

2021 Water Security Outlooks

Annual Water Outlook

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Executive Summary

South Gippsland Water (SGW) currently manages eight water supply systems that provide water to 22 individual towns and locations. This document describes the expected outlook for these systems over the coming summer season, with the likelihood of restrictions in each system summarised in Table 1. In most instances, the forecasts below reflect the 12-month period from December 2021 to November 2022. The forecast period for run-of river systems is 3 months from November 2021 to January 2022, reflecting the period over which the forecast has an acceptable level of uncertainty. The Little Bass and Coalition Creek supply systems that previously supplied Korumburra, Poowong, Loch and Nyora are not currently being used, other than to supply very small volumes of non-residential water, and therefore have not been listed in Table 1.

The following general statements can be made about the SGW systems over the outlook period:

- Restrictions are not considered likely or certain for any supply systems;
- For Fish Creek, restrictions are possible, but are not anticipated unless conditions were to become considerably drier than indicated by the Bureau of Meteorology's climate forecast and recent climate conditions.
- For Leongatha, restrictions are unlikely, and are projected to only occur if conditions were to become considerably drier than indicated by the Bureau of Meteorology's climate forecast and recent climate conditions.
- The systems with low storage capacity relative to demands (Dumbalk, Meeniyah and Yarram) have been assigned a restriction level of very rare, as the recent streamflow conditions, as well as the forecast climate conditions, are above average.

Table 1 Outlook Summary

Supply Sources	Towns Supplied	Outlook Period	Likelihood of Restrictions ⁽¹⁾
Ruby Creek Reservoirs	Leongatha, Koonwarra	1 Nov 2021 to 30 Nov 2022 (13 months)	Rare
Lance Creek Reservoir and the Melbourne system	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare
Tarwin River East Branch	Dumbalk	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare (to end Jan 2021)
Tarwin River	Meeniyan	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare (to end Jan 2021)
Deep Creek Reservoir and Foster Dam	Foster	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare
Battery Creek Reservoir	Fish Creek	1 Nov 2021 to 30 Nov 2022 (13 months)	Possible
Cook's Dam (Agnes River)	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach	1 Nov 2021 to 30 Nov 2022 (13 months)	Unlikely
Tarra River and groundwater	Yarram, Alberton, Port Albert, Devon North	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare (to end Jan 2021)

⁽¹⁾ Explanation of the likelihood classification is available in Table 7

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1. Introduction

South Gippsland Water (SGW) currently manages eight water supply systems that provide water to 22 individual towns and locations, listed in Table 1. A locality map of the towns supplied by SGW is shown in Figure 1.

South Gippsland Water made key achievements in 2019, by improving supplies to Korumburra and Poowong, Loch, Nyora with their connection to the Lance Creek system, and ultimately to SGW's Melbourne Bulk Entitlement. The Little Bass and Coalition Creek supply systems that previously supplied Korumburra, Poowong, Loch and Nyora are not currently being used, other than to supply very small volumes of non-residential water, and are therefore not considered further in this outlook.

Current raw water demand is presented to indicate the relative size of each supply system. The towns of Poowong, Loch, Nyora, Korumburra, Leongatha and Koonwarra are referred to collectively as SGW's "northern towns" and Wonthaggi, Cape Paterson and Inverloch are referred to as SGW's "southern towns". Dumbalk, Meeniyan, Foster, Fish Creek, Toora, Welshpool, Port Welshpool, Port Franklin and Barry Beach are referred to as SGW's "central towns", whilst "Yarram, Alberton, Port Albert and Devon North are referred to as SGW's "eastern towns".

Table 2 Water Supply Systems managed by SGW

Supply System	Towns Supplied	Current average raw water demand (ML/year) ⁽¹⁾
Northern Towns		
	Leongatha, Koonwarra	1,670
Southern Towns and connected Northern Towns		
Lance Creek	Wonthaggi, Cape Paterson, Inverloch	1,860
	Poowong, Loch, Nyora	260
	Korumburra	710
Central Towns		
Tarwin River East Branch	Dumbalk	22
Tarwin River	Meeniyan	65
Deep Creek/Foster Dam	Foster	180
Battery Creek	Fish Creek	130
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	560
Eastern Towns		
Tarra River	Yarram, Alberton, Port Albert, Devon North	440
TOTAL		5,900

⁽¹⁾ Taken from the SGW's UWS (2021), estimated at current level of population and industrial development over a long-term climate sequence (50 years) to account for differences in water demand in wet, average and dry years.

SGW is preparing an update to its Urban Water Strategy in 2021. This document, which is due to be published on SGW's website as a final draft by March 2022, outlines SGW's long term plan to balance the supply of water to meet the region's residential, business, industry and

community water needs. The UWS identifies systems where future water supplies may need to be enhanced in order to meet the growing demands and be resilient to climate change. The UWS is complemented by a Drought Preparedness Plan (DPP) which provides SGW with a ready reference for operational guidance in times of drought. The DPP details the actions SGW will take in order to prepare for and to respond to periods of water scarcity. This Water Security Outlook is one such action.

