potable water supplied to our water districts was 19,127 ML. Total number of customer connections was 34,784, which is a 1.4% increase compared to the previous year.

In 2020/21, the total volume of water supplied to irrigation districts was 118,731 ML. Of the total volume of water supplied, 99.2% was supplied to the primary entitlement holders and a small portion (0.8%) was supplied to the Victorian Environmental Water Holder (VEWH).

LMW manages a variety of short-and long-term risks to its urban water supply. There is a shift in some of the risks in this year compared to the previous year reflecting the favourable climatic conditions observed since the start of 2021/22 and higher inflows to the supply storages.

Table 2 summarises the risk ranking and a comparison of risks with the previous year.

Table 2. Risks (perceived) to the urban supply over the next 12 months

Risk	Rank (20/21)	Rank (21/22)
Infrastructure resilience	1	1
Water Availability	3	4
Urban growth & Supply-demand	4	3
Water quality- Blue-Green Algae (BGA) & Plumatella	2	2

Note that Rank 1 and 4 corresponds to highest and lowest risk respectively. These risks represent a 'point in time' and highlight some immediate areas for attention within LMW's operational planning and development of longer-term strategies.

An increase in the number and duration of BGA outbreaks continued to challenge our ability to maintain required water quality standards in 2020/21, therefore, BGA outbreaks in the Murray River system is still one of the key issues to ensure water supply to our communities.

Significant operational interventions are required to produce complaint drinking water during BGA bloom events.

The BGA blooms also impact rural customers particularly the stock and domestic customers. Given the potential for presence of algal toxins in the water during the BGA bloom periods, the stock and domestic customers are advised not to use the water as a precautionary measure to minimise the risk.

Water availability is the key risk to rural water supply, which is highly dependent on climate. LMW and the customers are taking actions to adapt to climate change and reduce water use such as implementing efficient irrigation systems and reduce losses in the water transfer systems.



Blue Green Algae, Murray River

### Water Performance Reporting

Table 3 summarises the key customer service results achieved by LMW in 2020/21 (amongst various performance criteria) for the urban water service and a comparison with 2019/20 data.

#### Table 3. Urban Customer Responsiveness Performance Indicators

	Res	sult	Target	Vari	ance
Key Performance Indicator	2019/20	2020/21	2020/21	to Prior Year	to Target
<b>Unplanned Water Supply Interruptions</b> No. of customers receiving 5 unplanned interruptions in the year/total number of water (domestic and non- domestic) customers x100	0%	0%	0%	0%	0%
<b>Interruption Time</b> The average duration of unplanned water supply interruptions (minutes) <sup>1</sup>	66.65	58.98	60	-11.5%	-1.7%
<b>Restoration of Unplanned Water Supply</b> Unplanned water supply interruptions restored within 5 hours/total unplanned water supply interruptions x100	95.92%	100.00%	99.40%	4.3%	0.6%
Sewer Spills- Containment Sewer spills from reticulation and branch sewers contained within 5 hours/total sewer spill from reticulation and branch sewers	100%	100%	97.00%	0.0%	3.1%
Sewer Spills - Interruptions No. of residential sewerage customers affected by sewerage interruptions restored within 5 hours	100%	100%	97.00%	0.0%	3.1%

Table 4 summarises LMW's Urban Customer Responsiveness Performance during 2020/21 and a comparison with 2019/20 performance.

#### Table 4. Urban Customer Responsiveness Performance Indicators

	Result		Target	Variance	
Key Performance Indicator	2019/20	2020/21	2020/21	to Prior Year	to Target
<b>Water Quality Complaints</b> No. complaints per 1000 customers <sup>2,4</sup>	1.02	0.804	1.621	-21.2%	-50.4%
<b>Billing Complaints</b> No. of complaints per 1000 customers <sup>3, 4</sup>	0.437	0.172	0.717	-60.6%	-76.0%

Note: Variances greater than 5% are described below

- <sup>1</sup> Favourable variance to the prior year can be attributed to continuous improvement to the work practices implemented by our Service Delivery Teams.
- <sup>2</sup> Favourable variance to the prior year and target was due to the low number of water quality complaints (i.e. 28 complaints compared to 34 in the previous year), which could be attributed to improvements in work practices and production of high-quality water consistently throughout the year.
- <sup>3</sup> Favourable variance to the prior year and target was due to the low number of complaints (i.e. 6 billing complaints compared to 15 in the previous year), which could be attributed to continuous improvements implemented in customer service and billing processes.
- <sup>4</sup> Both water quality and billing complaints received during 2020/21 were less than the five-year average.

