2020 Water Security Outlooks

South Gippsland Water

Annual Water Outlook

| Final

29 October 2020

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Contents

Executive Summary

South Gippsland Water (SGW) currently manages eight water supply systems that provide water to 21 individual towns. 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 2020 to November 2021. The forecast period for run-of river systems is 3 months from November 2020 to January 2021, reflecting the period over which the forecast has a suitable level of skill. 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.

Table 1 : Outlook summary

Supply Sources	Towns Supplied	Outlook Period	Likelihood of Restrictions[1]
Ruby Creek Reservoirs	Leongatha, Koonwarra	1 Nov 2020 to 30 Nov 2021 (13 months)	Possible
Lance Creek Reservoir and the Melbourne system	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	1 Nov 2020 to 30 Nov 2021 (13 months)	Very Rare
Tarwin River East Branch	Dumbalk	1 Nov 2020 to 31 Jan 2021 (3 months)	Very Rare (to end Jan 2021)
Tarwin River	Meeniyan	1 Nov 2020 to 31 Jan 2021 (3 months)	Very Rare (to end Jan 2021)
Deep Creek Reservoir and Foster Dam	Foster	1 Nov 2020 to 30 Nov 2021 (13 months)	Very Rare
Battery Creek Reservoir	Fish Creek	1 Nov 2020 to 30 Nov 2021 (13 months)	Unlikely
Cook's Dam (Agnes River)	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach	1 Nov 2020 to 30 Nov 2021 (13 months)	Unlikely
Tarra River and groundwater	Yarram, Alberton, Port Albert	1 Nov 2020 to 31 Jan 2021 (3 months)	Very Rare (to end Jan 2021)

Note:

1. Explanation of the likelihood classification is available in Table 4.2.

1. Introduction

South Gippsland Water (SGW) currently manages eight water supply systems that provide water to 21 individual towns, listed in Table 1-1. A locality map of the towns supplied by SGW is shown in Figure 1-1.

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.

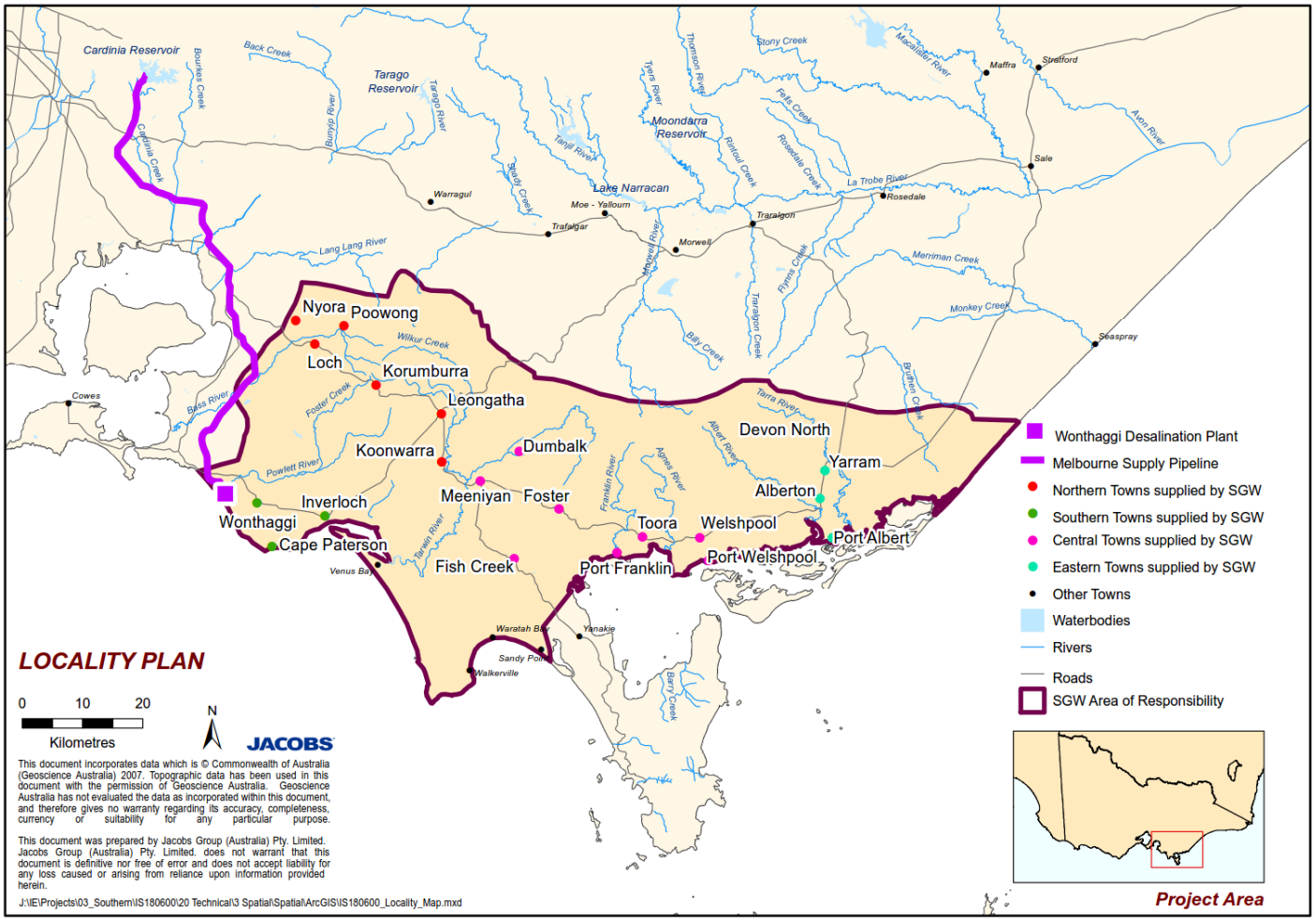
Current raw water demand is presented to indicate the relative size of each supply system. The towns of Poowong, Loch, Nyora, Korumburra, Leongatha and Koonwarra are referred to collectively as SGW's "northern towns" and Wonthaggi, Cape Paterson and Inverloch are referred to as SGW's "southern towns". 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 1-1 Water Supply Systems Managed by SGW

Supply System	Towns Supplied	Current average raw water demand (ML/year) [1]
Northern Towns		
Ruby Creek	Leongatha, Koonwarra	1,639
Southern Towns and connected Northern Towns		
Lance Creek	Wonthaggi, Cape Paterson, Inverloch	1,709
	Poowong, Loch, Nyora	265
	Korumburra	675
Central Towns		
Tarwin River East Branch	Dumbalk	14
Tarwin River	Meeniyan	66
Deep Creek/Foster Dam	Foster	177
Battery Creek	Fish Creek	124
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	518
Eastern Towns		
Tarra River	Yarram, Alberton, Port Albert, Devon North	448
TOTAL		5,635

(1) Taken from the UWS (2017), estimated at current level of population and industrial development over a long-term climate sequence (typically 40+ years) to account for differences in water demand in wet, average and dry years.

SGW prepared their most recent Urban Water Strategy in 2017. This document, available on the SGW website (http://www.sgwater.com.au/about-us/water-supply-demand-strategy/), outlines SGW's long term plan to balance the supply of water to meet the region's residential, business and community water needs. The UWS has identified those systems where future water supplies may need to be enhanced in order to meet the growing demands and be resilient to potential climate change conditions. Details around potential augmentation options will continue to be developed by SGW in order to meet the augmentation timelines set out in the UWS. 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.