2021 Water Security Outlook
 Annual Water Outlook

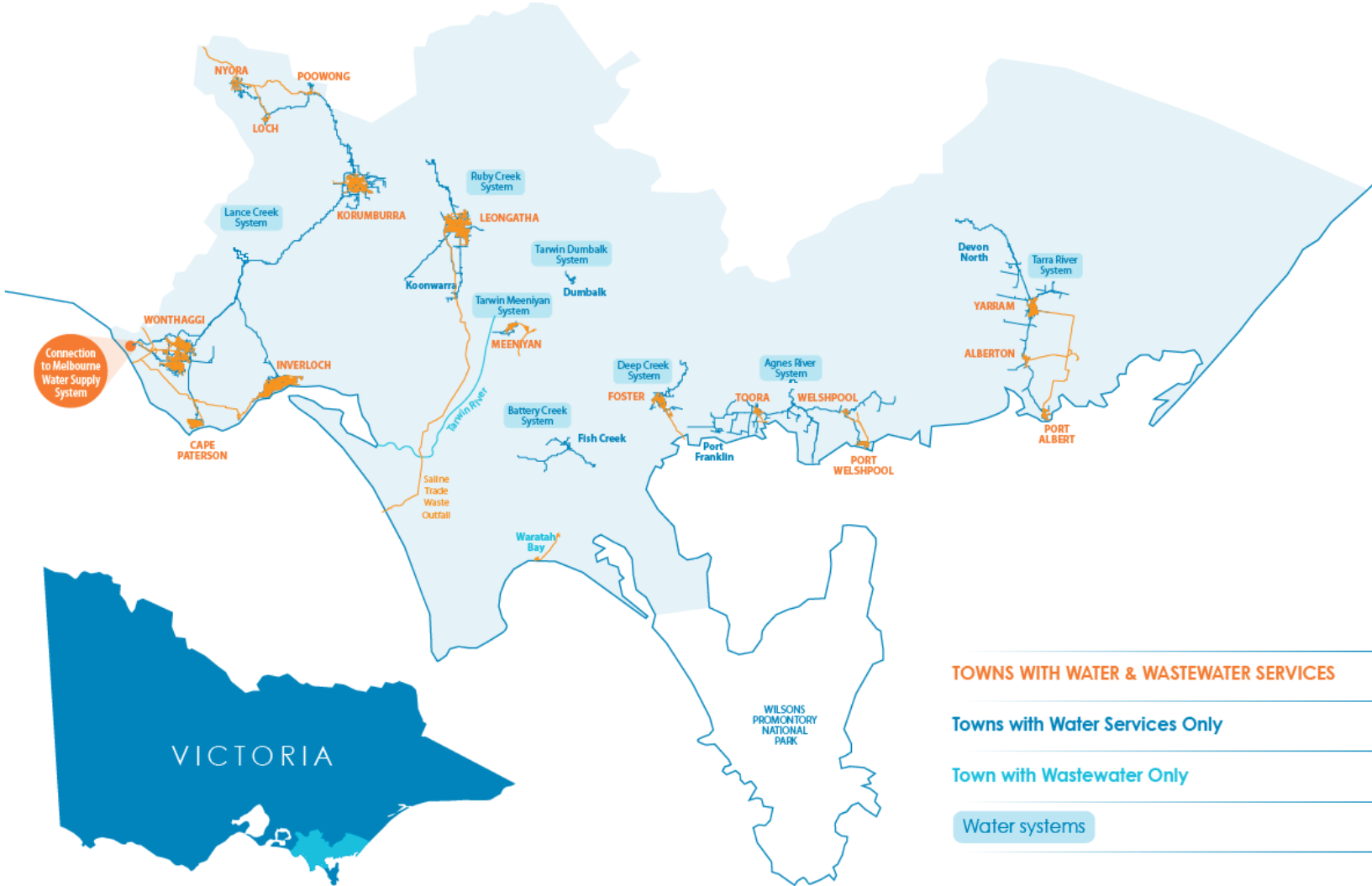


Figure 1 Locality map of SGW's supply systems

1.1 Climate Summary

1.1.1 Victoria's long-term trends in climate and streamflow

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

- Higher temperatures;
- Reductions in rainfall in winter/spring in southern Victoria; and,
- In many catchments, a shift in the streamflow response to rainfall, with less streamflow generated for the same amount of rain.

Some of the rainfall decline in winter/spring can be attributed to global warming and changes in the weather systems that deliver rainfall to Victoria. Observationally, some catchments currently yield less streamflow for a given rainfall than what has been recorded historically. Changes to catchment response to rainfall after long periods of drought is currently the subject of ongoing research. Over the longer term, we can expect:

- the rainfall reductions in winter/spring to persist;
- possible increases in summer rainfall, falling in shorter, more intense bursts;
- increases in potential evapotranspiration due to higher temperature and lower relative humidity;
- reductions in streamflow because of less rainfall and higher potential evapotranspiration; and
- the streamflow response to rainfall to no longer remain the same, and generally decline.

Even if there is an increase in summer rainfall, it is unlikely to offset the streamflow impact of rainfall reductions in winter because most of the runoff in Victorian catchments occurs over winter and spring. In the warmer months, catchments are drier and more rainfall soaks into the ground, is used by vegetation or evaporates.

Although there will still be a lot of 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>.

The Victorian Government is investing in further research to better understand how Victoria's climate is changing and the water resource implications, as part of implementing Water for Victoria.

1.1.2 Recent Climactic Conditions in South Gippsland

Over the past 12 months, rainfall across the South Gippsland Region has been close to the long-term average conditions, as shown in Figure 2. The northern and southern Towns, around Wonthaggi, Inverloch, Korumburra and Leongatha, have not been as wet as the eastern towns

(e.g. Toora and Yarram). On average, rainfall conditions in the eastern towns have been 100-125% of the long-term average, and between 80-100% of the long-term average for the northern and southern towns.

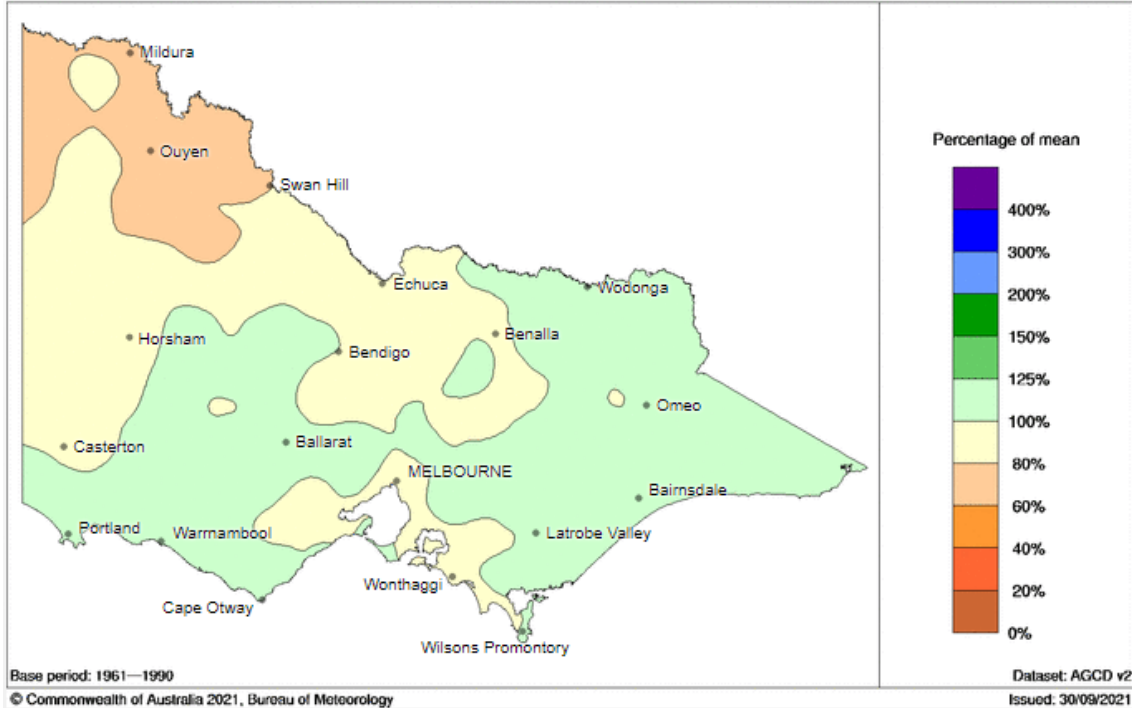


Figure 2 Rainfall percentages relative to mean over the period 1 October 2020 to 30 Sept 2021 (<http://www.bom.gov.au/climate/maps/rainfall>)

Seasonal rainfall conditions over the past year at two representative rainfall sites in South Gippsland are illustrated in Figure 3 for Korumburra and Yarram. This chart compares the recent rainfall to the long term monthly average rainfall and confirms the observations made for the region above. Over the past 12 months, rainfall has been close to average conditions with some wetter periods in January and March in 2021. The rainfall observations for the most recent months show that rainfall was lower than average in both locations compared in July and August 2021, but above average June and September 2021.

