

WATER OUTLOOK 2022-2023



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.



This artwork has been provided by local artist Bella Sloane from the Ngiyampaa tribe. Her painting represents family and is titled 'The Connection to Family'.

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WATER OUTLOOK 2022-23

At a glance

▶ 100% seasonal determinations

(All Northern Victorian water systems as of 15 December 2022)

▶ Dam storage

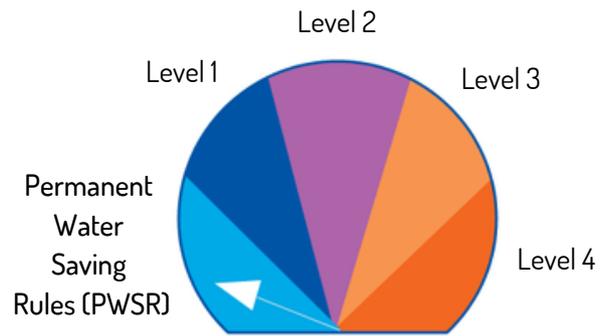
Dartmouth Dam

- Current capacity; 100%
- 2021-22 capacity: 87%

Hume Dam

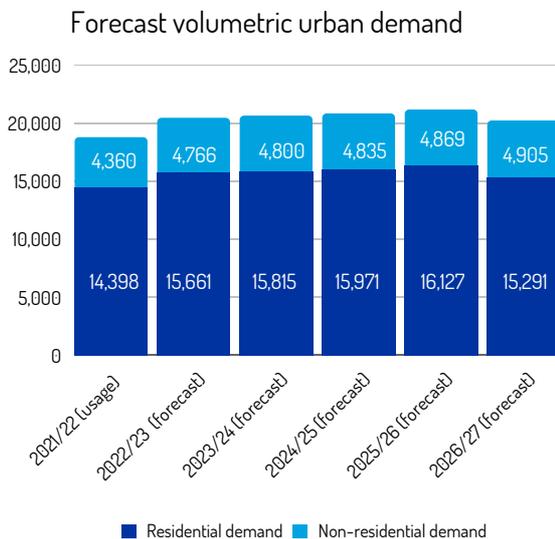
- Current capacity; 99%
- 2021-22 capacity: 97%

Likelihood of water restrictions

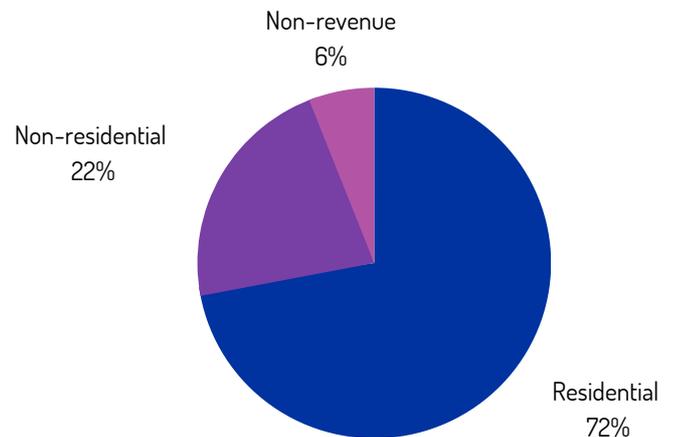


Permanent Water Saving Rules are in place

Urban demand is set to increase steadily over time and rural demand remains relatively constant



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



Strategy	LMW actions to balance supply and demand
Increase supply availability	<ul style="list-style-type: none"> • Purchase additional water entitlements to secure supply
Reduce demand for water	<ul style="list-style-type: none"> • Community engagement through public information and water-wise education programs • Target Your Water Use” and Permanent Water Savings Rules (PWSR) campaigns • Deliver Schools and Community Education Programs • Delivery of the Community Housing Retrofit Program
Improved use of existing supplies	<ul style="list-style-type: none"> • Invest in metering and analytics to better understand water usage • Manage efficient carryover of water to maximise system reliability
Alternative water sources	<ul style="list-style-type: none"> • Continue to explore opportunities for alternative water supplies and alternative sources to supplement potable water. A feasibility study is currently being undertaken on provision of fit for purpose recycled water to public open spaces in Mildura for irrigation to offset potable water use for this kind of applications.
Water Efficiency	<ul style="list-style-type: none"> • A project known as Sunraysia Water Efficiency Project (SWEP) has recently commenced to reduce water losses in the irrigation water supply systems in Mildura, Merbein and Red Cliffs Irrigation districts with the assistance from the State and Commonwealth governments.

EXECUTIVE SUMMARY

Annual Water Outlook for 2022/23 has been prepared by Lower Murray Water (LMW) to support the needs of its customers and the Department of Energy, Environment and Climate Action (DEECA formerly 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 2022/23

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) are in place since June 2020.	Higher than average rainfall occurred particularly since November 2022 in the Murray – Darling catchments resulted in significant water resource improvements. The seasonal determinations for the Murray system on 15 December 2022 was 100% High-Reliability Water Share (HRWS) and Low-Reliability Water Share (LRWS). The Bureau of Meteorology (BoM) is forecasting wetter than average conditions for the remainder of the water year 2022/23. High stream flows are expected across the Basin. Therefore, LMW will have sufficient allocation to meet its urban customers' demand for rest of the year with a forecast surplus at the end of season. The PWSR will remain effective for the 2022/23 season. Despite the rare likelihood of restrictions, extreme weather events or emergencies such as bushfires in our catchments, major loss of power supply or water contamination might require implementation of restrictions to manage water demands. More details about the PWSRs can be found on DEECA's website. www.water.vic.gov.au/liveable/using-water-wisely/advice-and-rules/permanent-water-saving-rules Maintaining adequate security of supply for our current and future customers is one of the challenges as strong regional growth continues. Our 50-year Urban Water Strategy (2022) has been approved by the Victorian Minister for Water. The strategy sets out LMW's plan to meet the demand for the next 50 years and comprises various action plans for securing water supply.
Swan Hill	Swan Hill, Nyah/Nyah West, Lake Boga and Woorinen	Loddon River, GMW channels (3%)		
Kerang	Kerang			
Red Cliffs	Red Cliffs			
Piangil	Piangil			
Robinvale	Robinvale			
Koondrook	Koondrook			
Murrabit	Murrabit			

LMW services to 2,655 irrigation and 2,255 stock and domestic customers in the four pumped irrigation districts of Mildura, Merbein, Red Cliffs and Robinvale, and to 300 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 Modernization Project, is expected to be utilised by the rural customers in Red Cliffs and Merbein irrigation districts in the coming years, which might increase the irrigation demand. On the other hand, irrigation demand for the 2022/23 season will be less than previous year due to recent wet weather events.