- Figure 1-1 Locality Map

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 late autumn and winter and, in some locations, some increases in rainfall during the warmer months; 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 late autumn and winter can be attributed to global warming and changes in the weather systems that deliver rainfall to Victoria. The cause of the reduction in streamflow response to rainfall is not yet fully known and is the subject of continuing research.

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 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 is 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 Climatic Conditions in South Gippsland

Over the past 12 months, rainfall across the South Gippsland Region has been close to average conditions, as shown in Figure 1-2. The western part of this region, in the vicinity of Wonthaggi, Inverloch, Korumburra and Leongatha, has been wetter than the eastern part. In general, rainfall conditions have been between 80% - 125% of the long-term average.

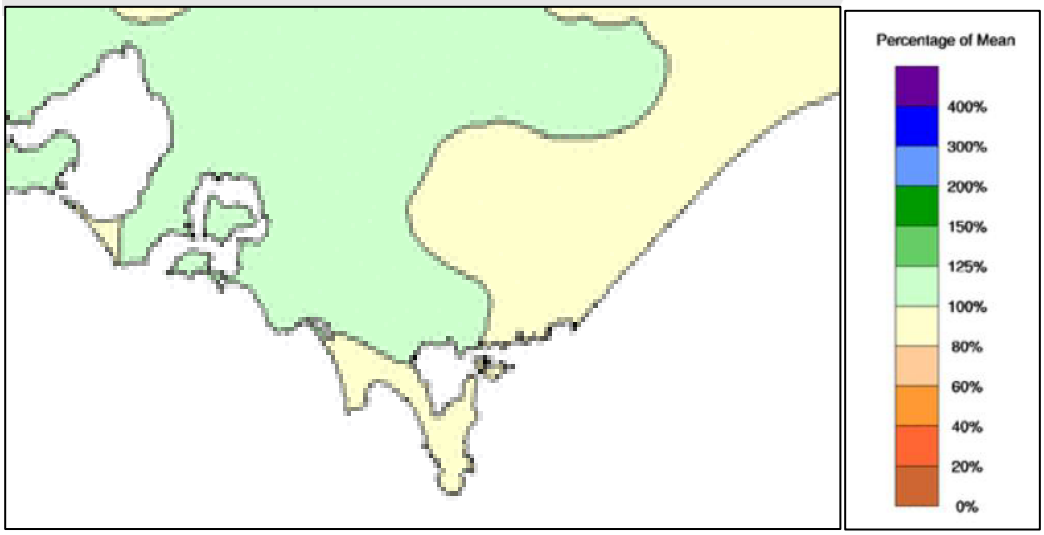


Figure 1-2 : Rainfall percentages relative to the mean over the period 1 October 2019 to 30 September 2020 (sourced from the Bureau of Meteorology's 12 monthly rainfall percentages for Victoria http://www.bom.gov.au/jsp/awap/rain/index.jsp?colour=colour&time=latest&step=0&map=percent&period=12month&area=vc).

Rainfall conditions across the SGW region are shown in Figure 1-3 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 early in 2020. The rainfall observations for the most recent two months show that August and September 2020 rainfall was close to the average monthly conditions in both locations after below average rainfalls in June and July.

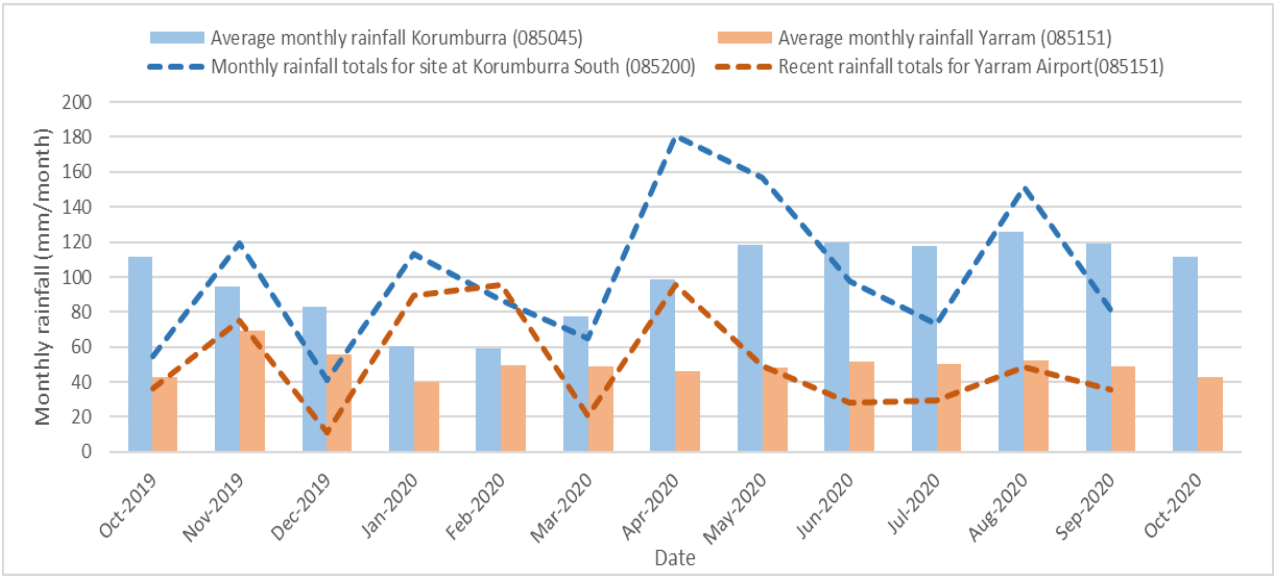


Figure 1-3 : Recent and long term average monthly rainfall in Korumburra and Yarram

1.1.3 Recent Streamflow Conditions in South Gippsland

Streamflow conditions across South Gippsland are summarised in Figure 1-4 for sites on the Tarwin River East Branch and Tarra River. These charts compare 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 these sites for long periods over the last 12 months. Similar observations can be made across the whole region. Above average flow conditions were observed across July and August in 2020, in response to the higher rainfalls for these months.