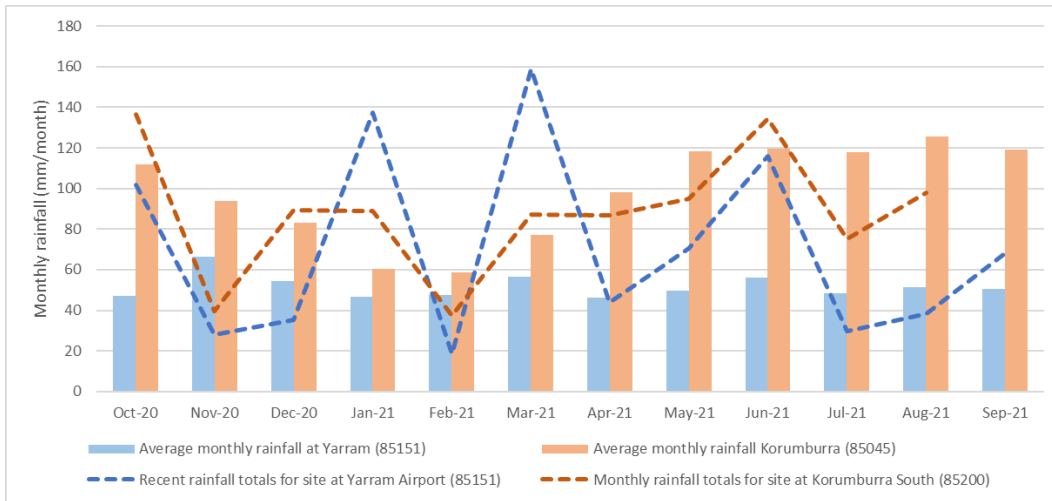


Figure 3 Recent and long-term average monthly rainfall in Korumburra and Yarram

1.1.3 Recent Streamflow Conditions in South Gippsland

Streamflow conditions across South Gippsland are illustrated in Figure 4 using two representative streamflow sites on the Tarwin River East Branch and on the Tarra River. This chart compares the recent streamflow observations with their long-term average monthly streamflow characteristics, and demonstrate that flow conditions have been generally above the long-term average at both of these sites for long periods over the last 12 months. Above average flow conditions were observed in June, but streamflow from July to September in 2021, streamflow was closer to the long-term average. This is broadly consistent with the trends observed in recent rainfall data.

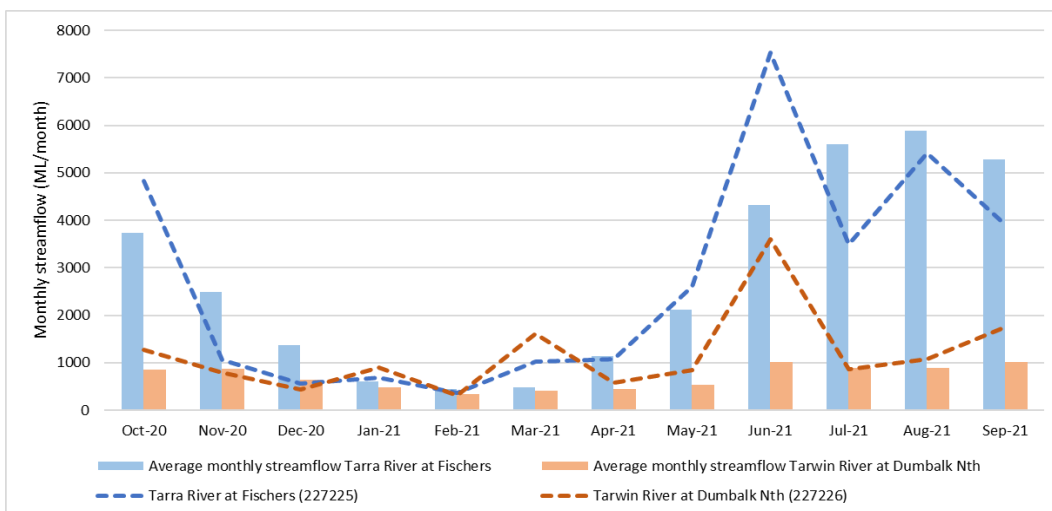


Figure 4 Recent and long-term average monthly streamflow for example sites on the Tarra River and Tarwin River

2. Current Water Resource Position

This section provides a summary of the current position of SGW's water supply systems. Table 3 summarises each of SGW's systems, with information on the major customers and water sources. For completeness, this table provides a comprehensive list of all legal entitlements however it should be noted that not all of these water sources are actively used. Some are entitlements that require significant infrastructure upgrades to be able to utilise them. The year-to-date extraction volumes listed in Table 3 cover the period from the beginning of July until the end of September.

For the Lance Creek Water Supply System, in the year to date South Gippsland Water has been allocated 56% of its entitlement from the Melbourne Water Supply System. Based on projections by Melbourne Water, this year's allocation is expected to increase to over 80% over the coming months under the forecast average climate conditions (see Section 3) over the outlook period. South Gippsland Water has also carried over 1,768 ML of unused allocations from previous years to the current year, providing a significant supply buffer in this supply system if conditions were to become drier than expected.

In the year to date no water has been extracted from supplementary groundwater sources at Leongatha and Yarram. These supply sources remain in reserve and can be drawn upon if required.

Table 3 System Summary – Water Supply Connections, Major Customers and Available Entitlements

Supply System	Towns Supplied	Number of connections	Major customers	Primary Bulk Entitlement			Supplementary water sources	
				Annual entitlement (ML)	Volume extracted 2021-22 YTD (ML)	Volume remaining 2021-22 (ML)	Annual entitlement (ML)	Volume extracted (ML)
Ruby Creek	Leongatha, Koonwarra	3,364	Saputo Dairy Australia	2,476	403	2073	Share of 715.3 ML from groundwater	0
Lance Creek	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	14,044	Burra Foods Australia, Tabro Meat, and GBP Australia (Poowong Abattoir)	3,800 ML from Lance Creek Reservoir	567 ML from Lance Ck	3,233 ML from Lance Creek	1,000 ML from the Melbourne system: 56% year to date seasonal allocation (564 ML) plus 1,768 ML carried over from previous year	52 ML from Melbourne
Tarwin River East Branch	Dumbalk	109		100	4	96		
Tarwin River	Meeniyah	277		200	18	182		
Deep Creek / Foster Dam	Foster	924		326	58	268		
Battery Creek	Fish Creek	210		251	33	218		
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	1,126	Esso, ViPlus	1,617	99	1,517		
Tarra River	Yarram, Alberton, Port Albert, Devon North	1,874		853	91	762	214.2 ML from groundwater	0

The volume in storage across the SGW systems is summarised in Table 4. All storages are currently full. The volume of water consumed over the year to date is compared to the average demand over the past five years for each system in Figure 5 to Figure 12. In the Leongatha, Dumbalk and Yarram supply systems, recent water consumption has been close to the average water use. Consumption in the Lance Creek, Meeniyan and Foster supply systems was greater than the long-term average, peaking in July for Meeniyan and August for Lance Creek and Deep Creek. In line with the forecast average climate conditions, consumption for these systems is expected to be close to the long-term average for the remainder of the year. In the Fish Creek and Toora supply systems water consumption was below the long-term average in the first few months of the 2021-22 water year.

The Urban Water Strategy provides further information on the expected growth in residential, stock and domestic, major industrial and other non-residential demands over a long-term (50 year) planning horizon for a range of possible future climate scenarios.

Table 4 Current Water Resource Position

Supply System	Storage	Storage capacity (ML)	Current storage volume (ML) at end October 2021	% of Full Supply Volume
Little Bass	Little Bass Reservoir ⁽¹⁾	218	N/A	N/A
Korumburra	Coalition Creek Reservoir ⁽¹⁾	143	N/A	N/A
	Ness Gully Reservoir ⁽¹⁾	73	N/A	N/A
	Bellview Creek Reservoir ⁽¹⁾	359	N/A	N/A
Leongatha	Western Reservoir	1137	1137	100%
	Hyland Reservoir	671	671	100%
	No.2 Reservoir	84	84	100%
	No.1 Reservoir	19	19	100%
Lance Creek	Lance Creek Reservoir	4200	4200	100%
Fish Creek	Battery Creek Reservoir	119	119	100%
Foster	Deep Creek Reservoir	5	5	100%
	Foster Dam	233	233	100%
	Raw Water Basin	27	27	100%
Agnes River	Cook's Dam	59	59	100%
Tarra River	Yarram Basin	30	30	100%

⁽¹⁾ storage not in use, other than for minor supply to non-urban customers. These storages are currently maintained at target operational water levels below full supply volume.