Higher than average rainfall occurred particularly since November 2022 in the Murray – Darling catchments resulted in significant improvement in water resource position with 100% allocation of both HRWS and LRWS. Moreover, Bureau of Meteorology (BoM) is forecasting wetter than average conditions for the remainder of the water year 2022/23. As a result, security of supply to urban and rural customers in 2022/23 is high. It should be noted that despite the rare likelihood of restrictions, extreme weather events or emergencies such as bushfires in our catchments, major loss of power supply or water contamination might require implementation of restrictions to manage water demands.

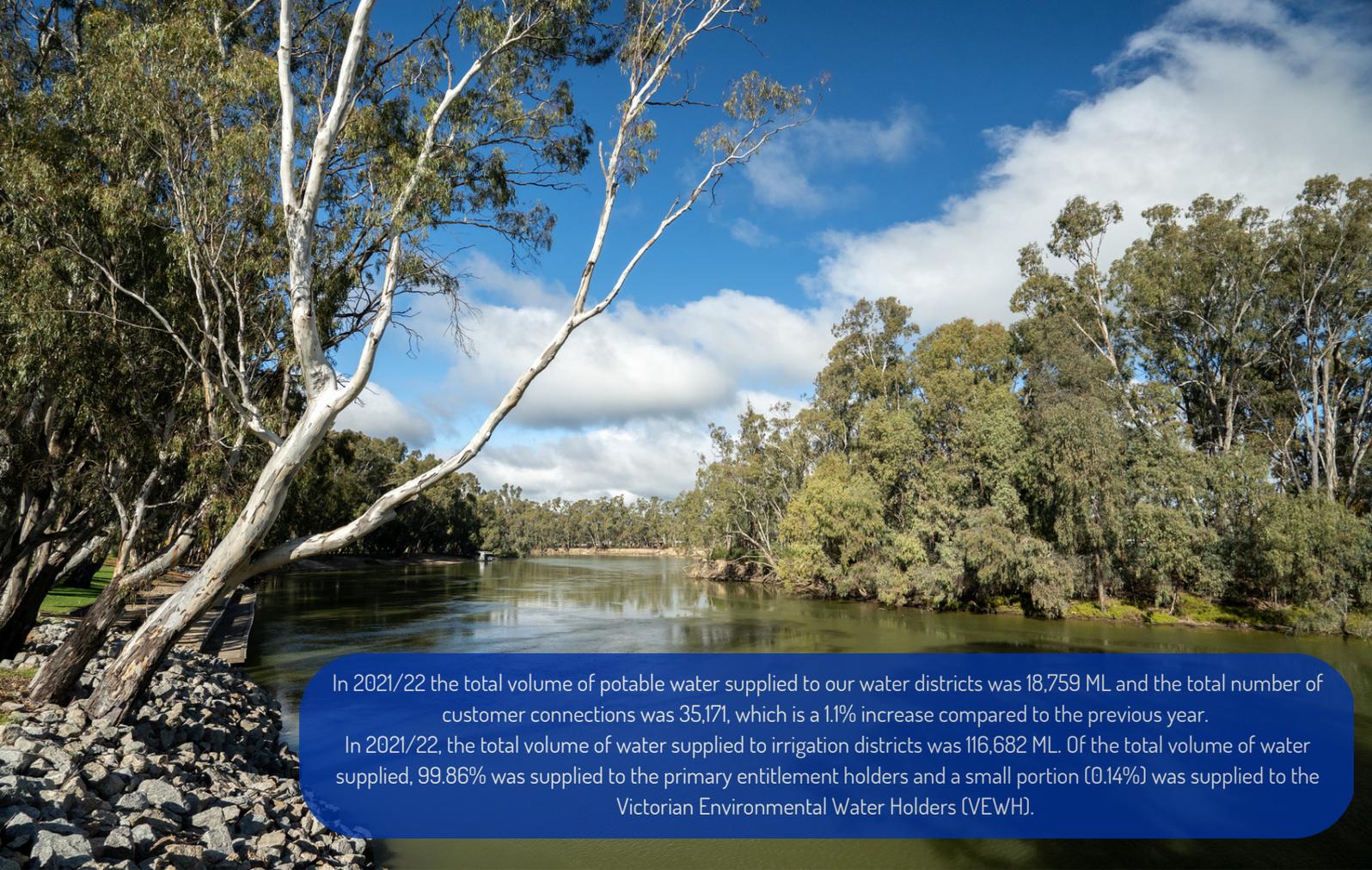
All of LMW's service region has faced significant flooding in the later parts of 2022, with many areas still facing very high rivers. LMW has enacted its emergency response plans to respond the flooding event.

Several initiatives were undertaken to protect our assets and ensure continuity of service delivery. Some of the initiatives includes construction of a 4km levee at the Mildura Wastewater Treatment Plant, temporary protection structure for the levee adjacent to the Merbein Irrigation pump station, a new culvert system on the Millewa main channel, sandbagging, increased surveillance of the critical assets and optimization & alterations of water treatment processes etc. The incident is current while flood water is receding. Given the wet climate outlook, LMW will continue to monitor the climate conditions and river flows to manage potential future flooding risk. The leanings from the flooding incident will be incorporated into our emergency response plans and climate adaptation strategies, where appropriate.



Interim Managing Director
Paul O'Donohue

A handwritten signature in black ink, appearing to read 'Paul O'Donohue', written in a cursive style.



In 2021/22 the total volume of potable water supplied to our water districts was 18,759 ML and the total number of customer connections was 35,171, which is a 1.1% increase compared to the previous year.

In 2021/22, the total volume of water supplied to irrigation districts was 116,682 ML. Of the total volume of water supplied, 99.86% was supplied to the primary entitlement holders and a small portion (0.14%) was supplied to the Victorian Environmental Water Holders (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 75,000 urban customers, 5,000 irrigation, stock and domestic water customers and 1,317 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. These services, 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 north-west 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;
- Management of private diversion licenses;
- 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.

Figure 1 - LMW's service region



Table 1 below shows the connection numbers and volume of potable water supplied to each water supply system in 2022/23.