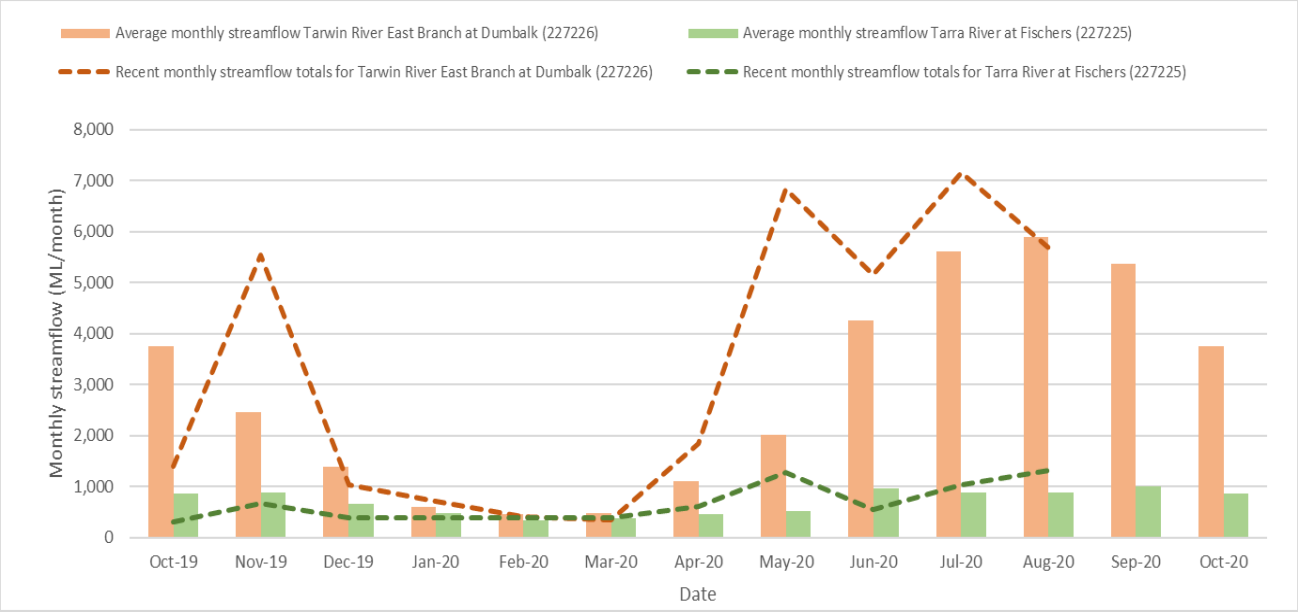


Figure 1-4 : Recent and long term average monthly streamflow for Tarwin River East Branch at Dumbalk (227226) and Tarra River at Fischers (227225)

2. Current Water Resource Position

This section provides a summary of the current position of SGW's water supply systems. Table 2.1 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 temporary entitlements or entitlements that require significant infrastructure upgrades to be able to utilise them. Full details of the legal entitlements to water are described in the UWS. The year-to-date extraction volumes listed in Table 2.1 cover the period from the beginning of July until the end of September.

Table 2.1 : System summary

Supply System	Towns supplied	Number of connections	Major customers	Primary Bulk Entitlement			Supplementary water sources	
				Annual entitlement	Volume extracted 2020-21 YTD	Volume remaining 2020-21	Annual entitlement	Volume extracted 2020-21 YTD
Ruby Creek	Leongatha, Koonwarra	3,150	Murray Goulburn and Steam Generation Plant	2,476 ML	413 ML	2063 ML	Share of 386.4 ML from groundwater (Note 1).	0 ML
Lance Creek	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	12,900	Tabro Meats, Burra Foods and Poowong Abattoir	• 3,800 ML from Lance Creek Reservoir • 1,000 ML from the Melbourne system	• 687 ML from Lance Ck • 6 ML from Melbourne	• 3,113 ML from Lance Creek • 2,279 ML from Melbourne including carryover	1800 ML from Powlett River (Note 2)	N/A
Tarwin River East Branch	Dumbalk	100		100 ML	3 ML	97 ML		
Tarwin River	Meeniyan	250		200 ML	12 ML	188 ML		
Deep Creek / Foster Dam	Foster	850		326 ML	55 ML	271 ML		
Battery Creek	Fish Creek	200		251 ML	28 ML	223 ML		
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	1,100	Esso	1,617 ML	84 ML	1,533 ML		
Tarra River	Yarram, Alberton, Port Albert, Devon North	1,850		853 ML	93 ML	760 ML	214.2 ML from groundwater	0 ML

Table 2.1 Notes:

(1) There are several groundwater bores within access of Korumburra and Leongatha.

(2) The Powlett River entitlement is not currently used and the supply infrastructure has been decommissioned

The volume in storage across the SGW systems is summarised in Table 2.2. 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 2-1 to Figure 2-8. In most systems, recent water consumption has been close to the average water use. Consumption from July to September in the Deep Creek Supply System is the notable exception to this, where recorded water consumption to date was well above average. The increase in the recorded water consumption can be attributed to an error in calibrating the newly installed flow meter at Foster Dam. The issue has been rectified and it is anticipated that the recorded water consumption will return closer to the five-year average demand for the rest of the year. Water consumption at Lance Creek has been consistently above average in the year to date and will be closely monitored by SGW over the coming months. The UWS provides further information on the expected growth in residential, stock and domestic, major industrial and other non-residential demands over the longer term planning horizon for a range of possible future climate scenarios.

Table 2.2 : Current Water Resource Position

Supply System	Storage	Storage capacity (ML)	Current storage volume (ML) at end October 2020	% Full Supply Volume
Little Bass	Little Bass Reservoir (Note 1)	218	NA	NA
Korumburra	Coalition Creek Reservoir (Note 1)	143	NA	NA
	Ness Gully Reservoir (Note 1)	73	NA	NA
	Bellview Creek Reservoir (Note 1)	359	NA	NA
Leongatha	Western Reservoir	1137	1124	98.9%
	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	122	122	100%
Foster	Deep Creek Reservoir	14	14	100%
	Foster Dam	200	200	100%
	Raw Water Basin	23	23	100%
Agnes River	Cook's Dam	58	58	100%
Tarra River	Yarram Basin	30	30	100%