N/A = not applicable.

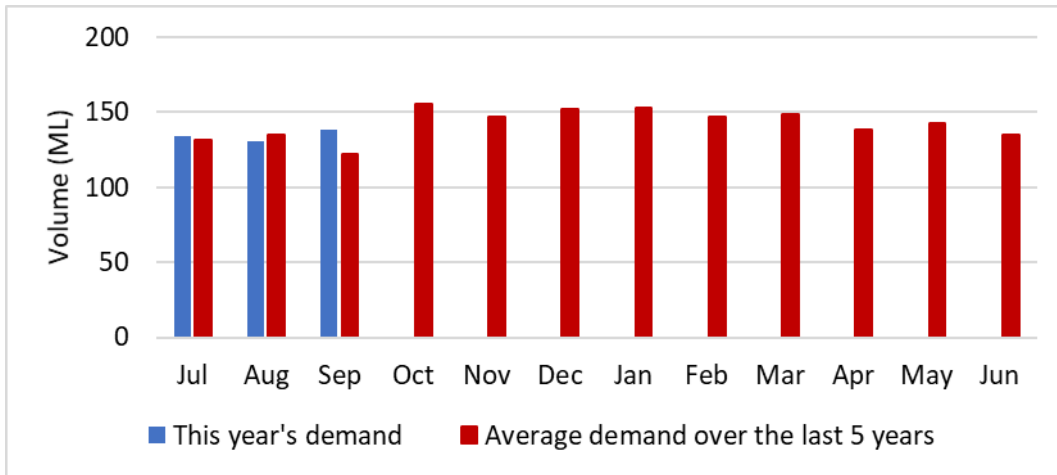


Figure 5 Water consumption in Leongatha

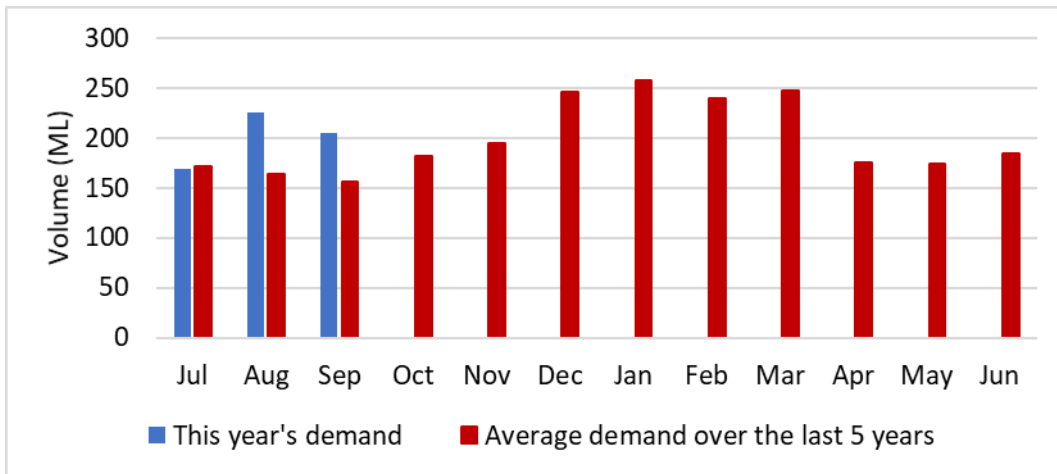


Figure 6 Water consumption in the Lance creek system

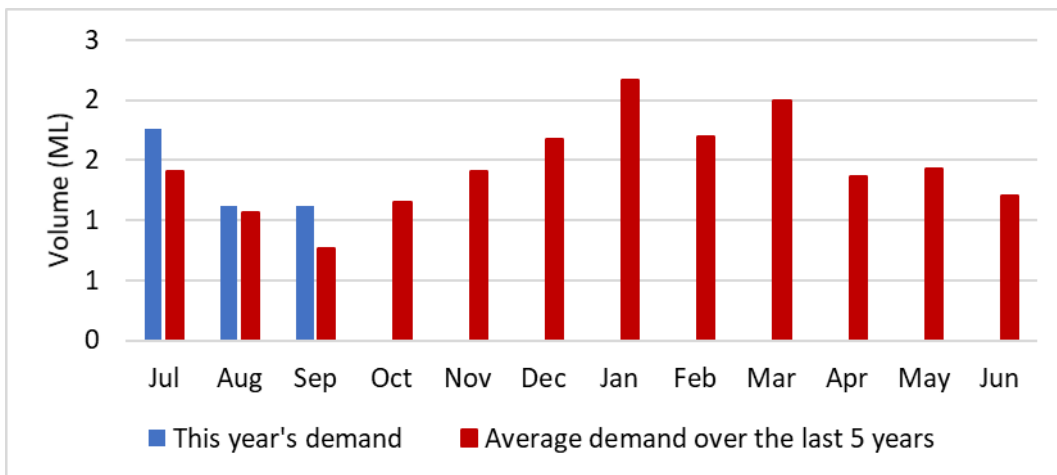


Figure 7 Water consumption in Dumbalk

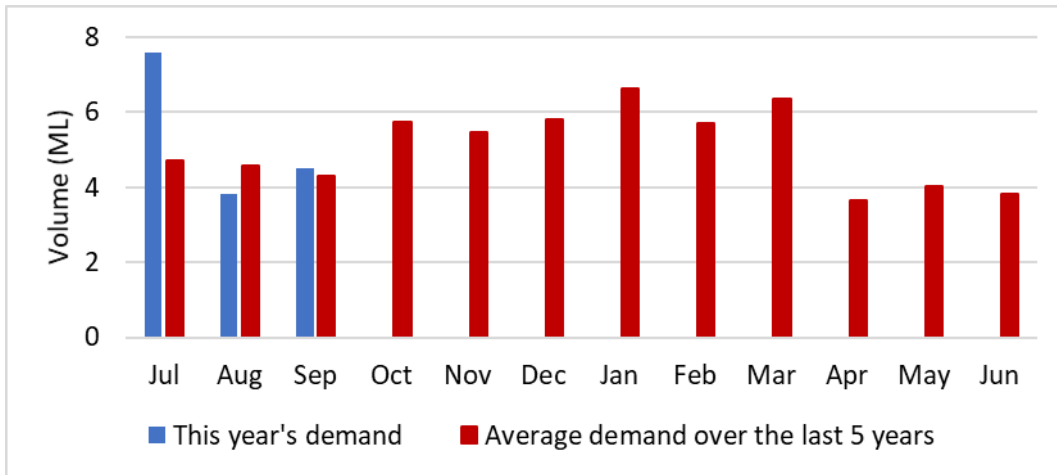


Figure 8 Water consumption in Meeniyán

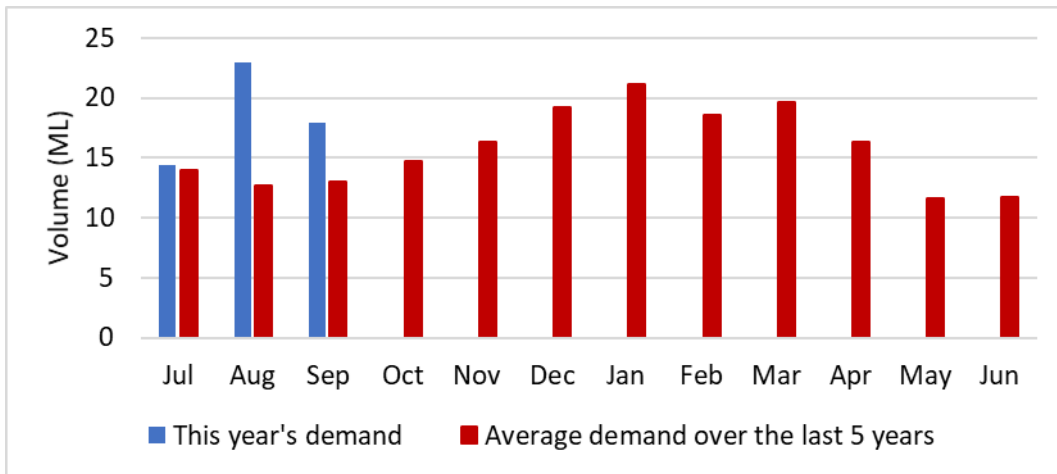


Figure 9 Water consumption in Foster

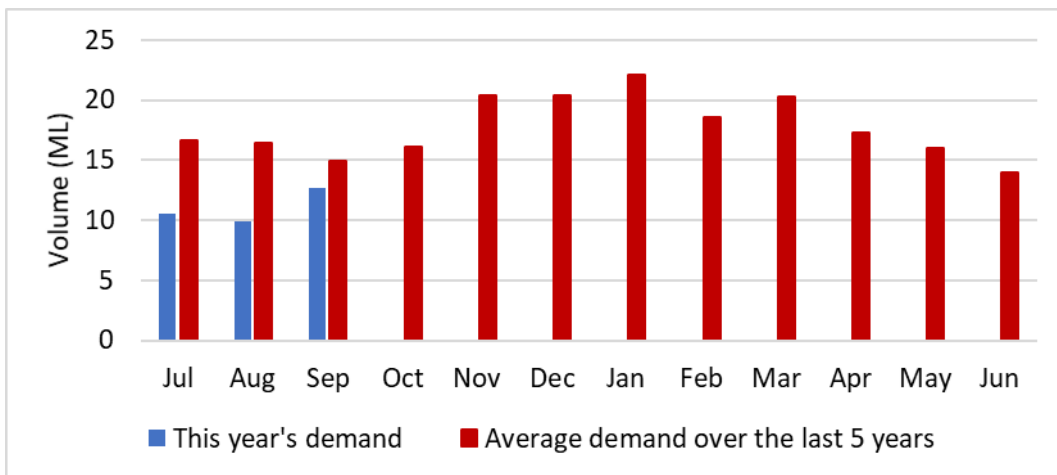


Figure 10 Water consumption in Fish Creek

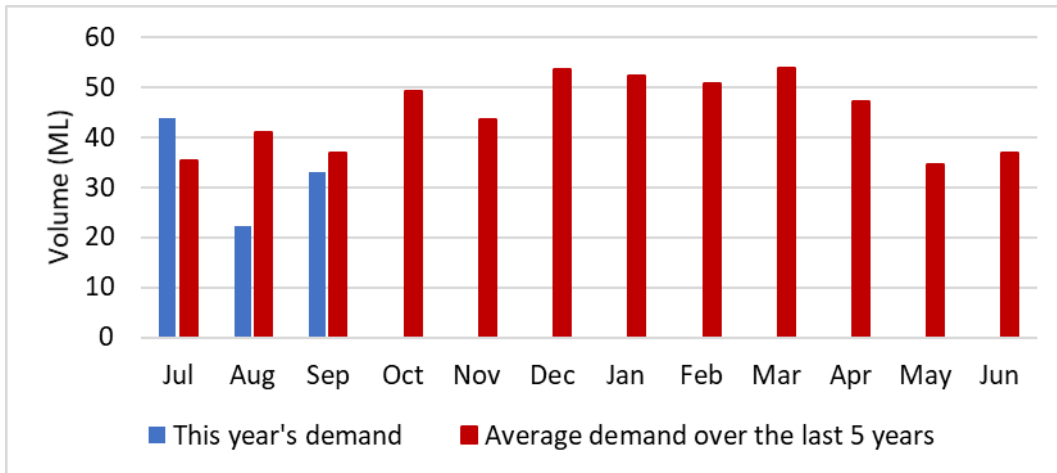