Table 1 - Total number of customer connections across LMW districts - urban

Town	Number of Urban Customer Connections	Volume of potable water supplied (ML)
Kerang	2,184	896
Koondrook	538	205
Lake Boga	508	286
Mildura	22,173	12,187
Murrabit	56	28
Mystic Park	15	8
Nyah	351	223
Nyah West	296	153
Piangil	122	112
Red Cliffs	1,807	1,272
Robinvale	1,013	532
Swan Hill	5,933	2,746
Woorinen South	175	109
Total	35,171	18,759

Table 2 shows the volume of water delivered to our rural customer in 2021/22

Table 2. Volumes of water delivered to rural districts in 2021/22

District	Primary Entitlement Holders (ML)	Victorian Environmental Water Holders (ML)
Mildura	31,561	118
Merbein	16,710	-
Red Cliffs	28,958	-
Robinvale	17,605	-
Millewa	21,730	-
Total	116,564	118

The total annual volume of water taken by the Private Diverters was 449,132 ML

LMW manages a variety of short-and long-term risks to its urban and rural water supplies. There is a shift in some of the risks in this year compared to the previous year reflecting the wet climatic conditions observed since the start of 2022/23, higher inflows to the supply storages and the consequent flood impacts.

Table 3 summarises the risk ranking and a comparison of risks with the previous year.

Table 3. Risks (perceived) to the urban and rural supply over the next 12 months

Risk	Rank (21/22)	Rank (22/23)
Infrastructure resilience	4	4
Flood (i.e., risk of access or damages to critical infrastructure such as irrigation pump stations, WTPs & WWTPs)	-	4
Water availability	3	1
Urban growth & supply-demand	3	1
Water quality – Blue Green Algae (BGA & Plumatella)	4	4

Note that Rank 1 and 5 correspond 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.

Victoria is currently experiencing extended high river flows due to well above average rainfall throughout the Murray Darling catchment. This impacted LMW’s operation since mid-October at our water treatment plants. When the water passes over the flood plain an increase in organic carbon and other physiochemical parameters such as turbidity, colour, iron and manganese occurs in the raw water. Therefore, the treatment processes to treat the water to potable standard has been difficult during the last few months. Consequently, an increase in chemicals consumption and reduction in quantity of treated water are being experienced across all the water treatment plants managed by LMW.

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 reducing losses in the water transfer systems. Given the above average rainfall throughout the Murray Darling catchment, this risk is reduced in the short term.

Infrastructure resilience remains one of the focus areas for both urban and rural water supply. LMW is undertaking several actions such as improvements in asset maintenance, asset renewals and augmentations to improve infrastructure resilience.



Flooding of the River Murray, Merbein Irrigation Pump Station.

WATER PERFORMANCE REPORTING

Table 4 summarises the key customer service results achieved by LMW in 2021/22 (amongst various performance criteria) and a comparison with 2020/21 data.

Table 4 - Urban customer service performance indicators

Key performance indicator	Result		Target	Variance	
	2020/21	2021/22	2021/22	to prior year	to target
Unplanned Water Supply Interruptions No. of customers receiving five unplanned interruptions in the year/total number of water (domestics and non-domestic) customer x 100 ¹	0.0%	0.34%	0.0%	100%	99.64%
Interruption Time The average duration of unplanned water supply interruptions (minutes) ²	58.98	52.43	60	-11.1%	-12.6%
Restoration of Unplanned Water Supply Unplanned water supply interruptions restored within five hours/total water supply interruptions x100	100%	97.97%	99.4%	-2.0%	-1.4%
Sewer spills - containment Sewer spills from reticulation and branch sewers contained within five hours/total sewer spill from reticulation and branch sewers	100%	100%	97.0%	0.0%	3.1%
Sewer spills - interruptions No. of residential sewerage customers affected by sewerage interruptions restored within five hours	100%	99%	97.0%	-0.8%	2.2%

Note: Variances greater than 5% are described below

Table 5 summarises LMW's Urban Customer Responsiveness Performance during 2021/22 and a comparison with 2020/21 performance.

Table 5 - Urban customer responsiveness performance indicators

Key performance indicator	Result		Target	Variance	
	2020/21	2021/22	2021/22	to prior year	to target
Water quality complaints No. complaints per 1000 customers ³	0.804	0.768	1.370	-4.5%	-43.9%
Billing complaints No. complaints per 1000 customers ⁴	0.172	0.142	0.360	-17.4%	-60.6%

Note: Variances greater than 5% are described below

1. Unfavourable variances to the prior year and target are attributed to 12 of our customers experiencing unplanned interruptions due to a faulty water main installation.
2. Favourable variance to the prior year can be attributed to continuous improvement to the work practices implemented by our Service Delivery Teams.
3. Favourable variance to target is a result of complaints received being less than the 5 year average.
4. Favourable variance to prior year is a result of complaints received being less than the 5 year average.

Table 6 - Rural customer service performance indicators

Key performance indicator	Result		Target	Variance	
	2020/21	2021/22	2021/22	to prior year	to target
Rural water supply deliveries Number of orders delivered / total number of orders x 100	99.76%	99.90%	98.0%	0.1%	1.9%
Applications completed within agreed timeframes Number of applications completed/total number of applications ⁵	98.0%	98.0%	85.0%	0.0%	15.3%
Unavailability of Domestic and Stock Supply Duration that domestic and stock service is unavailable in excess of on-property storage	0.0%	0.0%	0.0%	0.0%	0.0%
Groundwater Supply Number of transfers processed within target period / total number of transfers processed x 100	0.0%	0.0%	0.0%	NA	NA

Note: Variances greater than 5% are described below.

5. Favourable variance to target is a result of our Customer Team processing 514 water share transfers in 21/22 whereby 98% of these transfers were approved with 20 business day, exceeding our projected target.

Table 7 - Rural customer responsiveness performance indicators

Key performance indicator	Result		Target	Variance	
	2020/21	2021/22	2021/22	to prior year	to target
Billing complaints No. complaints per 1000 customers ⁶	0.810	0.319	1.670	-60.6%	-60.6%

6. Favourable variance compared to prior year is a result of receiving two (2) billing complaints compared to five (5) in the previous year.

Compliance Reporting

LMW issued 25 advisory notices to Urban customers during 2021/22. Advisory notices were issued due to customers watering outdoors outside of the nominated hours during the PWSR.