#### Compliance Reporting<sup>1</sup>

LMW issued 65 advisory notices and 2 formal warnings to Urban customers during 2020/21. Advisory notices were issued due to customers watering outdoors outside of the nominated hours during the PWSR. Formal Warnings were issued only to those customers found in breach of the PWSR on multiple occasions.

LMW issued 245 advisory notices and 275 formal warnings to Rural customers during 2020/21. Notices were issued in relation to Sections 33E (Unauthorised take of water) and 289 (Wrongful take of water) of the *Water Act 1989.* During this period, access suspended to 5 customers and 2 customers were recommended for prosecution with 1 prosecution finalised.

LMW fully complied with our Urban and Rural bulk entitlement provisions.

<sup>1</sup> LMW Internal Record 2020/21



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lmw.vic.gov.au

VICTORIA State Government

### Commitment to Our Environment and Region

Water corporations are required to undertake activities and provide services that minimise environmental impacts, mitigate climate change, and demonstrate reasonable progress in integrating climate change adaptation into planning and decision-making across the business. LMW has two specific KPIs to address this commitment. They are Emission reductions (E2) and Climate Adaptation (E3).

#### Emission Reduction/Pledge

LMW continued with the commitment to reduce our carbon emissions to meet our pledge of a 39% reduction (compared to the emission in 2016-17 as the base year) in CO2 emission by 2024-25. The total combined CO2 emissions from rural and urban operations during 2020-21 was 38,092 tonnes, which is 17% lower than the projected value for same year (44,433 tonnes). Whilst the reduction is mostly attributed to the use of solar power and Covid 19 restrictions, i.e., less travel, working from home, etc. we're still well above the target emission.

Therefore, we plan to implement additional Greenhouse Gas (GHG) emissions reduction initiatives over the coming years, which will enable us to achieve our pledge. They are summarised below:

- Continue to undertake pressure control optimisation, including dynamic pressure control and district pressure control that reduces wasted energy through the irrigation network.
- Eliminating unscheduled irrigation water use and other over-deliveries of flow rate including losses.
- Use of tariffs to regulate use, including incentives for growers to smooth their demand profile.
- Introduction of additional renewable energy options including a mix of behind and front of meter solar and remote renewable offtakes via power purchase agreements.
- Investigate the establishment of a carbon sequestration project, which involves the use of plantation as a mean to sequester carbon. This type of projects can help reduce scope 1 (direct emissions from owned or controlled sources) emissions.
- Accelerate and promote biosolids reuse as they contribute to scope 1 emissions.
- Investigate clean or green energy options to reduce scope 2 (indirect emissions from the generation of purchased electricity, heating and cooling) emissions.
- Optimise the treatment processes at Mildura and Koorlong WWTPs and thus reducing emissions.

#### Climate Adaption

- Resilience to climate variability has been improved through the investment in increasing standby generator capacity for key urban water and sewerage assets.
- The Urban Water Strategy (UWS) process is driving planning and adaptation options for securing Urban Water supplies into the future. With the primary source of water being the Murray River, assessing the impacts of climate on raw water availability and demand is one of the main aspects of the UWS.
- The installation of secondary disinfection barriers in the form of Ultraviolet (UV) disinfection at our Water Treatment Plants (WTP) is strengthening our water treatment plants' ability to treat a greater range of raw water quality, which may result from increased climate variability. Four of nine WTPs currently have UV units installed with installation is on track for the remaining plants within the current pricing period (Water Plan 4).
- The frequency, duration, and concentration of algal blooms within the Murray River appear to have altered in recent years. Understanding operationally how raw water with increased amounts of algae can be processed through our water treatment processes without impacting our customers remains an area of focus. Additional initiatives including further online monitoring and additional tools to better manage the treatment of algae and any potential impacts are being explored.
- We have adapted and extended our processes for controlling the growth of organic materials within our irrigation pipe networks to reduce impacts to the customers especially during the spring irrigation period.