Figure 11 Water consumption in Toora

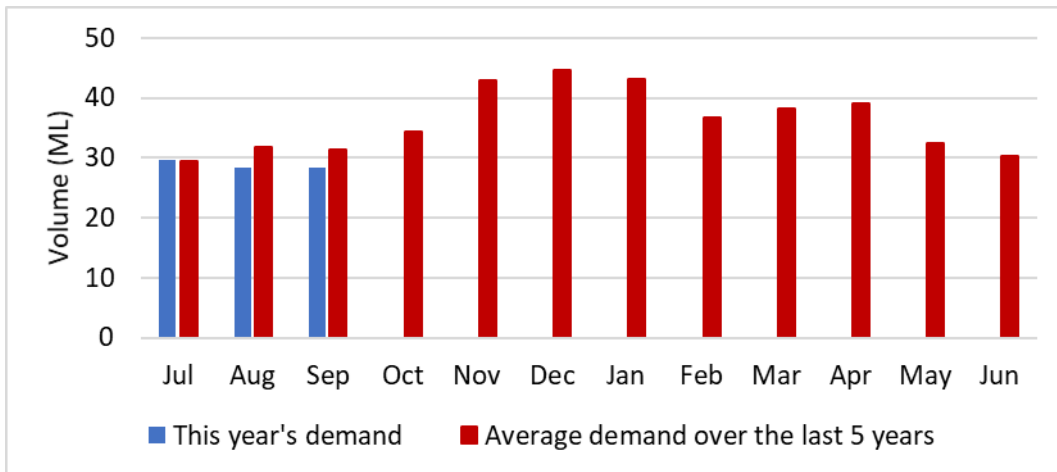


Figure 12 Water consumption in Yarram

3. Climate Outlook

The Bureau of Meteorology’s seasonal climate forecasts have been obtained for the November to January three-month period.

Across the region, rainfall is anticipated to be above average, with most systems forecast to have a 60-80% chance of exceeding median rainfall conditions during November to January. Figure 13 presents the Bureau outlook for the region showing the likelihood of a wetter three months for most of SGW’s systems.