LMW issued 943 formal warnings to Rural customers during 2021/22 and 230 Notices of Contravention. 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, 18 Infringement Notices were issued, access suspended to 2 customers and 5 customers were recommended for prosecution with 6 prosecutions finalised.

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

Source: LMW Internal Record 2021/22

Urban

25

Advisory notices

0

Formal warnings

Rural

943

Formal warnings

230

Notice of
contravention

ZERO  **tolerance**
on water theft

Keep your account balance
positive to avoid penalties.

lmw.vic.gov.au

VICTORIA
State
Government

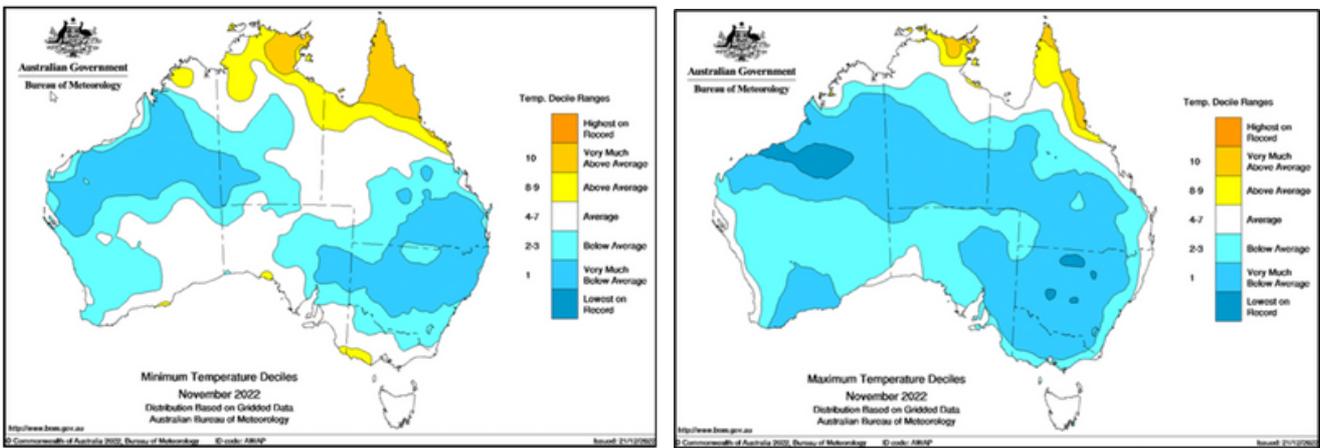
CLIMATE CONDITIONS AND OUTLOOK

Recent conditions

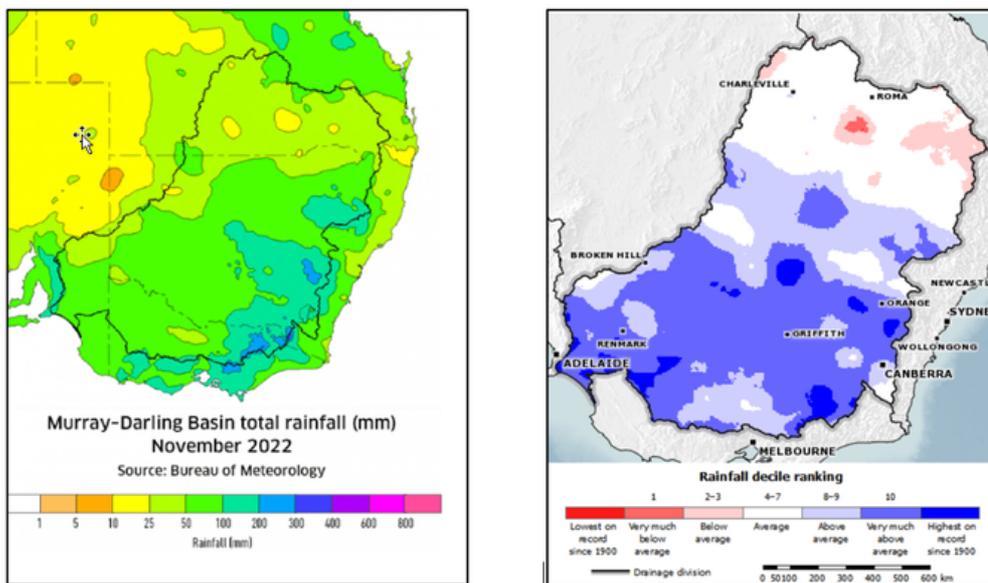
The BoM reports that the mean temperature in November for the whole of Australia was 1.17°C below average. Across the Murray–Darling Basin, both minimum and maximum temperature deciles varied from average to below average (Figure 4 & 5). November rainfall was the tenth highest on record for Australia, including most parts of Victoria.

Across the basin, rainfall was above average (including highest on record) across 44 per cent of the area, distributed over southeast and centre. Total rainfall was 68 mm which is 66 per cent higher than the long-term mean of 41 mm for November. Observation stations in Victoria and southern and central New South Wales inland of the ranges recorded their highest November rainfall total on record, including some stations with more than 100 years of observations. Significant flooding continued to affect much of eastern Australia in November 2022, with floodwaters continuing to move downstream in the Murray–Darling Basin. Across much of the Basin, rainfall during November ranged from between average to very much above average (Figures 6 & 7).

Figures 4 & 5 - Murray–Darling Basin minimum temperature deciles for November 2022 (left) and maximum temperature deciles (right). Source: Bureau of Meteorology



Figures 6 & 7 - Murray–Darling Basin rainfall for November 2022 (left) and November rainfall deciles. Source: Bureau of Meteorology



The high rainfall in November increased the River Murray System inflows with totals around 5,500 GL. Note that the inflow figure 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 2021/22 and average inflow (both 10 year and long-term average).

The November 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 December 2022 was 100% High-Reliability Water Share (HRWS) and Low-Reliability Water Share (LRWS).

Figures 8 - Murray system monthly inflows (excluding Snowy, Darling, IVT and environment inflows).