Table 2.2 Notes: (1) storage not in use. NA = not applicable

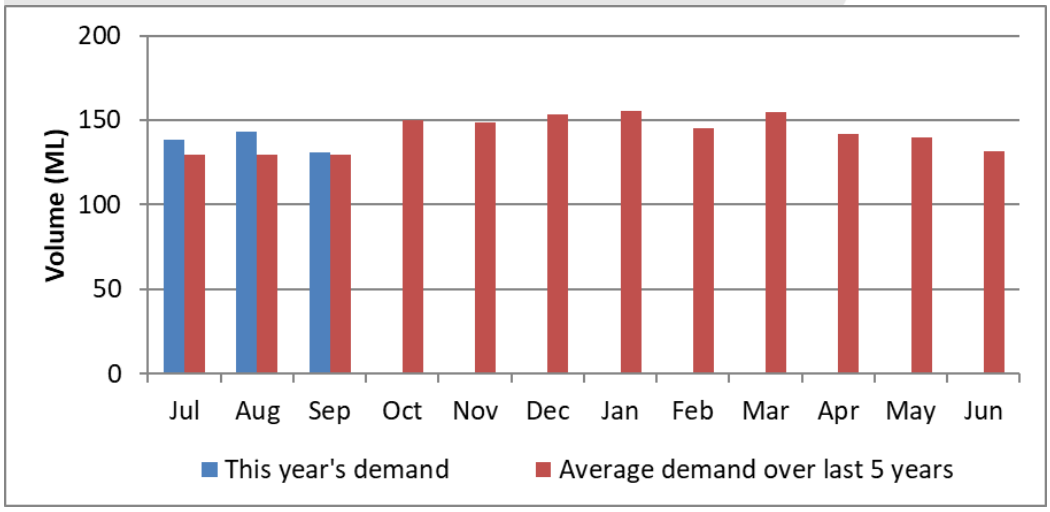


Figure 2-1 : Water consumption in the Ruby Creek System

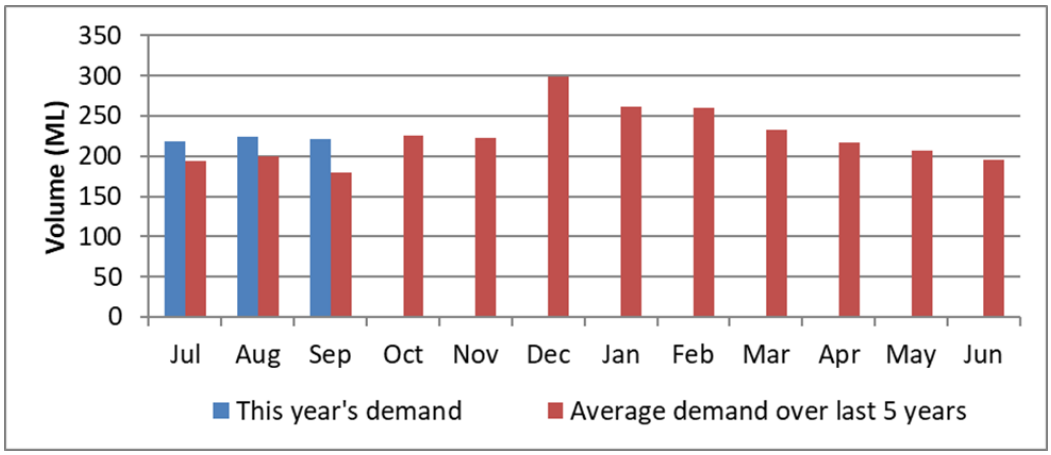


Figure 2-2 : Water consumption in the Lance Creek System

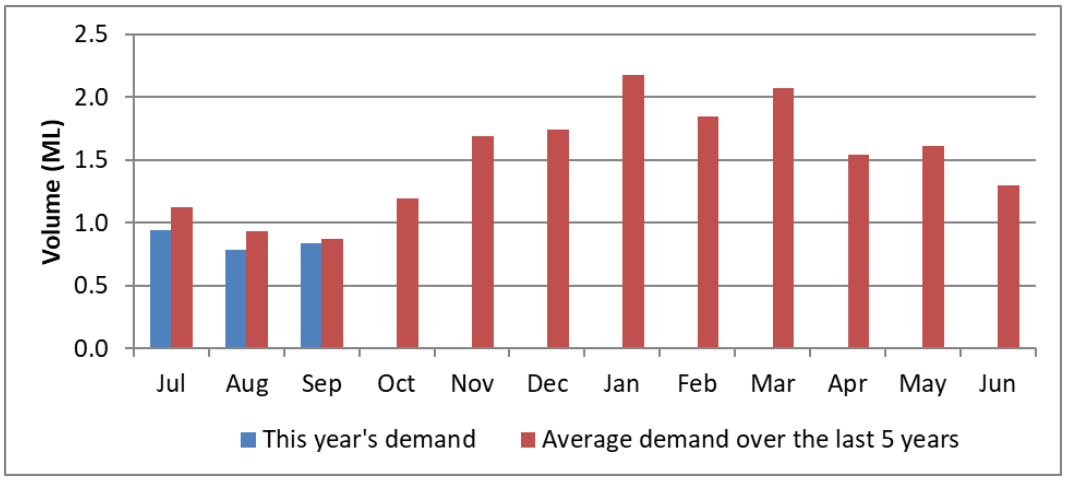


Figure 2-3 : Water consumption in the Dumbalk System

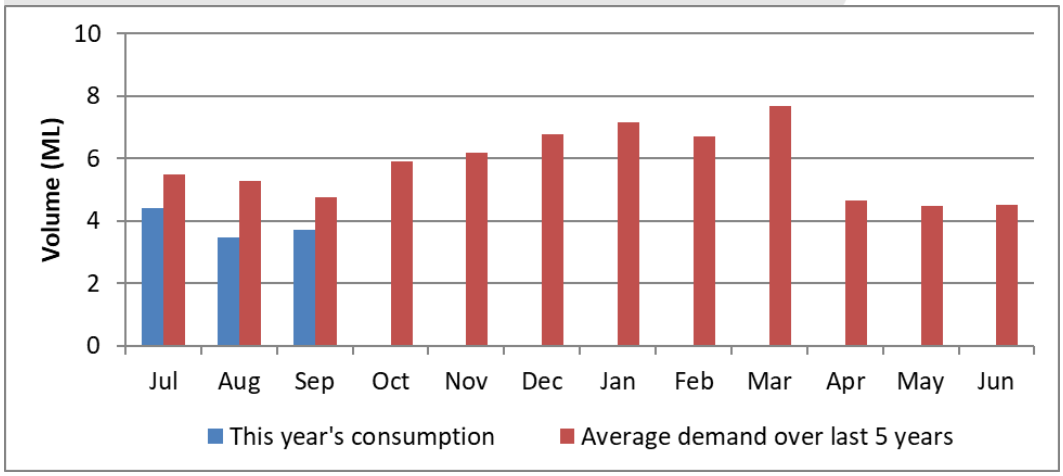


Figure 2-4 : Water consumption in the Meeniyan System

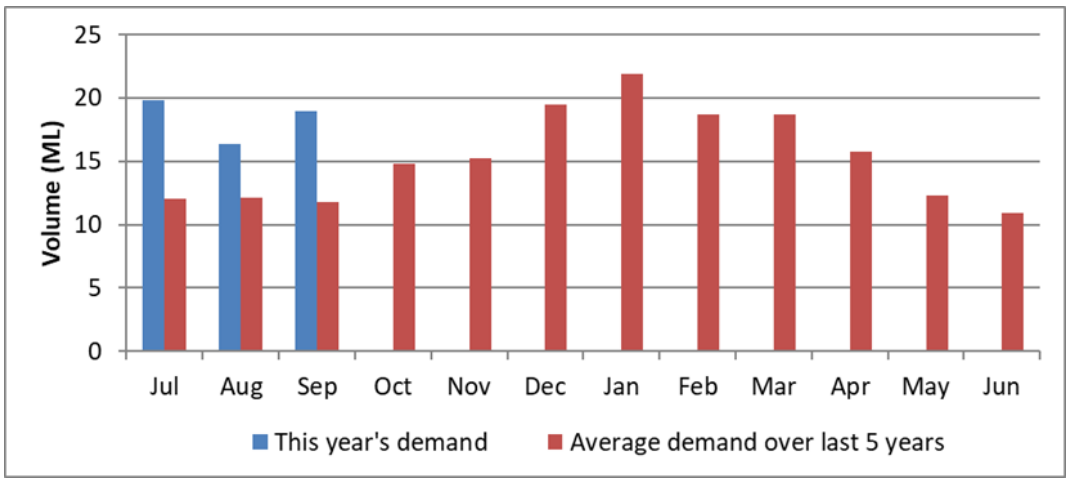


Figure 2-5 : Water consumption in the Deep Creek System

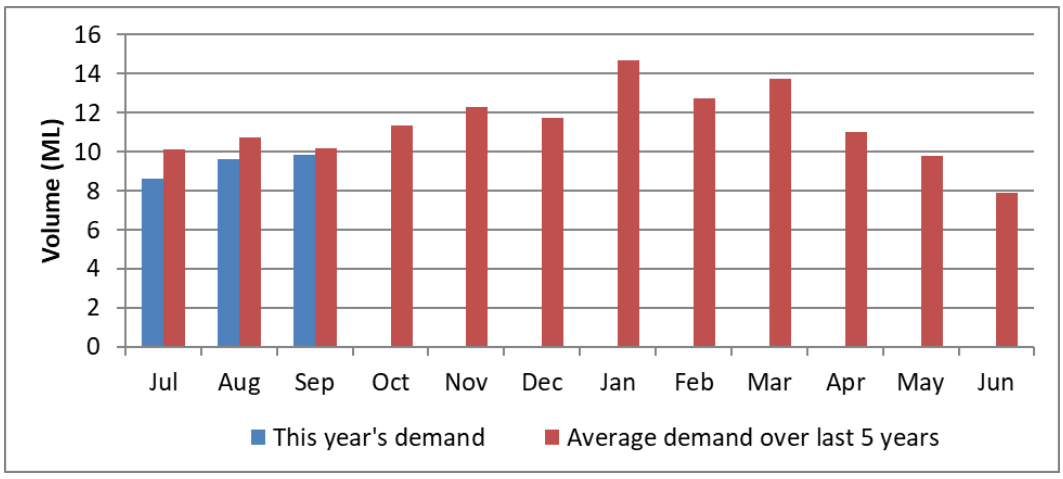


Figure 2-6 : Water consumption in the Battery Creek System

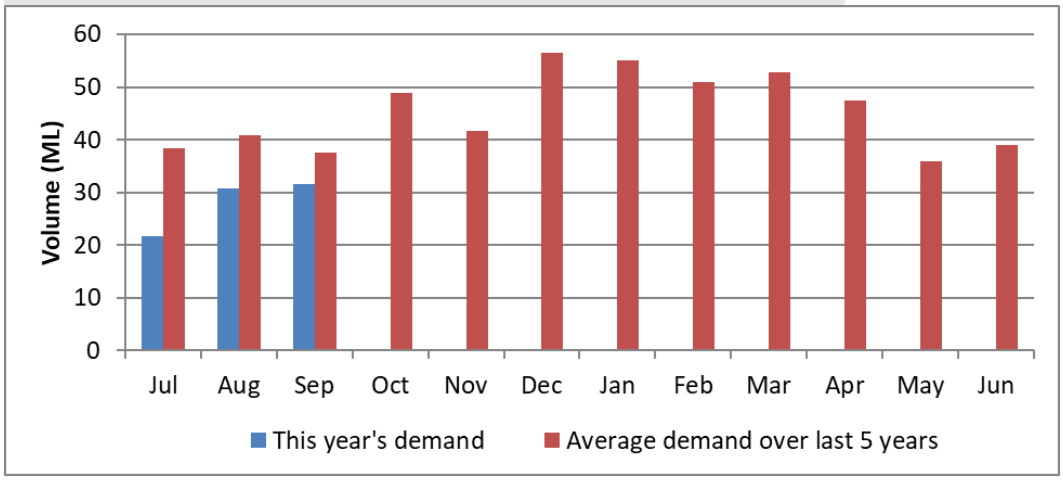


Figure 2-7 : Water consumption in the Agnes River System

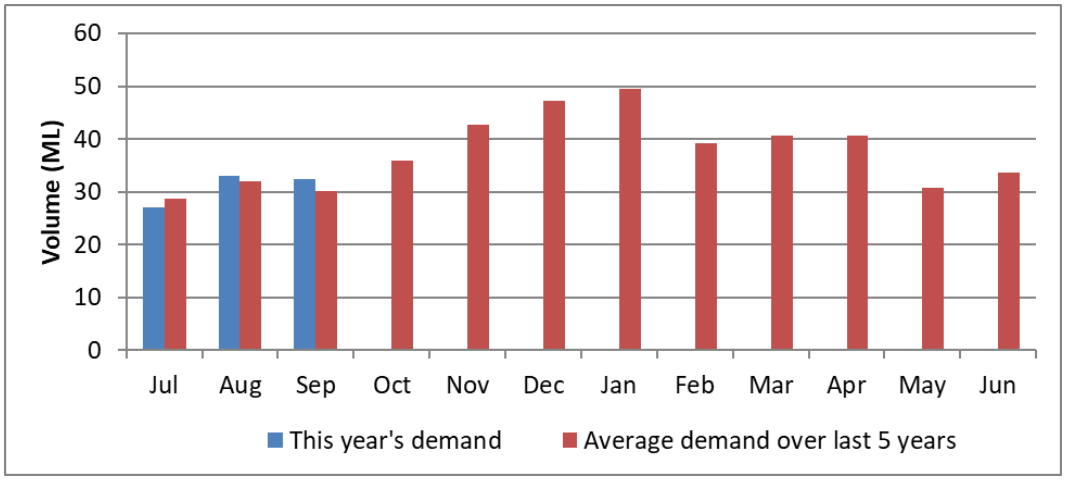


Figure 2-8 : Water consumption in the Tarra River System

3. Climate Outlook

The Bureau of Meteorology's seasonal climate forecasts have been obtained for the November to January 3-month period.