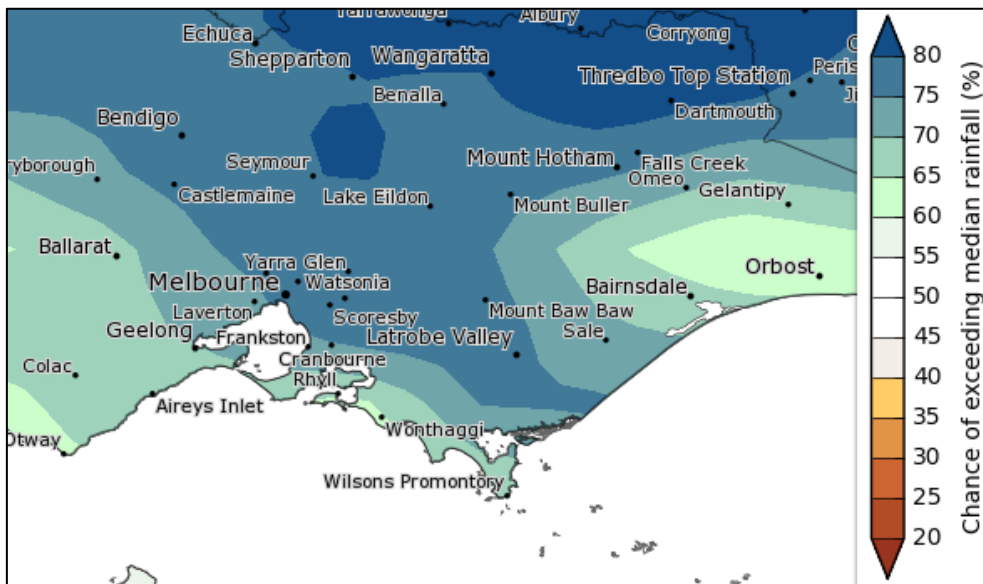


Figure 13 Chance of above median rainfall for November to January (<http://www.bom.gov.au/climate/ahead/outlooks/>) issued 14 October 2021

The maximum daytime temperature across the region is forecast to be above the long-term average during November to January. The Bureau outlook indicates a more than 80% likelihood that maximum daytime temperatures will be above long-term median values (Figure 14). December to February temperature outlooks similarly indicate a more than 80% likelihood of exceeding median temperatures across South Gippsland.

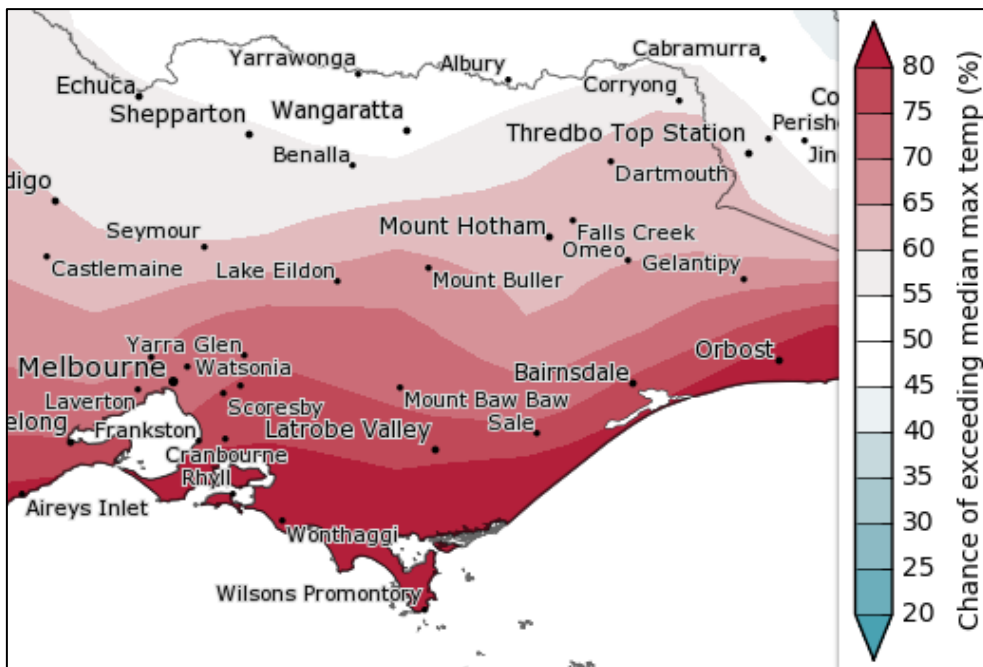


Figure 14 Chance of above median maximum temperature for November to January (<http://www.bom.gov.au/climate/ahead/outlooks/>) issued 14 October 2021

The forecast climate conditions for South Gippsland have been developed based on the Bureau’s forecast for the region and the local climate conditions in the year to date. Table 5

summarises the climate outlook across SGW's systems and specifies the scenario assumed for the Annual Water Outlook for each system, based on the assumption that:

- Wet conditions have >80% chance of exceeding median rainfall
- Average conditions have >40% to <80% chance of exceeding median rainfall
- Dry conditions have <40% chance of exceeding median rainfall

Climate influences on southern Australia this year:

- Cooling of the tropical Pacific driving a likely La Nina event, contributing to above average rainfall across most of Australia during spring and summer. As at 12 October 2021, the Bureau was indicating a La Nina alert, with a 70% likelihood of a La Nina event forming over the coming months.
- A weak negative Indian Ocean Dipole, which will possibly ease to neutral levels in late spring
- The Bureau incorporates these events into forecast models and outlooks.

Table 5 Climate outlook across SGW systems

Supply System	Towns supplied	Bureau of Meteorology Forecast (Nov-Jan)		Winter and spring rainfall for 2021 year to date	Likely Outlook Scenario
		Chance of exceeding median rainfall	Chance of exceeding median maximum temperature		
Ruby Creek	Leongatha, Koonwarra	65-70%	Greater than 80%	Average	Average
Lance Creek	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	60-65%	Greater than 80%	Average	Average
Tarwin River East Branch	Dumbalk	65-70%	Greater than 80%	Average	Average
Tarwin River	Meeniyah	65-70%	Greater than 80%	Average	Average
Deep Creek / Foster Dam	Foster	65-70%	Greater than 80%	Average	Average
Battery Creek	Fish Creek	60-65%	Greater than 80%	Average	Average
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	65-70%	Greater than 80%	Above average	Average
Tarra River	Yarram, Alberton, Port Albert, Devon North	65-70%	Greater than 80%	Above average	Average

4. Forward Outlook

The urban water restrictions outlook for SGW's supply systems are based on consideration of the information presented in each of the previous sections, in combination with an assessment of the projected storage over the coming year based on modelled information. For run of river systems, streamflow is projected for the coming three months.

Table 6 summarises SGW's assessment of the likelihood of water restrictions for each of its supply systems over the outlook period specified in the Annual Water Outlook. For systems with no storage, the outlook period is 3 months, and for systems with available storage, the outlook period is 13 months. Forecasts for supply systems with low storage capacity relative to demands (i.e. the run-of-river systems) have a greater level of uncertainty than the forecasts for supply systems with considerable storage. As such, the likelihood of restrictions for Dumbalk, Meeniyam and Yarram will be reviewed throughout the year. The assessment presented in Table 6 utilises the DELWP rating system (Table 7) that is drawn from the previous Guidelines for the Development of Urban Water Strategies and the Melbourne System Strategy (DELWP, 2016) and which have not been changed by DELWP since that time.

The following general statements can be made about the SGW systems:

- Restrictions are not considered likely or certain for any supply systems;
- For Fish Creek, restrictions are possible, but are not anticipated unless conditions were to become considerably drier than indicated by the Bureau of Meteorology's climate forecast and recent climate conditions.
- For Leongatha, restrictions are unlikely, and are projected to only occur if conditions were to become considerably drier than indicated by the Bureau of Meteorology's climate forecast and recent climate conditions.
- The systems with low storage capacity relative to demands (Dumbalk, Meeniyam and Yarram) have been assigned a restriction level of very rare, as the recent streamflow conditions, as well as the forecast climate conditions, are above average.