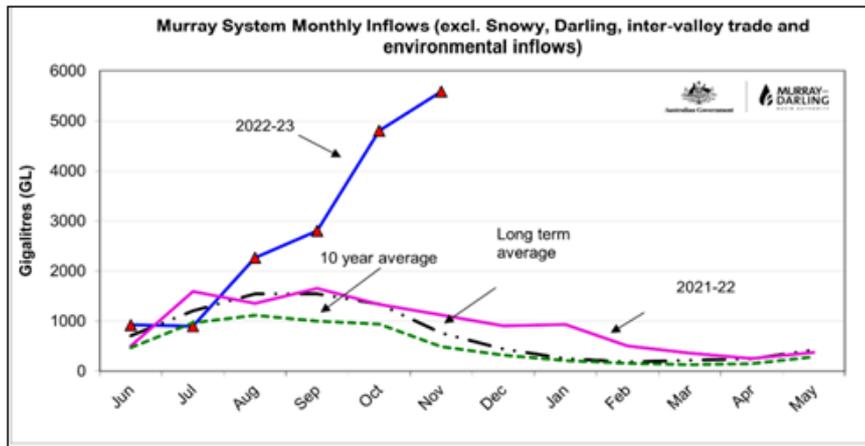


Table 8 compares the equivalent seasonal determination in the Murray system for 15 December between 22/23 and 21/22. This shows a positive outlook for this water year regarding water resource position.

For the remainder of the water year, based on the ocean pattern, the BoM is forecasting above median rainfall (greater than 60% chance) for southern coastal parts of New South Wales and eastern Victoria and high streamflows are expected in the south-east basin. As the catchments across the Basin are wet, more rainfall and inflows might cause flooding, which is the key operational risk in 2022/23.

Table 8 - Seasonal determination in the Murray system - 22/23 and 21/22

Date of announcement	High/Low reliability water share	
	2022/23	2021/22
15 December 2022	100%/100%	100%/12%

Climate Outlook

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

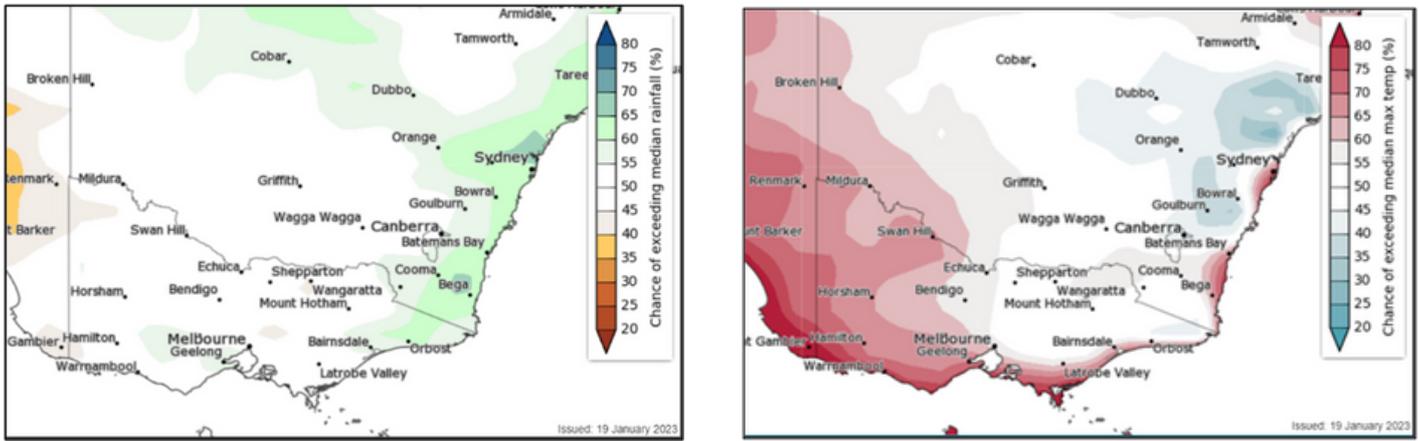
Rainfall and temperature

For February to April, above median rainfall is likely (greater than 50% chance) for most of Victoria (Refer to Figure 9). On the other hand, maximum temperatures are likely to very likely (60% to 80% chance) to be warmer than median for Western Victoria (Refer to Figure 10). This forecast reflects the status and outlook for several climate drivers, including La Niña, a positive Southern Annular Mode (SAM) and warm ocean temperatures around Australia. (Refer to Figure 10).

Water storages and Streamflow

- Current active water storage across the Murray-Darling Basin is at 100% capacity. The active storage volume remains around maximum with Dartmouth Dam, Hume Dam, Menindee Lakes and Lake Victoria all effectively full. Flows currently remain unregulated in the River Murray between Yarrawonga and the Murray Mouth. Unregulated flows are expected to continue in the South Australian River Murray as flood peaks slowly travel downstream.
- High streamflow is likely for January to March along south-east Victoria (Refer to Figure 11)
- Flows were high at 63% of locations in December, all around Australia
- Flows were near median at 29% of locations across Australia.

Figure 9 & 10 - Chance of exceeding the median rainfall (February to April) (left) and chance of exceeding the median maximum temperature (February to April) (right).



The current planning process for the River Murray Operations 2022-23

- Significant flooding occurred in large parts of the basin. Flood operations continued from August- late December for Dartmouth, Hume and Yarrawonga. As of January 2023, releases from Hume and Yarrawonga are meeting demands and back to regulated conditions.
- Both Hume Dam and Menindee lakes are full – similar to 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 2022-23.
- 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 despite the recent high rainfall events. In comparison to historical conditions, we are already experiencing:

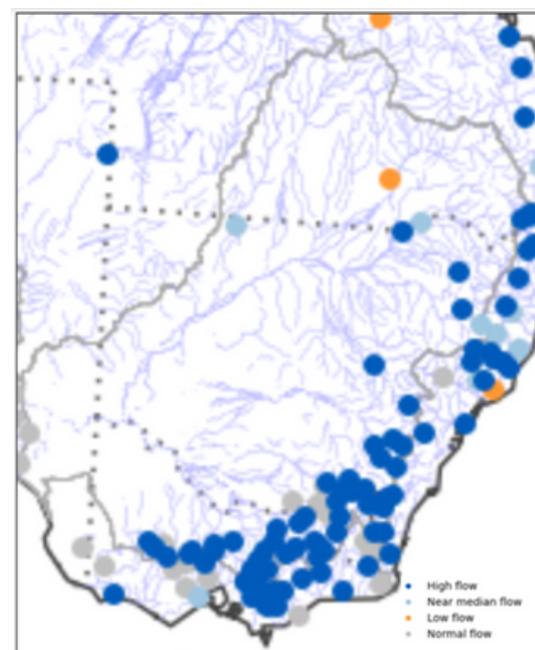
- Higher temperatures and more numbers of hot days
- Reductions in rainfall during the cooler months
- In some locations, increases in rainfall during the warmer months and during extreme, short-duration rainfall events
- In many catchments, a shift in the streamflow response to rainfall is being observed, where less stream flows are generated for the same amount of rainfall.