Across the region, rainfall is anticipated to be above average, with most systems forecast to have a 70-80% chance of exceeding median rainfall conditions during November to January. Figure 3-1 presents the Bureau outlook for the region showing the likelihood of a wetter three months for most of SGW's systems.

Figure 3-1 : The chance of above median rainfall for November to January (sourced from the Bureau of Meteorology: http://www.bom.gov.au/climate/ahead/outlooks/)

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 75% likelihood that maximum daytime temperatures will be above long-term median values (Figure 3-2). December to February temperature outlooks indicates a similar more than 75% likelihood of exceeding median temperatures across SGW's systems.

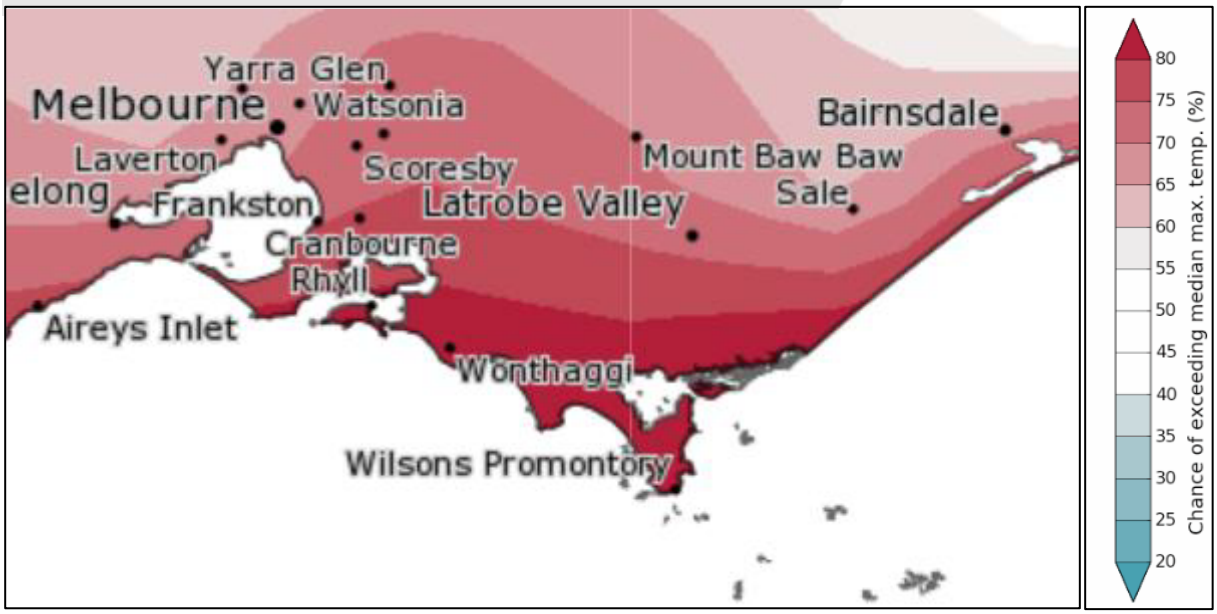


Figure 3-2 : The chance of above median maximum temperature for November to January (sourced from the Bureau of Meteorology: http://www.bom.gov.au/climate/ahead/outlooks/)

