2019 Water Security Outlooks

South Gippsland Water

Annual Water Outlook

| Final

30 October 2019

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Contents

Executive Summary

South Gippsland Water (SGW) currently manages ten 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 2019 to November 2020. The forecast period for run-of river systems is 3 months from November 2019 to January 2020, reflecting the period over which the forecast has a suitable level of skill. The Little Bass and Coalition Creek supply systems are not currently being used and 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 2019 to 30 Nov 2020 (13 months)	Possible
Lance Creek Reservoir and the Melbourne system	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	1 Nov 2019 to 30 Nov 2020 (13 months)	Very Rare
Tarwin River East Branch	Dumbalk	1 Nov 2019 to 31 Jan 2020 (3 months)	Rare
Tarwin River	Meeniyan	1 Nov 2019 to 31 Jan 2020 (3 months)	Rare
Deep Creek Reservoir and Foster Dam	Foster	1 Nov 2019 to 30 Nov 2020 (13 months)	Very Rare
Battery Creek Reservoir	Fish Creek	1 Nov 2019 to 30 Nov 2020 (13 months)	Possible
Cook's Dam (Agnes River)	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach	1 Nov 2019 to 30 Nov 2020 (13 months)	Possible
Tarra River and groundwater	Yarram, Alberton, Port Albert	1 Nov 2019 to 31 Jan 2020 (3 months)	Rare

Note:

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

Ruby Creek storage levels are expected to be close to stage 1 water restriction triggers over the coming year under the anticipated dry climate scenario. If climate conditions are drier than expected, restrictions may be implemented.

South Gippsland Water made key achievements through the last year, 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.

1. Introduction

South Gippsland Water (SGW) currently manages ten 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 through the last year, 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.

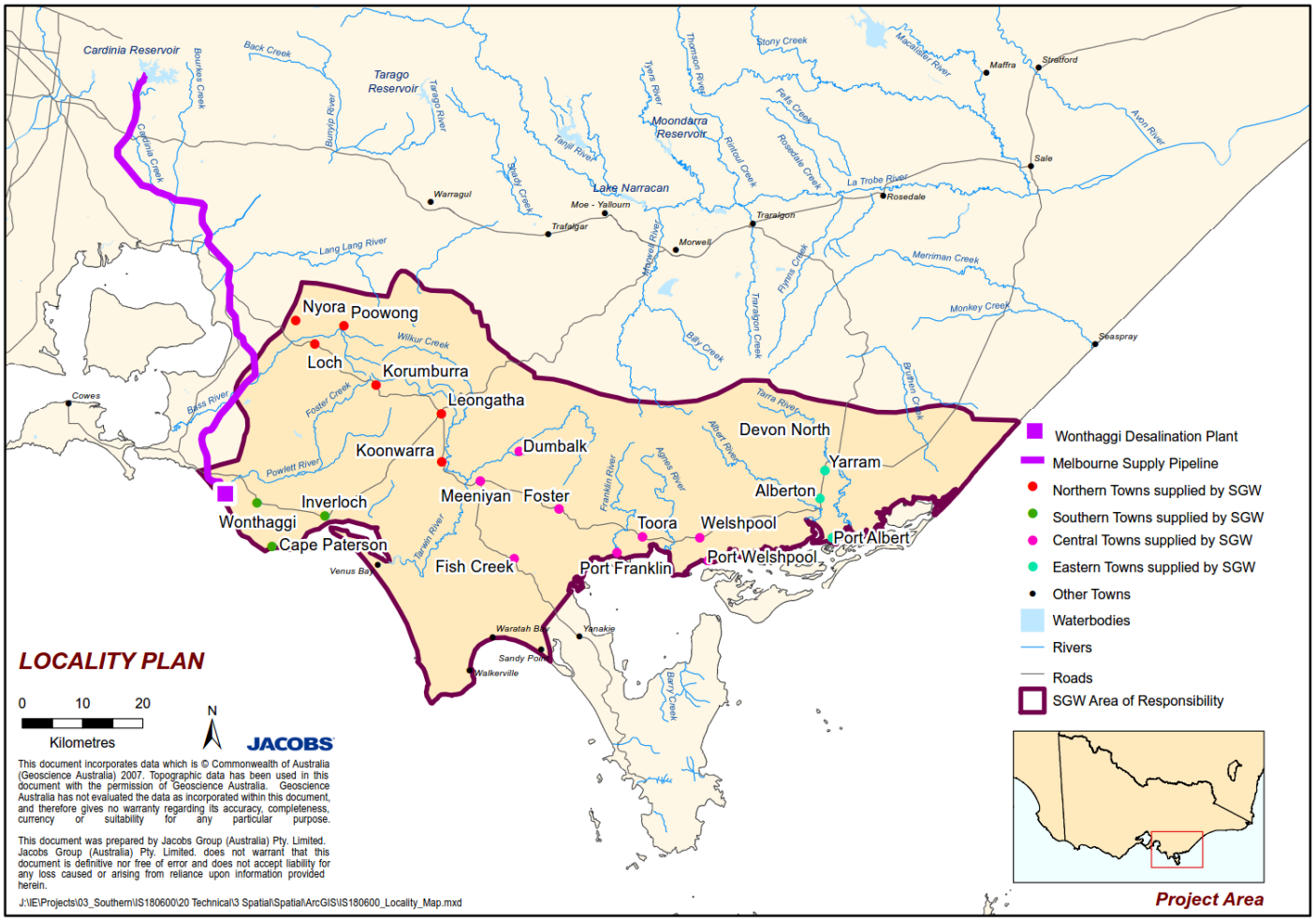
Current raw water demand is presented to indicate the relative size of each supply system. The towns of Poowong, Loch, Nyora, Korumburra, Leongatha and Koonwarra are referred to collectively as SGW's "northern towns" and Wonthaggi, Cape Paterson and Inverloch are referred to as SGW's "southern towns". 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. In comparison to historical conditions we are already experiencing:

- Higher temperatures, particularly during the warmer months of the year;
- Reductions in rainfall in cooler months of the year, and in some locations, increases in rainfall during the warmer months; and,

In some catchments, less streamflow is generated for the same amount of rain.

The decline in rainfall during cooler months of the year is associated with a southerly shift in rain bearing weather systems. Global warming is a contributor to this southerly shift, which means that the downward trend in rainfall is likely to continue.

Over the longer term, modelling indicates that we can expect:

- the rainfall reductions in cooler months to remain, or become drier still;
- possible increases in summer rainfall; and,
- overall reductions in streamflow.

Even if there is an increase in summer rainfall, it is unlikely to offset the streamflow impact of rainfall reductions in other seasons.

Although there will still be a lot of variability in Victoria's climate, the chances of experiencing cooler conditions and higher than average streamflow is lower now than it was in previous decades. Conversely, the chances of experiencing warmer conditions and less streamflow is now higher than in past decades.

The BOM seasonal climate outlooks build in the influence of changes in climate that have already occurred.

More information on the observed changes and longer-term future climate 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 its water policy outlined in 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 west of the region, in the vicinity of Wonthaggi, Inverloch, Korumburra and Leongatha, has been wetter than the east. However, in general, rainfall conditions have been between 60% - 100% of the long term average.

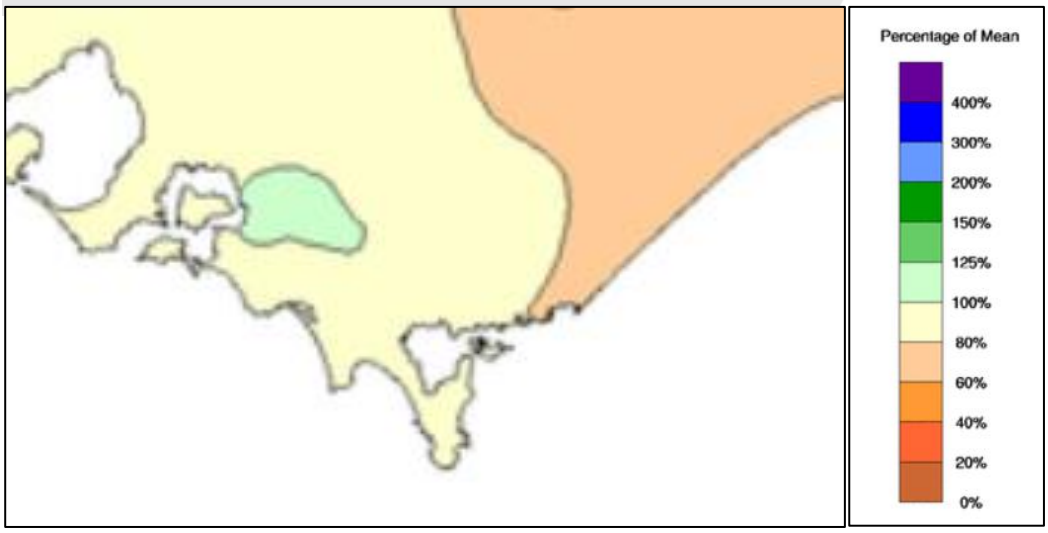


Figure 1-2 : Rainfall percentages relative to the mean over the period 1 October 2018 to 30 September 2019 (sourced from the Bureau of Meteorology's 12 monthly rainfall percentages for Victoria http://www.bom.gov.au/jsp/awap/rain/index.jsp?colour=colour&time=latest&step=0&map=percent&period=12month&area=vc).

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 often been below average conditions. However, the observations for the most recent two months show that August and September 2019 rainfall was above or similar to the average monthly conditions in both locations.