### Climate conditions & Outlook

#### Recent conditions:

The Bureau of Meteorology (BoM) reports that the mean temperature in September for the whole of Australia was 1.01°C warmer than average. Across the Murray-Darling Basin, minimum temperature deciles varied from below average to above average (Figure 2), while maximum temperature deciles were average to above average (Figure 3).

The recorded temperature at Mildura Airport on 2 September was 33.0°C which was the highest daily maximum temperature in the state. September rainfall was above average for the state as a whole. Averaged across the state, rainfall was 11% above the long-term (1961-1990) mean. Towards the end of the month, a complex low-pressure system and an associated low-pressure trough that extended well into the tropics resulted in widespread rainfall across Victoria. Some locations in the state had their highest total September rainfall on record, or their highest total September rainfall for at least in the last 20 years.

Across much of the Basin, rainfall during September ranged from between average to very much above average (Figures 4 & 5).

### Figures 2 & 3 - Australia minimum temperature deciles for September 2021 (left) and maximum temperature deciles (right). Source: Bureau of Meteorology



### Figures 4 & 5 - Murray-Darling Basin rainfall for September 2021 (left) and September rainfall deciles (right). Source: Bureau of Meteorology



The high rainfall in September wetted the catchment, which helped to increase the River Murray System inflows with totalling around 1,637GL. Note that the inflow figure (refer to figure 6) excludes Water for the Environment, Inter-valley trade (IVT) and Darling and Snowy scheme contributions. This monthly inflow is significantly higher than the monthly inflows in 2020/21 and 10-year average inflow. However, only 5% higher than the long-term average inflow.

The September inflows resulted in significant water resource improvements and seasonal determinations continued to increase, as advised by the Northern Victoria Resource Manager. The seasonal determinations for the Murray system on 15 October 2021 was 100 % High-Reliability Water Share (HRWS), which is 79 % more than the opening allocation for the 21/22 season.

Table 5 compares the equivalent seasonal determination in the Murray system for 15 October between 20/21 and 21/22. This shows a very positive outlook for this water year regarding water resource position.

Based on the ocean pattern, the BoM is forecasting wetter than average conditions for the remainder of the water year 2021/22. Near median to high stream flows are expected across the Basin. As the catchments across the Basin are wet, more rainfall and inflows can cause flooding, which is the key operational risk in 2021/22.

#### Climate Outlook

The climate trends are summarised in the following section based on the BoM's latest climate outlook and seasonal streamflow forecast report.

#### Rainfall and temperature

November to January rainfall is likely to be above the median across the Wimmera Mallee region (Refer to Figure 7). Maximum temperatures for November to January are also likely to be above median across the Wimmera Mallee region (Refer to Figure 8).

### Seasonal streamflow forecast and current observation

- High and near-median streamflow is most likely for October – December 2021 (Refer to Figure 9).
- High and near-median flows were observed at 45% and 35% of locations respectively, across Australia in September as well as across the Basin. Low flows occurred only at 20% of locations, mostly in the southern half of the country.

#### Figure 6 - Murray System monthly inflows (excl. Snowy, Darling, IVT and env. inflows)



#### Table 5 - Seasonal determination in the Murray system - 20/21 and 21/22

Date of announcement	High Reliability Water Share		
	2020/21	2021/22	
15 October	55%	100%	
15 Uctober	55%0	100%	

### Figure 7 - Chance of exceeding the median rainfall (November to January)



### Figure 8 - Chance of exceeding the median maximum temperature (November to January)



### The current planning process for the River Murray Operations 21-22

- Flood operations continue at Hume Dam and Yarrawonga Weir. Releases from Hume are currently maintaining airspace.
- Both Hume Dam and Menindee lakes are almost full- significantly higher than last year. Due to the availability of Menindee Lakes, bulk transfers from Dartmouth to Hume and Hume to Lake Victoria are not likely to be undertaken during 2021.
- The Murray Darling Basin Authority (MDBA) can call on releases from Menindee lakes to help meet River Murray system demands into summer. The availability of the option to release water from Menindee lakes reduces the system shortfall risk significantly.
- Currently, the unregulated flows in the River Murray meets the flow requirements (both dilution flow and operational water) for South Australia.