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 (Source: DELWP Hydrology and Climate Science). 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 11 - Seasonal Streamflow forecast for January to March 2023.



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 22,000 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 75ML/d and the Mildura West plant has a design capacity of 18ML/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 ground-level 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 Mildura (both MDA Seventh Street and MDA West WTP) via a 450mm diameter transfer pipeline 7.14km long. 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 and supplies it to a dissolved air flotation and filtration treatment plant. The treated water is stored in a 6ML ground-level storage tank (GLS). From the GLS 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 11.5 ML/d 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 and set of booster pumps. 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 booster 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 1.0ML/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.

In 21-22 a new water main was constructed (225 mm PE,1,2 km long) as the old AC main was approaching to the end of asset life and had multiple leaks/ failures. This enabled LMW to provide an increased volume of water supply with increased pressure (from 180 kPa – 240kPa).

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 0.4ML/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 ground-level storages, each of 4.0ML capacity, and a 0.15ML water tower are situated west of the city. A new 5ML storage has also been recently constructed at this storage site and is operational as of March 2022.

Woorinen South is supplied from the Swan Hill system via a 10km long pipeline with 300mm and 250mm diameter sections 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, 250mm 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, relift pumps and a 0.1ML water tower.



New 5ML storage tank in Swan Hill

Rural Water Supply Systems

LMW services to 2,655 irrigation and 2,253 stock and domestic customers in the four pumped irrigation districts of Mildura, Merbein, Red Cliffs and Robinvale, and to 300 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 holds 1,490ML of High-Reliability Water Shares (940ML Murray and 550ML Goulburn) , and 216ML of Low-Reliability Goulburn Water Shares as at 30 June 2022.

In 22/23, the opening allocation for High-Reliability Water Shares (HRWS) was 94% in the Murray system and 66% in the Goulburn system. The total available water volume was 33,848ML, with a carryover volume of 3,488ML (as of July 1, 2022). 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 1 September 2022. Pre-releases from Lake Hume continue to trigger spills from spillable water accounts in the Murray system. A total of 3,488 ML has been lost from the LMW Urban Allocation Bank Account (ABA) as of 15 December 2022. The total available water volume at present is 31,581ML.

Table 9 summarises the availability of water as per the seasonal determinations on 1 July 2022 and 15 December 2022.

Table 9 - Availability of water to LMW in 2022/23

Source of water	Entitlement (ML)	Seasonal determination on 1 July 2022	Seasonal allocation issued 1 July 2022 (ML)	Seasonal determination on 15 December 2022	Available balance 15 December 2022 (ML)
Goulburn HRWS	550	66%	363	100%	550
Goulburn LRWS	216	0%	0	100%	216
Murray HRWS	940	94%	884	100%	1,659
BE (Urban)	30,971	94%	29,113	100%	29,156
Carryover	-	-	3,488	-	-
Total (ML)	32,677		33,848		31,581

The available balance on 15 December is explained in detail below:

Table 10 - Availability of water to LMW in December 2022

Source of water	Carryover ¹ (ML) - A	Seasonal allocation issued 15 December 2022 (ML) - B	Net Trade ² (ML) - C	Write off ³ (due to spill) - D	Available balance (A+B+C-D)
Goulburn HRWS	361	550	-	361	550
Goulburn LRWS	216	216	-	216	216
Murray HRWS	803	1,480 ⁴	180	803	1,659
BE (Urban)	2,108	30,971	-1,815	2,108	29,156
Total (ML)	3,488	33,217	-1,835	3,488	31,581

1. Carryover as of the start of the season (1 July 2022)

2. Net trade Vol = trade in - trade out. Negative volume indicates trade out.

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

4. The volume includes permanent water shares purchased by LMW since 1 July 2022.

CURRENT DEMAND AND FORECAST

Table 11 below shows historical volumetric urban water usage from 18/19 to 21/22 and water use forecast up to 25/26. The forecast is based on average climatic conditions in the last 3 years with an average annual demand of 528kL per residential connection expected. This assumption is consistent with the LMW 2022 Urban Water Strategy (UWS).

Table 11 - Urban Water Volumetric Usage and Demand Forecast – ML pa 2018/19– 2025/26

Annual usage/ demand forecast	Actual Usage				Forecast			
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Residential demand (ML)	15,640	14,874	14,732	14,398	15,661	15,815	15,971	16,127
Non-residential demand (ML)	4,861	4,569	4,396	4,396	4,766	4,800	4,835	4,869
Total urban water demand	20,501	19,443	19,128	18,758	20,427	20,614	20,807	20,996

There was a small decrease (3%–5%) in usage in 19/20 compared to 18/19. Note that LMW’s water supply systems were under Stage 1 water restriction during most 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). In 20–21 there is also a reduction of water usage which could be attributed to Permanent Water Saving.

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.

There was a small reduction in water consumption from 2020/21 to 2021/22, which could be attributed to higher than average rainfalls occurred during this period, particularly in November 2021 and January 2022.

The typical urban water demand distribution between customer types is described in Figure 12, based on average annual raw water consumption of 21,234 ML (annual average from 17/18 to 21/22).

Figure 12 - Typical raw water demand distribution assuming annual water demand of 21,234ML

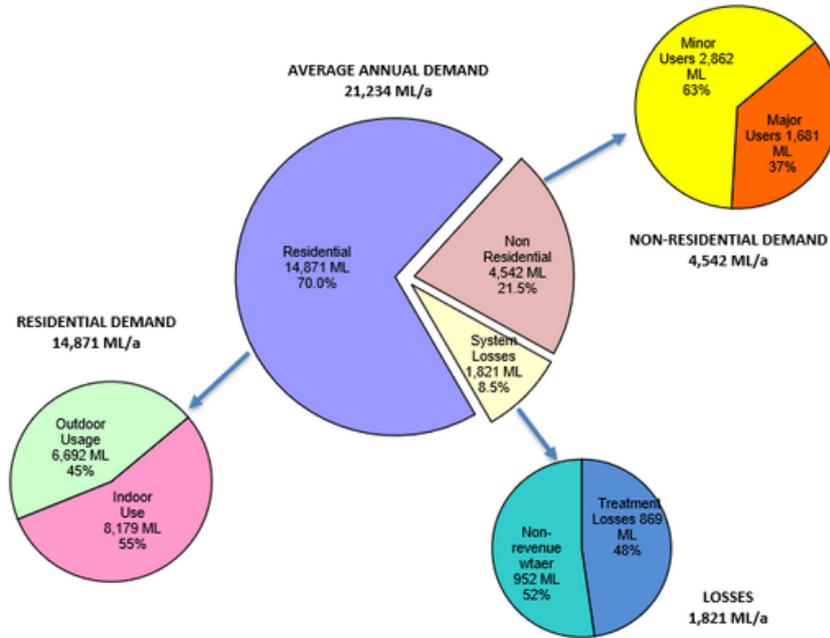


Table 12 shows the volume of water supplied to irrigation districts.