The forecast climate conditions for SGW's systems have been developed based on the Bureau's forecast for the region and the local climate conditions in the year to date. Table 3.1 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:

- A La Niña event is underway in the tropical Pacific. A La Niña event typically increases the likelihood of above average rainfall across much of Australia during spring and early summer
- The Indian Ocean Dipole (IOD) is currently neutral, and forecast to remain neutral over the coming months
- The Bureau incorporates these events into forecast models and outlooks.

Table 3.1 : Climate Outlook across SGW's systems

Supply System	Towns supplied	Bureau of Meteorology Forecast (Nov-Jan)		Winter and spring rainfall for 2020year to date	Likely Outlook Scenario
		Chance of exceeding median rainfall	Chance of exceeding median maximum temperature		
Ruby Creek	Leongatha, Koonwarra	75-80%	75-80%	Below average	Average
Lance Creek	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	70-75%	>80%	Below average	Average
Tarwin River East Branch	Dumbalk	>80%	>80%	Below average	Average
Tarwin River	Meeniyan	70-75%	>80%	Below average	Average
Deep Creek / Foster Dam	Foster	75-80%	>80%	Below average	Average
Battery Creek	Fish Creek	70-75%	>80%	Below average	Average
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	75-80%	>80%	Below average	Average
Tarra River	Yarram, Alberton, Port Albert, Devon North	75-80%	>80%	Below average	Average

4. Forward Outlook

The urban water restrictions outlook for SGW's 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, streamflows are projected for the coming three months.

Table 4.1 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. The outlook period is 3 months for run-of-river systems, and 13 months for systems with available storage. A shorter outlook period applies for run-of-river systems, reflecting the period over which the forecast has a suitable level of skill. As such, the likelihood of restrictions for Dumbalk, Meeniyan and Yarram will be reviewed throughout the year. The assessment presented in Table 4.1 utilises the DELWP rating system (Table 4.2) that is drawn from the Guidelines for the Development of Urban Water Strategies and the Melbourne System Strategy (DELWP, 2016).

Table 4.1 : Risk Assessment Likelihood Rating for Water Restrictions over the 2020/21 Outlook Period

Supply Sources	Towns Supplied	Outlook Period	Likelihood of Restrictions
Ruby Creek Reservoirs	Leongatha, Koonwarra	1 Nov 2020 to 30 Nov 2021 (13 months)	Possible
Lance Creek Reservoir and the Melbourne system	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	1 Nov 2020 to 30 Nov 2021 (13 months)	Very Rare
Tarwin River East Branch	Dumbalk	1 Nov 2020 to 31 Jan 2021 (3 months)	Very Rare (to end Jan 2021)
Tarwin River	Meeniyan	1 Nov 2020 to 31 Jan 2021 (3 months)	Very Rare (to end Jan 2021)
Deep Creek Reservoir and Foster Dam	Foster	1 Nov 2020 to 30 Nov 2021 (13 months)	Very Rare
Battery Creek Reservoir	Fish Creek	1 Nov 2020 to 30 Nov 2021 (13 months)	Unlikely
Cook's Dam (Agnes River)	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach	1 Nov 2020 to 30 Nov 2021 (13 months)	Unlikely
Tarra River and groundwater	Yarram, Alberton, Port Albert	1 Nov 2020 to 31 Jan 2021 (3 months)	Very Rare (to end Jan 2021)

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

- For the Ruby Creek system, restrictions are not forecast over the coming 12 months for the expected climate outlook. Modelling suggests that severe restrictions may eventuate under the worst drought scenario. As such, this system has been assigned a likelihood rating of possible.
- For the Battery Creek and Agnes River systems, restrictions are unlikely, but could occur if extremely dry conditions were to eventuate over summer/autumn.
- For the Lance Creek and Deep Creek systems, the likelihood of restrictions is estimated to be very rare over the outlook period.
- The run of river systems (Dumbalk, Meeniyan and Yarram/Alberton/Port Albert) have been assigned a likelihood of very rare. This forecast period extends only until the end of January 2021. Water restrictions have been previously only been enacted for the Meeniyan and Dumbalk systems during extreme drought. River flows are expected to remain above SGW's trigger for restrictions over the outlook period. Tarra river system has the supplementary option from the ground water and therefore not expected to be in restrictions over the outlook period.

Table 4.2 : Risk Assessment Likelihood Rating

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 4-1 to Figure 4-8.