### Overall climate and streamflow in the longer-term context for Victoria

Victoria's climate has shown a warming and drying trend over recent decades, and this trend is expected to continue. In comparison to historical conditions, we are already experiencing:

- Higher temperatures
- Reductions in rainfall in late autumn and winter and, in some locations increases in rainfall during the warmer months are being observed.
- In many catchments, a shift in the streamflow response to rainfall is being observed, where less streamflows are generated for the same amount of rainfall. The impact of the reduction in streamflow response to rainfall is not yet fully understood and is the subject of an ongoing investigation.

Over the longer term, we can expect:

- the rainfall reductions in winter to persist
- possible increases in summer rainfall
- increases in potential evapotranspiration due to the higher temperature and lower relative humidity
- reductions in streamflow because of less rainfall and higher potential evapotranspiration; and
- the streamflow response to rainfall no longer remains the same, and generally declines.

Although there will be significant variability in Victoria's climate and streamflow, the chances of experiencing warmer conditions and less streamflow are now higher than in past decades (More information on the observed changes and longer-term future climate and water projections can be found at: https://www.water.vic.gov.au/climate-change/ research/vicwaci). This outlook points to the need for strategic planning to manage the longer-term impacts of climate change and reduced streamflow on water availability.

#### Figure 9 - Seasonal Streamflow Forecast for October 2021 to December 2021 (Murray Darling Basin)



### Water supply systems

Lower Murray Water provides urban water supply service to 14 townships through 8 water supply systems. A high-level description of these systems is provided below:

#### Mildura

Water is pumped from the River Murray at Mildura through two conventional water treatment plants. The treated water is supplied to around 21,000 connections in the City of Mildura and surrounding rural-residential areas including the townships of Irymple, Merbein and Cardross. The Seventh Street treatment plant is designed for 85ML/d and the Mildura West plant has a design capacity of 20ML/d.

The summer months' average daily consumption is normally below 70ML/d with occasional consumption above this. Treated water pumping stations at Seventh Street and Mildura West distribute water to two water towers with a combined storage capacity of 3.03ML. Additional booster pump stations and groundlevel storages with a combined storage capacity of 37.6ML allow the system to maintain pressures to the outlying areas on higher demand days.

Merbein is supplied with treated water from the Mildura West treatment plant via the reticulation from the north-west end of Merbein via a 450mm diameter transfer pipeline 7.14km long from the South. The pipeline transfers water directly to the Merbein reticulation, including ground-level storage of 7.5ML capacity. During high demand, booster pumps of 150L/s (13ML/d) capacity can be operated to maintain optimum pressures and flows in the reticulation network.

#### Red Cliffs

The town of Red Cliffs (14km south of Mildura) is an independent system and services around 1,700 connections. A raw water pumping station extracts water from the River Murray river and supplies it to a dissolved air flotation and filtration treatment plant. The treated water is stored in a 6ML ground-level storage tank (GLST). From the GLST the treated water is delivered to a water tower near the town centre via two rising mains of 300 mm and 375mm in diameter and supplied to the town. The plant design capacity is 12ML/d after an upgrade in 2018, and the average daily consumption during the summer months is usually below 9ML/d.

#### Robinvale

At Robinvale, raw water is pumped from the River Murray via a 300mm pipeline to a conventional water treatment plant, which services around 1,000 connections. Treated water is pumped to a 0.9ML standpipe from a 3.6ML ground storage tank. The reticulation network is supplied from the standpipe. The maximum plant design capacity is 6ML/d, with an average peak daily consumption during the summer months of approximately 5.0ML/d, from a 3.6ML ground storage and 0.3ML water tower.