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 Modernization Project, is expected to be utilised by the rural customers in Red Cliffs and Merbein irrigation districts in the coming years, which might increase the irrigation demand.

On the other hand, there would be a reduction in demand due to wetter climate outlook for 2022/23 season than last seasons. The estimated delivery to the Primary Entitlement Holders to be 70,000 - 90,000 ML (as per the discussion with Irrigation Service Delivery Team) which is approximately 20%-40% less than delivered in 21/22

Table 12 - Volume of water supplied to rural customers

Year	Volume of water supplied to primary entitlement holders (ML)	Volume of water supplied to VEWH (ML)
2021/22	116,564	118
2020/21	117,809	922
2019/20	117,511	1,608
2018/19	129,348	1,561



River Murray, Red Cliffs

FORWARD OUTLOOK 2022/23

The HWRS on the Murray system was increased to 100% on 1 August 2022 from 94% (as of 1 July 2022). The HWRS on the Goulburn system is 100% since 1 September 2022. The BoM forecasts wetter than average condition for the next three months. This would be a very favourable position for LMW to meet its supply commitments to the customers.

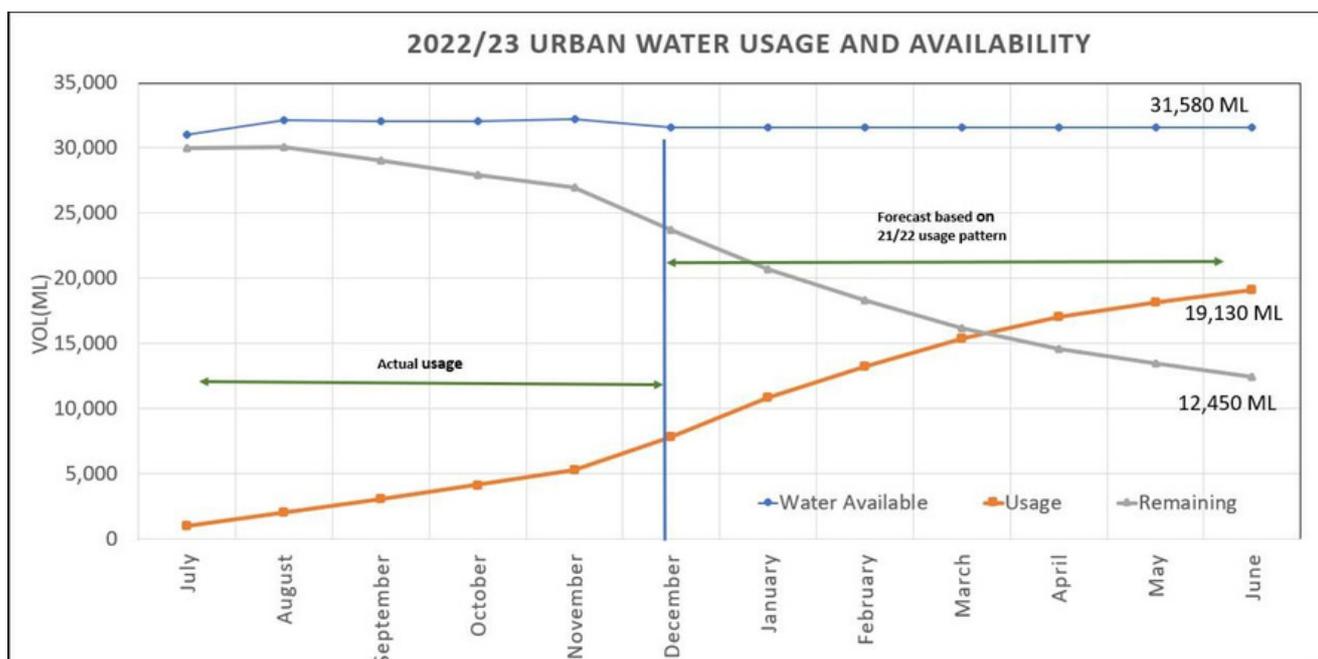
Factors to consider in the forward outlook:

- 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 October 2022 was approximately 4125 ML(Source: LMW operational data)
- The Murray-Darling Basin Authority commenced pre-release from Lake Hume in August 2022. This has triggered spills from specific resources in the Murray system (E.G: Barmah-Millewa Forest Environmental Water Allocation) as well as spillable water accounts. A deduction 641 GL (91 percent of spillable account volume) occurred from the spillable water accounts this season. This impacts the ability of 100% allocation to be securely stored for use or trade.
- Positive seasonal outlook for 2022/23 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.
- Despite the rare likelihood of restrictions, extreme weather events or emergencies such as bushfires in our catchments, major loss of power supply or water contamination might require implementation of restrictions to manage water demands.

Figure 13 summarises the urban water availability based on the supply-demand balance. The volume of available water is plotted in a cumulative monthly pattern considering seasonal allocation and trade (No trade volume assumed from December 2022 to June 2023).

The demand is plotted as a cumulative monthly volume (raw water) based on the actual usage till December 2022 and forecast for January 2023 - June 2023 based on usage pattern observed in the 2021/22 season. The data indicates there is no likely shortfall for the 22/23 season.

Figure 13- Forecast Water Supply/Demand (ML) for 2022/23 season



ACTIONS AND LEARNINGS

Key findings from 2021/22

Permanent Water Saving Rules were in place for the entire 21/22 season. The seasonal determination commenced with 94% HRWS in the Murray system but with the continual resource improvement reached 100% by 1 August 2022. This resulted in a positive season for water availability compared to the 20/21 season.