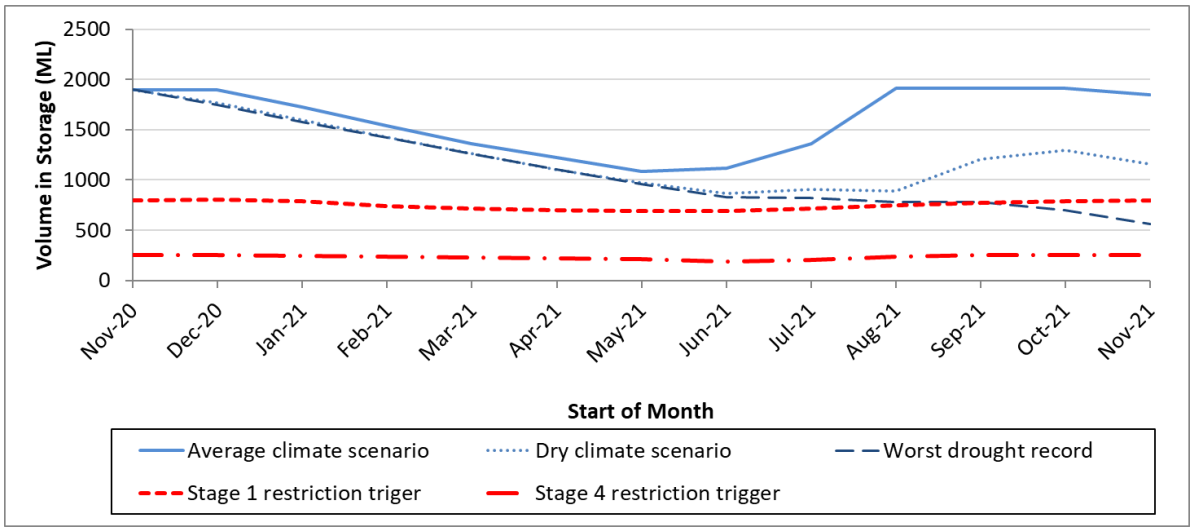


Figure 4-1 : Urban water restrictions outlook for the Ruby Creek system

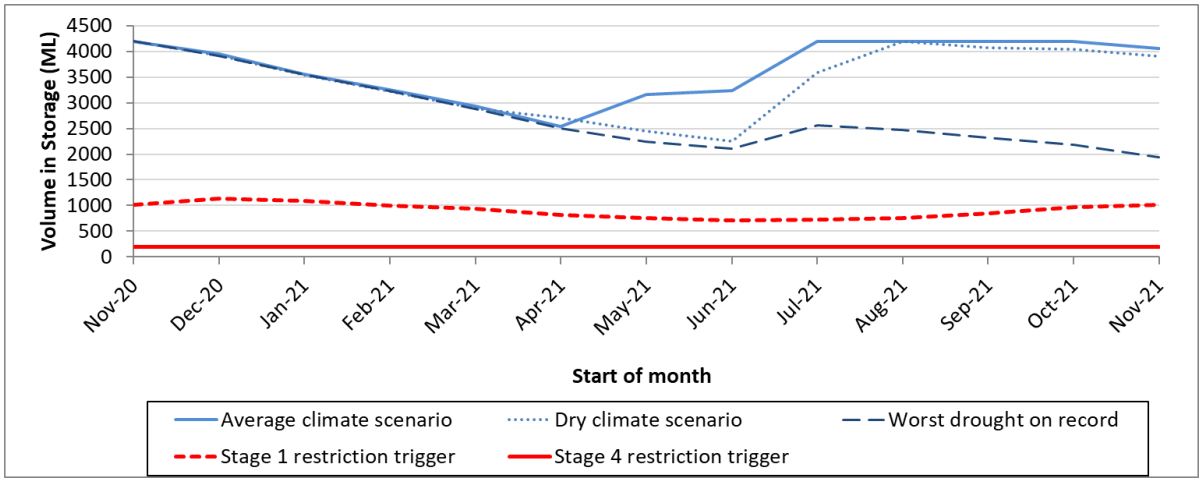


Figure 4-2 : Urban water restrictions outlook for the Lance Creek system

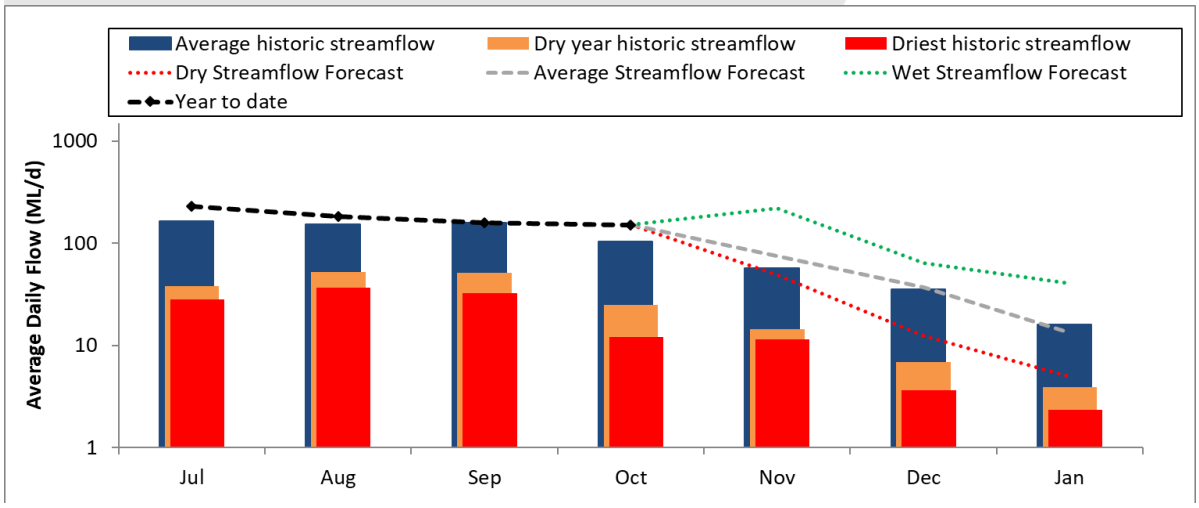


Figure 4-3 : Streamflow outlook for the Dumbalk system

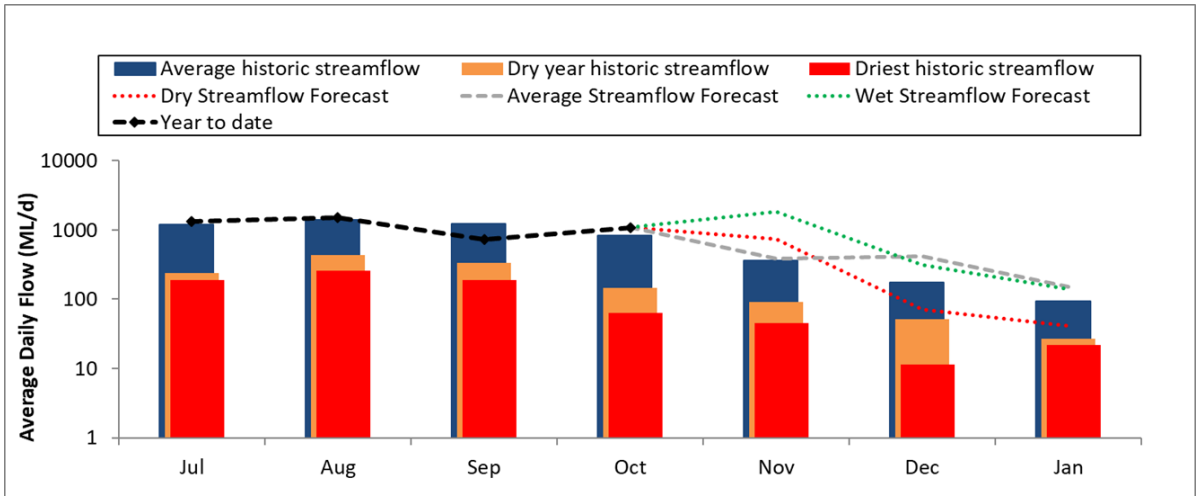


Figure 4-4 : Streamflow outlook for the Meeniyan system

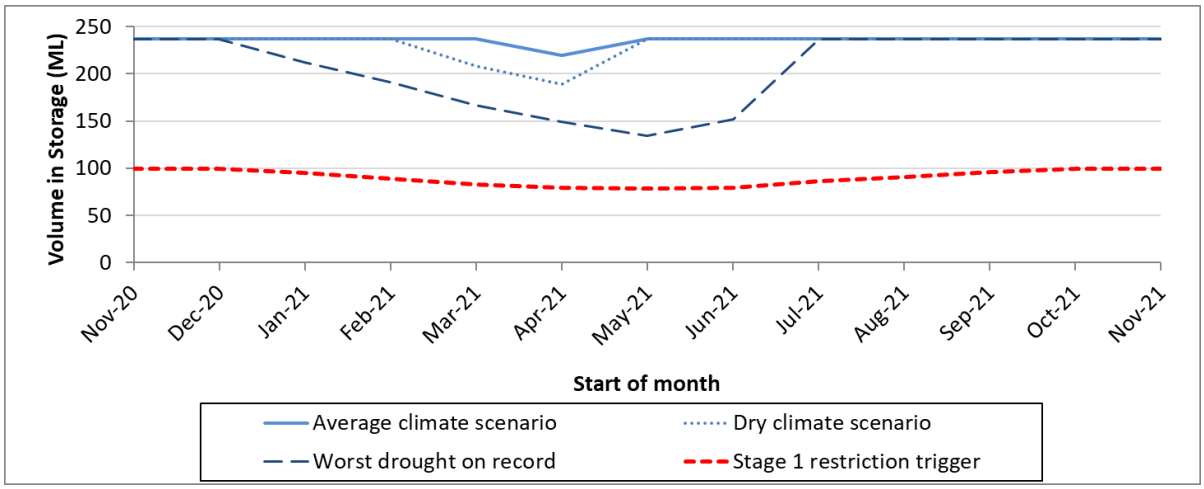


Figure 4-5 : Urban water restrictions outlook for the Deep Creek system

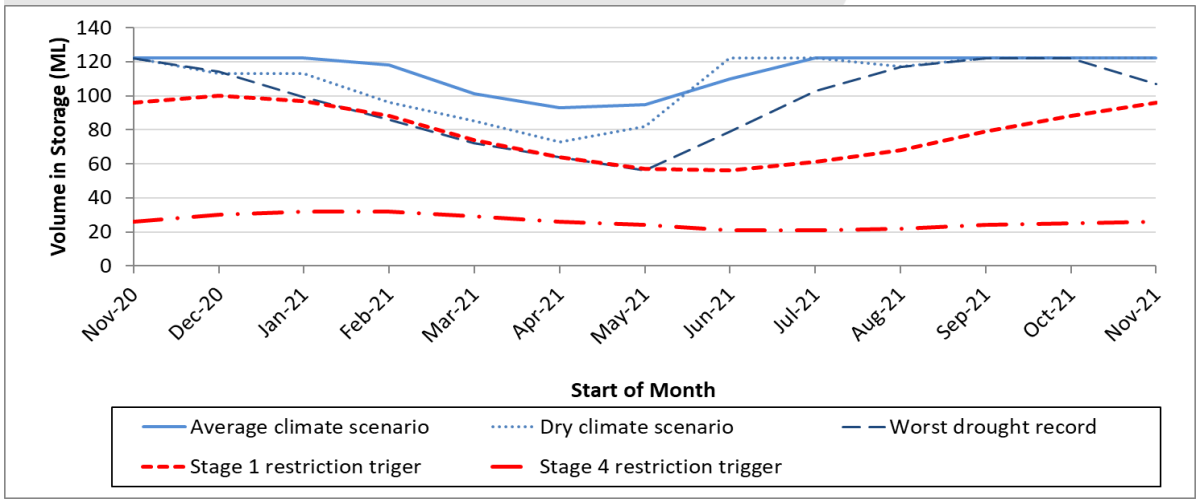


Figure 4-6 : Urban water restrictions outlook for the Battery Creek system

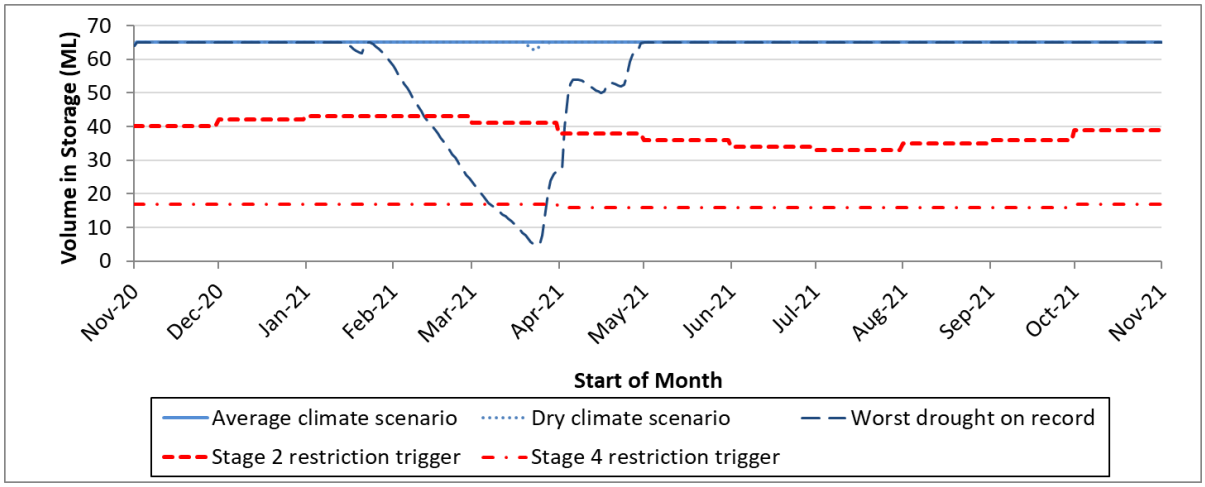