#### Kerang

Kerang is situated at the southern end of the LMW region. Raw water is pumped either from the River Murray (at Koondrook) or the Goulburn Murray Water 14/2 Channel and treated in a conventional treatment plant, which services around 2,100 connections. Note that extracting water from the Loddon River is not feasible due to the poor water quality at present. However, LMW can extract water from the Loddon River in the event of an emergency with a temporary pipework arrangement.

The treated water is pumped via dual rising mains of 400mm diameter to Nolan Street which supplies the reticulation network and a 0.68ML water tower and a 2.5ML ground storage tank. During high demand, water can be supplied from the ground storage tank via a pump station to maintain optimum pressures and flows in the reticulation network. The maximum plant design capacity is 11ML/d and the average peak daily consumption reached 7.2ML/d during summer periods.

#### Piangil

At Piangil, raw water is pumped from the River Murray to a "Package" conventional water treatment plant which services around 100 connections. The plant has a capacity of 0.7ML/d. Treated water is then pumped to a 1.14ML ground storage tank, situated on a high ridge east of the town. The system is re-pressurised by pressure booster pumps for distribution into the town's reticulation network from this storage tank.

#### Koondrook

Raw water is pumped from the Murray River to a conventional water treatment plant with a capacity of 3ML/d, which services around 500 connections. Treated water is pumped to a 0.9ML standpipe from a 2ML ground storage tank. The Koondrook reticulation network is supplied from the standpipe.

#### Murrabit

The Murrabit system can pump raw water from the Raw Water Storage, which is fed from the Goulburn-Murray Water channel or directly from the Murray River to a "Package" conventional water treatment plant with 0.2ML/d capacity, which services around 50 connections. Treated water is pumped into a 50kL high-level storage tank from 2x 50kL ground storage tanks. The Murrabit reticulation network is supplied from the tower.

#### Swan Hill

The Rural City of Swan Hill is situated in the centre of LMW's southern region. Raw water is pumped from the River Murray at Swan Hill to a conventional water treatment plant with a capacity of 30ML/d. The Swan Hill system also supplies Woorinen South, Nyah & Nyah West and Lake Boga, which together service around 7,000 connections. The average daily consumption is normally below 23ML/d for this system. Treated water pumps deliver treated water to a 2.27ML ground level storage and 0.68ML water tower near the city centre. Two extra ground-level storages, each of 4.0ML capacity<sup>2</sup>, and a 0.15ML water tower are situated west of the city.

Woorinen South is supplied from the Swan Hill system via a 10km long 300mm diameter pipeline together with a 2.0ML ground level storage tank and associated re-lift pumps and chlorination facilities.

The townships of Nyah and Nyah West are supplied via a 27km long, 300mm diameter pipeline from the Swan Hill Water Treatment Plant. A 6ML ground level storage tank, chlorination facility and re-lift pumps are situated at Nyah. Properties adjacent to this pipeline can access water for domestic or commercial supply.

Lake Boga is supplied via a 250mm diameter pipeline from the Swan Hill Water Treatment Plant. A 0.9ML ground level storage, chlorination facilities, and a 0.1ML water tower and associated re-lift pumps have been installed to maintain pressure on days of high demand.

#### Rural Water Supply Systems

LMW provides river quality water to 2,666 irrigation and 2,240 stock and domestic customers in the four pumped irrigation districts of Mildura, Merbein, Red Cliffs and Robinvale, and to 297 Millewa waterworks district customers and 12 Yelta waterworks district customers.

Raw water is drawn from the Murray River via a number of offtake pump stations and distributed to the customers via combination of channels and piped transfer networks except for Robinvale Irrigation District, which is supplied through a pressurised piped system.

### Sources of Supply and Current Resource Position

LMW draws 97% of raw water from the Murray River with the remaining from Goulburn Murray Water's irrigation channel systems. A bulk water entitlement of 30,971ML is currently specified under the Bulk Entitlement (River Murray - Lower Murray Urban and Rural Water - Urban) Conversion Order 1999 as of June 2011. LMW supplements the bulk entitlement with purchases of additional water share and currently holds 1,244ML of High-Reliability Water Shares (694ML Murray and 550ML Goulburn) and 216ML of Low-Reliability Goulburn Water Shares.