Table 13 summarises a few key findings and lessons learnt from 2021/22.

Table 13- Volume of water supplied to rural customers

Service delivery	Findings/ Lessons/ Actions
	<p>Significant flooding in the Murray River catchments has created various challenges during last few months to service delivery, which include increased risk to critical infrastructures such irrigation pump stations, WTPs and WWTPs, deterioration in raw water quality, access issues to receive goods and providing appropriate information to our customers etc. However, LMW was able to respond to these challenges and ensured continuity of our services by enacting necessary incident response measures and working closely with all relevant stakeholders including the State Incident Control Centre. This event also provided an opportunity to test our incident management processes and procedures. Note that the incident is continuing and expected to last until end of February 2023. The learnings from this event will be considered and incorporated into our processes and procedures where appropriate.</p> <p>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.</p>

Customer Engagement	Findings/ Lessons/ Actions
	<p>In early 2022, LMW developed a new Customer Engagement Framework and Strategy, outlining our overarching approach to communication and stakeholder engagement. This strategy aligned us with best practice guidelines and industry standards to ensure compliance with regulatory requirements and establish robust protocols for effective stakeholder engagement. Using this new strategy, LMW engaged with urban and rural customers heavily throughout 21/22 through the development of our Urban Water Strategy (UWS) and Pricing Submission 5 (PSS5).</p> <p>Transitioning out of COVID restrictions to a new COVID normal, LMW deployed a hybrid range of engagement approaches to reach as many customers as possible. From online deliberative panels, shed meetings, BBQs, face to face meetings and community events, we engaged heavily with customers whilst also progressing other initiatives such as the Mildura Field Days, Customer Committees, and the 2022 Growers conference to create a two-way engagement with customers across a range of areas and topics. These included levels of service, hardship and vulnerability, pricing, strategy, and planning.</p> <p>Rounding out a busy year of engagement, LMW finished 2022 responding to a one in fifty-year flood event across the service region in which we engaged and supported the community heavily through the emergency response as we prepare to assist the community and enter the recovery phase.</p> <p>Effective engagement with our stakeholders continues to be an ongoing Strategic Priority embedded in our Strategic Plan.</p>

Operational	Findings/ Lessons/ Actions
	<p>As mentioned above the major flooding event has caused various operational challenges to the production of drinking water. The raw water quality in the Murray River has deteriorated and caused difficulties in treating water. LMW is responding to raw water quality changes by optimising treatment processes. Consequently, consumption of water treatment chemicals increased significantly. Given that other water corporations are also facing water quality issue due to the flood, the demand for water treatment chemicals increased across the State. This has caused shortage of water treatment chemicals since November 2022, particularly Aluminium Chlorohydrate (ACH), which is a coagulant used in water treatment. LMW is managing this issue by using alternative chemical (i.e., Alum) where possible. Moreover, the poor raw water quality is impacting the amount water that can be produced due to treatment units such as filters require more frequent cleaning than usual to ensure the quality of the drinking.</p> <p>Although BGA blooms were not a significant issue this year, it is still a key issue for the coming years and LMW is undertaking several initiatives to manage this issue.</p> <p>LMW operational staff attended the “Summer Ready Risk Assessment” workshop on 21/22 (ongoing). The purpose of the workshop was proactive maintenance and planning in preparation for high demand in summer. As a positive outcome of the workshop, there were no major operational breakdowns.</p> <p>In 2021/22, LMW experienced an increase in rapid growth in aquatic weeds in the river and the channels. This impacted the irrigation pump stations’ operation as well as delivering water through the channels to the irrigation customers. This issue is being managed by a weed management program in our annual operational plan.</p>

Infrastructure	Findings/ Lessons/ Actions
	<p>LMW ensured our assets and infrastructure meets current and future needs by optimising our infrastructure through improved life cycle management and delivering our Water Plan capital expenditure (Capex) on time, and on quality. The following are some major Capex projects:</p> <p>In February 2022, a new 5 ML storage treated water storage tank has been commissioned at Swan Hill to improve security of supply to Swan Hill and satellite towns (i.e., Nyah, Nyah West & Woorinen South).</p> <p>Installation of UV treatment units at the Kerang, Swan Hill, Mildura and Mildura West WTPs are being undertaken. Note that progress of this work is impacted by the flood. However, LMW is working towards completing this project by end of 2022/23.</p> <p>The Mildura central pump station is the major irrigation pump station that supplies water to the Mildura irrigation district. LMW replaced old sections of the delivery pipeline from the central pump station as those sections of pipes were deteriorated due to severe corrosion and posed a significant risk to service delivery.</p> <p>Several customers in the Millewa irrigation district take water for irrigation from Lake Cullulleraine. The existing pump station that extracts water from the Murray River and supply to Lake Cullulleraine has reliability issues and unable to meet the demand, therefore a new pump station is currently being built to ensure supply reliability.</p>

Compliance	Findings/ Lessons/ Actions
	<p>Urban customers compliance with the PWSRs improved significantly in 2021/22 compared 2020/21 with no formal warnings were issued.</p> <p>There was a marked increase in advisory letters issued to rural customers in relation to S.33E (Unauthorised Take of Water) of the Water Act 1989 in 2021/22. 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 22/23, LMW will continue to work with its customers to build awareness around compliance and water-saving opportunities.</p>

2022 Urban Water Strategy (UWS)	Findings/ Lessons/ Actions
	<p>LWM has started implementation of our 2022 UWS. The progress on the actions is summarised below:</p> <ol style="list-style-type: none"> 1. Increase supply availability Purchased 540ML of permanent water entitlements (i.e., Murray River HRWSs). Note that LMW will assess our water resource position, urban water demand and water market to determine volume of additional water entitlements to be purchased to ensure security of supply on a regular basis. 2. LMW is continuing with the following activities to reduce demand for potable water <ul style="list-style-type: none"> • “Target Your Water Use” and Permanent Water Savings Rules (PWSR) campaigns. • Deliver Schools and Community Education Programs. • Delivery of the Community Housing Retrofit Program. 3. Improved use of existing supplies LMW is managing carryover of water to maximise system reliability. 4. Alternative water sources LMW will continue to explore opportunities for alternative water supplies and alternative sources to supplement potable water. For example, a feasibility study is currently being undertaken on provision of fit for purpose recycled water to public open spaces in Mildura for irrigation to offset potable water use for this kind of applications.

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