Table 6 Risk Assessment Likelihood rating for water restrictions over the 2021/22 Outlook period

Supply Sources	Towns Supplied	Outlook Period	Likelihood of Restrictions
Ruby Creek Reservoirs	Leongatha, Koonwarra	1 Nov 2021 to 30 Nov 2022 (13 months)	Rare
Lance Creek Reservoir and the Melbourne system	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare
Tarwin River East Branch	Dumbalk	1 Nov 2021 to 31 Jan 2022 (3 months)	Very Rare (to end Jan 2021)
Tarwin River	Meeniyan	1 Nov 2021 to 31 Jan 2022 (3 months)	Very Rare (to end Jan 2021)
Deep Creek Reservoir and Foster Dam	Foster	1 Nov 2021 to 30 Nov 2022 (13 months)	Very Rare
Battery Creek Reservoir	Fish Creek	1 Nov 2021 to 30 Nov 2022 (13 months)	Possible
Cook's Dam (Agnes River)	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach	1 Nov 2021 to 30 Nov 2022 (13 months)	Unlikely
Tarra River and groundwater	Yarram, Alberton, Port Albert	1 Nov 2021 to 31 Jan 2022 (3 months)	Very Rare (to end Jan 2021)

Table 7 Risk Assessment Likelihood Rating (DELWP, 2016)

Likelihood Rating	%	Description
1 Very Rare	< 1	Event may occur only in extraordinary circumstances
2 Rare	1-4	Event may occur only in exceptional circumstances
3 Unlikely	5-19	Event could occur at some time There is little opportunity, reason or means to occur
4 Possible	20-49	Event might occur There is some opportunity, reason or means to occur
5 Likely	50-79	The event is likely to occur in most circumstances There is considerable opportunity, reason or means for the event to occur
6 Almost Certain	80-100	Event is expected to occur in most circumstances There is great opportunity, reason or means to occur

Further details on the outlook for each system are provided in Figure 15 to Figure 22:

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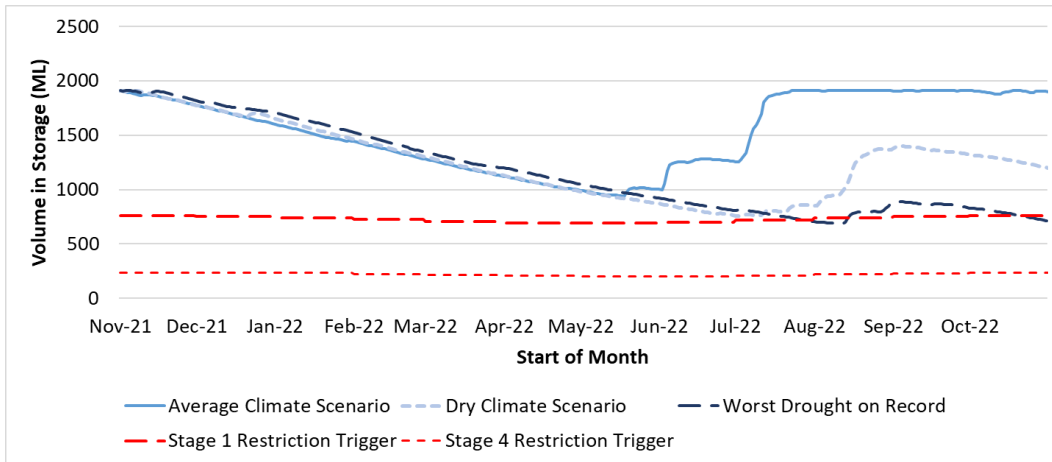


Figure 15 Urban water restrictions outlook for Leongatha

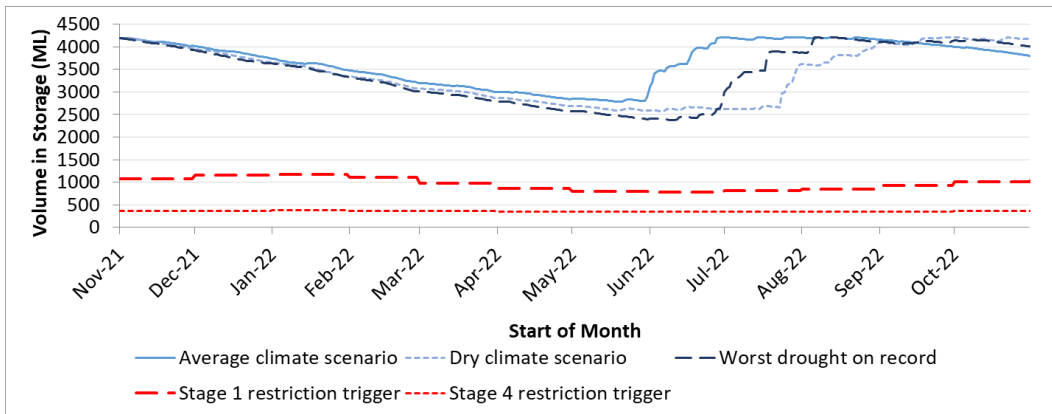


Figure 16 Urban water restrictions outlook for the Lance Creek system

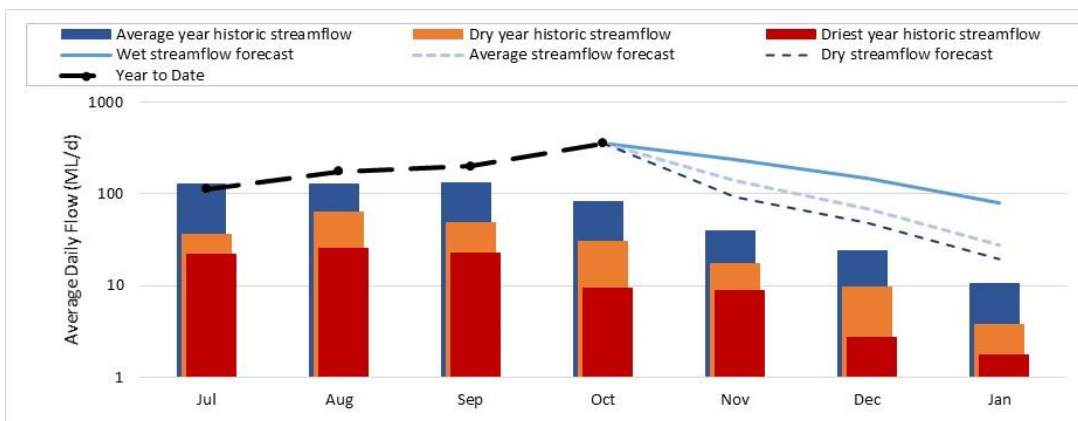


Figure 17 Streamflow outlook for Dumbalk

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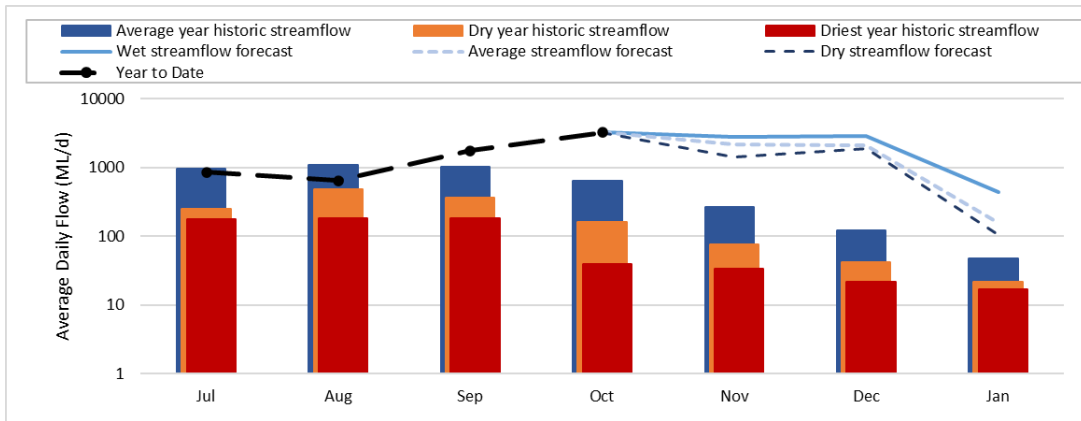