In 21/22, the opening allocation for High-Reliability Water Shares (HRWS) was 21% in the Murray system and 33% in the Goulburn system. The total available water volume was 13,293ML, with a carryover volume of 6,443ML (as of July 1, 2021). As a result of water resource improvement during the season, the allocation was increased to 100% HRWS for both the Murray and Goulburn system on 15 October 2021.Prereleases from Lake Hume continue to trigger spills from spillable water accounts in the Murray system. A total of 4,393ML has been lost from the LMW Urban Allocation Bank Account (ABA) as of 15 October 2021. The total available water volume at present is 30,902ML.

Table 6 summarises the availability of water as per the seasonal determinations on 1 July 2021 and 15 October 2021.

 $<sup>^{\</sup>rm 2}$  A new 5ML storage is being constructed and it will be operational from March 2022

#### Table 6 - Availability of water to LMW in 2021/22

Source of water	Entitlement (ML)	Carryover (ML)	Seasonal Determination on 1 July 2021	Seasonal allocation issued 1 July 2021 (ML)	Seasonal Determination on 15 October 2021	Available balance 15 October 2021 (ML)
Goulburn HRWS	550	0	33%	182	100%	550
Goulburn LRWS	216	57	0%	0	0%	57
Murray HRWS	694	51	21%	146	100%	694
BE (Urban)	30,971	6,335	21%	6,504	100%	29,601
Total (ML)	32,431	6,443		6,831		30,902

Table 7 provides a detailed breakdown of the calculation of available water based on the recent seasonal allocation (i.e. on 15 October 2021) of water shares and bulk water entitlement

#### Table 7 - Availability of water to LMW in 2021/22

Source of water	Carryover <sup>1</sup> (ML)	Seasonal allocation as of 15 October 2021 (ML) (A)	Trade out (ML) (B)	Write off <sup>3</sup> (due to spill)	Available balance (A-B)
Goulburn HRWS	-	550	0	0	550
Goulburn LRWS²	57	-	-	-	57
Murray HRWS	51	694	-	32	694
BE (Urban)	6,335	30,971	1,370	4,361	29,601
Total (ML)	6,443			4,393	30,902

1. Carryover as of the start of the season (1 July 2021).

2. There was no allocation for the Goulburn LRWS as of 15 October 2021, hence carryover becomes the available balance.

3. The volume of water write-off was from the spillable water account, which do not impact the water available.

During 2020/21, rural customers received a final seasonal determination of 100% HRWS for the Murray system on 1 April 2021. As per the recent seasonal determination on 15 October 2021, customers received 100 % HRWS for the Murray system.

### Current Urban demand and forecast

Table 8 below shows historical volumetric potable water usage from 17/18 to 20/21 and water use forecast up to 24/25. The forecast is based on average climatic conditions in the last 3 years with an average annual demand of 499kL per residential

connection expected. This assumption is consistent with the 2021 Urban Water Strategy (UWS) and the long-term augmentation strategy, which are currently under development.

			_					
	Actual Usage				Forecast			
	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Residential Demand (ML)	14,694	15,640	14,874	14,732	15,515	15,670	15,827	15,986
Non-residential Demand (ML)	4,522	4,861	4,569	4,396	4,731	4,766	4,800	4,835
Total potable water demand	19,216	20,501	19,443	19,128	20,246	20,436	20,627	20,821

#### Table 8 - Potable Water Volumetric Usage and Demand Forecast (2017/18 - 2024/25)

Source: 2021 UWS (under development) and monitoring data

There was a small decrease (3%-5%) in usage in 19/20 compared to 18/19 and 20/21. Note that LMW's water supply systems were under Stage 1 water restriction during most part of 19/20. The decrease in water usage observed in 19/20 was less than the anticipated water savings of 10% for Stage 1 restriction (source: LMW Drought Response Plan 19-20).