Figure 4-7 : Urban water restrictions outlook for the Agnes River system

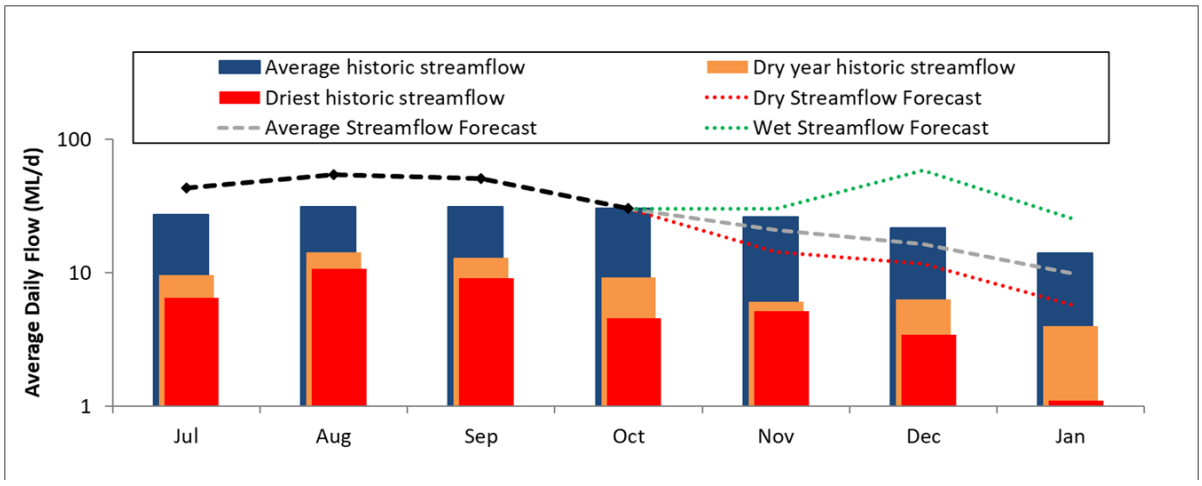


Figure 4-8 Streamflow outlook for the Tarra River system

5. Short-term Action Plan

A list of priority actions for each of SGW's supply systems is provided in Table 5.1. Further information on these activities can be found in the recent UWS and DPP.

Table 5.1 : Action plan

System	Action	Timing
All	Demand management	Ongoing
	Reduce leaks and wastage	Ongoing
	Update water security outlooks	Every November
Ruby Creek	Planning for long term options as per Urban Water Strategy	2017-2021
Tarra River	Continue to purchase groundwater licences as required	Ongoing