Figure 18 Streamflow outlook for Meeniyán

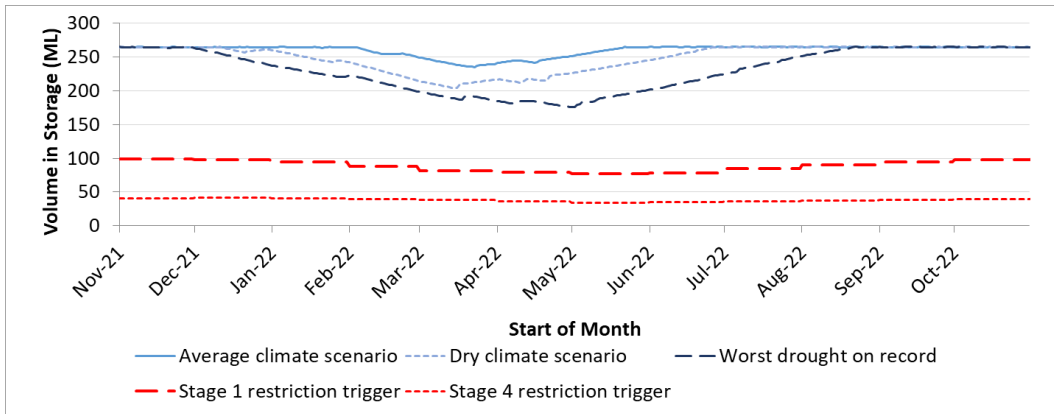


Figure 19 Urban water restrictions outlook for Foster

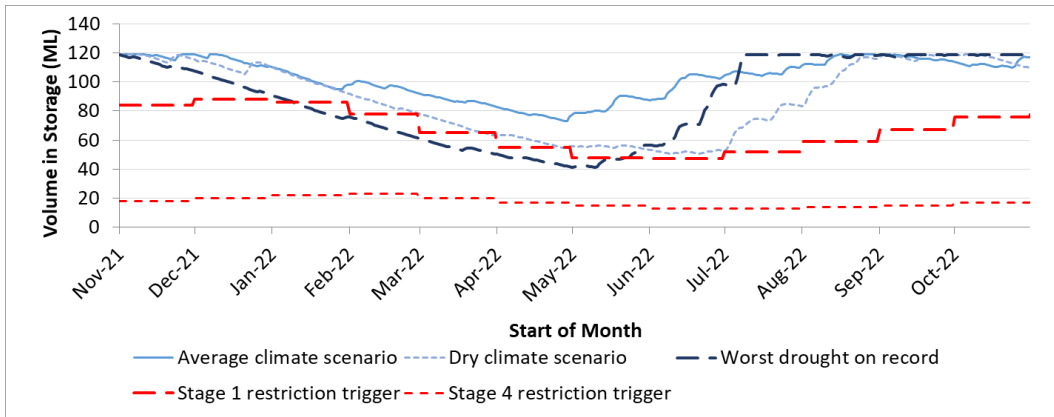


Figure 20 Urban water restrictions outlook for Fish Creek

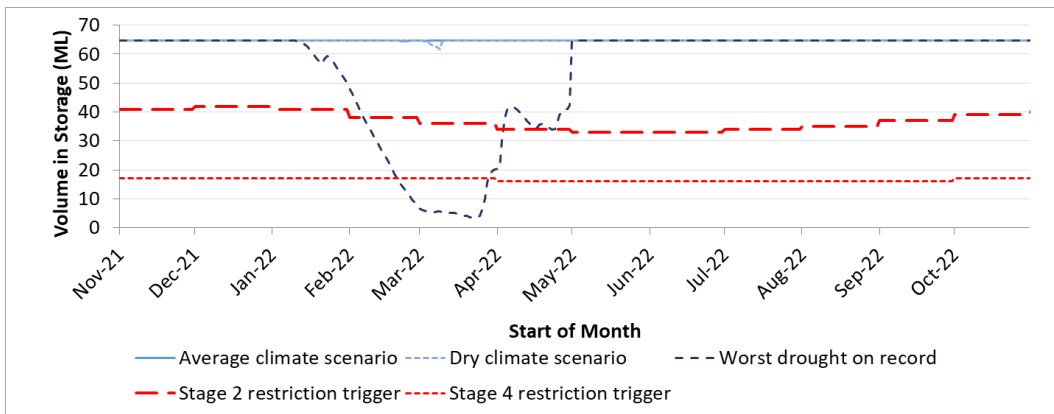


Figure 21 Urban water restrictions outlook for Toora

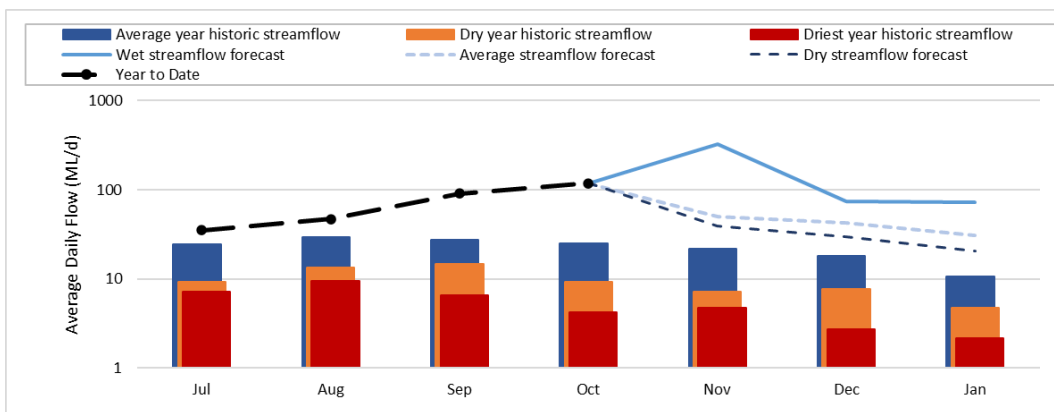


Figure 22 Streamflow outlook for Yarram

5. Short Term Action Plan

A list of priority actions for each of SGW's supply systems, prior to the next update of the Urban Water Strategy in 2027, is provided in Table 8. Further information on actions can be found in the Urban Water Strategy, due to be published as a final draft in March 2022, and SGW's Price Submission 2020-2023 publication on our website.

Table 8 Action Plan

System	Action	Timing
All	Demand management	Ongoing
	Reduce leaks and wastage (including supernatant reuse)	Ongoing
	Update water security outlooks	Every November
Leongatha	Planning for long term options as per Urban Water Strategy	2021-2027
Yarram	Continue to purchase groundwater licences as required	Ongoing
Lance Creek	Planned purchase of additional bulk entitlement from the Melbourne System in 2023/24	2023/24