During 19/20, Stage 1 water restrictions were in effect from November 2019 to June 2020. Over this time, temperatures exceeded 35°C for almost half of the restriction period. Furthermore, temperatures were above 40°C for seven days in December 2019 and 4 days in January 2020. Rainfall in these months was well below the mean. Extreme hot weather conditions with close to zero rainfall over the 19/20 summer period most likely contributed to a higher water usage compared to what was anticipated.

It is difficult to accurately predict water savings achieved through restrictions during a single season and across a relatively large population base such

as Mildura. The level of water usage depends on several factors such as temperature, rainfall and customer behaviour. Water restrictions offer public guidelines on water use but do not necessarily have a direct impact, particularly when the restriction is at a low level such as Stage 1.



The typical water demand distribution between customer types is described in Figure 10, based on annual raw water consumption of 21,134ML (annual average from 16/17 to 19/20).

#### Figure 10 - Typical raw water demand distribution (based on 2021 UWS under development) assuming annual water demand of 21,134ML



Table 9 shows the volume of water supplied to irrigation districts.

As can be seen from the historical water usage data, rural demand is relatively constant. Moreover, no new irrigation district off -take points were agreed to or used in the last 3 years. However, spare capacity created due to the Sunraysia Rural Modernisation Projects, is expected to be utilised by the rural customers connected to the Red Cliffs and Merbein irrigation districts in the coming years, with an anticipated increase in demand.

On the other hand, there is a possibility of reduction in demand due to wet climate outlook for 2021/22 season. Therefore, the rural demand in 2021/22 likely to be in the same order as previous years (i.e. 117,000 – 125,000ML).

### Table 9 - Volume of water supplied to rural customers

Year	Volume of Water Supplied to Primary Entitlement Holders (ML)	Volume of Water Supplied to VEWH (ML)
2020/21	117,809	922
2019/20	117,511	1,608
2018/19	129,348	1,561



### Forward outlook 2021/22

The HRWS on the Murray system was increased to 100% from 93% (1 October) on 15 October. HRWS on the Goulburn system is 100% since 1 October. The BoM forecasts higher than average rainfall for the next three months. This would be a very favourable position for LMW to meet its supply commitments to the customers.

Factors to consider in the forward outlook:

- LMW's typical annual potable water usage is generally between 19,000 and 21,000ML
- The volume of water supplied to urban customers to the end of September 2021 was approximately 3,500ML (Source: LMW operational data)
- The Murray- Darling Basin Authority commenced pre-release from Lake Hume on 6 August 2021. This has triggered spills from specific resources in the Murray system (eq: Barmah-Millewa Forest Environmental Water Allocation) as well as spillable water accounts. A deduction of 165GL (61 percent of spillable account volume) occurred from the spillable water accounts till 15 October. Further deductions are expected while the Murray-Darling Basin Authority (MDBA) maintains pre-releases to keep Lake Hume close to its full supply level and this continues to be monitored on a fortnightly basis. This impacts the ability of 100% allocation to be securely stored for use or trade.
- Positive seasonal outlook for 2021/22 suggests LMW will have enough allocation to meet its Urban customers' demand with a surplus volume at the end of the season.
- Similarly, rural customers likely to have enough allocation to meet their irrigation and stock and domestic demand.

Figure 11 summarises the water availability based on the supply-demand balance. The volume of available water is plotted in a cumulative monthly pattern considering carryover, seasonal determination and spill write off. The demand is plotted as a cumulative monthly volume (raw water) based on the actual usage till September 2021 and forecast for October-June based on usage pattern observed in the 2020/21 season. The data indicates there is no likely shortfall for the 21/22 season.

(Please note: the volume of available water does not include any potential increase if low risk of spill is declared)



#### Figure 11 - Forecast Water Supply/Demand (ML) for 2021/22 season

### Actions & Learnings

#### Key findings from 2020/21

Permanent Water Saving Rules were in place for the entire 20/21 season. The seasonal determination commenced with 8% HRWS in the Murray system but with the continual resource improvement reached 100% by 15 February 2021. This resulted in a positive season for water availability compared to the 19/20 season.

Table 10 summarises a few key findings and lessons learnt from 2020/21.

#### Table 10 - Findings and lessons 20/21

	Findings / Lessons/ Actions
Service delivery	Although this year continues to be influenced by the unprecedented challenges of the global coronavirus (COVID-19) pandemic, LMW's ability to adapt our operations and manage the impacts of ongoing disruption and uncertainty have ensured the continued supply of our essential services. Our 'customer at the centre' focus has enabled us to support our customers with empathy as they navigate through the financial impacts of COVID-19 and drives us to deliver the best quality services that we can.
	Our service delivery performance continued to a high standard and enhanced engagement with the customers and stakeholders enabled us to effectively adapt and manage the impacts accordingly. Our ability to identify, define and deliver upon agreed customer service levels, and improve our responsiveness to customer issues remains a key priority for LMW. In October 2020, the Mildura Water Treatment Plant was awarded the 2020 IXOM Best Tasting Tap Water in Victoria bu the Water Industry Operators' Association of Australia

	Findings / Lessons/ Actions
Customer engagement	Customer engagement looked very different in 2020- 21, as we utilised technology in new and innovative ways, many of which had not been considered in a pre-COVID-19 world. A range of new initiatives including the continuation of our customer consultation meetings and the delivery of our 2020 Annual Growers' Conference online enabled easier access for customers. Where face-to-face engagement is possible, we progressed initiatives such as Mildura Field Days.
	This enabled LMW a two-way engagement with the customers across a variety of topics and issues, including rural unauthorised take, Water Plan 5 planning, Urban Water Strategy development, Community Rebate program and individual property consultation. Effective engagement with our stakeholders has been identified as an ongoing Strategic Priority in our Strategic Plan.

	Findings / Lessons/ Actions
Operational	LMW experienced few operating challenges throughout 2020/21. A notable challenge was an increase in the number and duration of BGA blooms requiring additional water treatment efforts to provide the community with safe drinking water.
	The BGA blooms also impact rural customers particularly the stock and domestic customers. Given the potential for presence of algal toxins in the water during the BGA bloom periods, the stock and domestic customers are advised not to use the water as a precautionary measure to minimise the risk.
	Therefore, the BGA blooms is a key issue for the coming years and LMW is undertaking several initiatives to manage this issue.

	Findings / Lessons/ Actions
Infrastructure	<ul> <li>LMW ensured our assets and infrastructure meets current and future needs by:</li> <li>Optimising our infrastructure through improved life cycle management</li> <li>Delivering our Water Plan capital expenditure (Capex) on time, on quality</li> </ul>
	LMW operational staff attended the "Summer Ready Risk Assessment" workshop on 20/21 (ongoing). The purpose of the workshop was to discuss the events that could occur during LMW's summer operation, what controls LMW currently has in place and what additional controls are required to reduce the level to within LMW's risk appetite.
	<ul> <li>The various scenarios for the risk assessment were discussed, which are below:</li> <li>Ability to meet high customer demand and required service levels</li> <li>Power reliability to meet operational requirements</li> <li>Electrical, mechanical and civil asset reliability</li> <li>Operation during high temperatures</li> <li>Water supply source and quality</li> </ul>
	As a positive outcome of the workshop, there were no major operational breakdowns impacting serviceability during the 20/21 summer. Slightly less temperatures than the 20/21 season is expected for this summer, which could result in favourable operating conditions.
	Findings / Langary / Antions

	Findings / Lessons/ Actions
Compliance	There was an increase in advisory letters issued to urban customers during the permanent
	water savings period, which was due to customers watering outside nominated hours.
	Several advisory notices and formal warnings were issued to rural customers in relation to
	S.33E (Unauthorised Take of Water) and S.289 (Wrongful Take of Water) of the Water Act 1989.
	LMW recognises there is scope for improvements in developing community awareness for
	efficient water use behaviour. This is an ongoing effort.
	As we move into 21/22, LMW will continue to work with its customers to build awareness around
	water-saving opportunities.