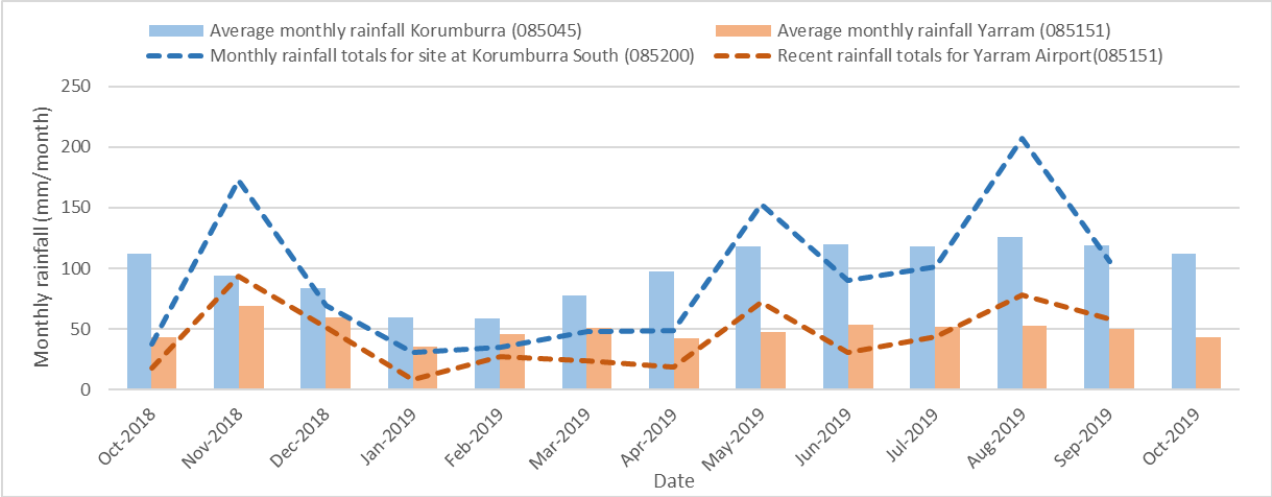


Figure 1-3 : Recent and long term average monthly rainfall in Korumburra and Yarram

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 well below 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 August and September in 2019, in response to the higher rainfalls for these months.

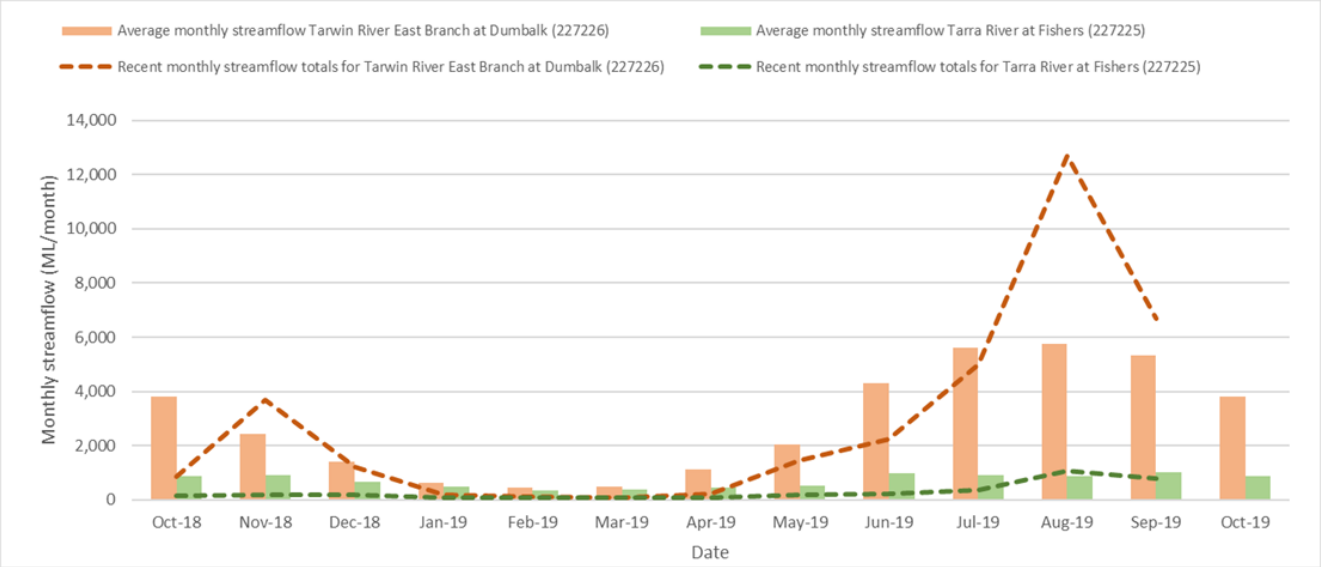


Figure 1-4 : Recent and long term average monthly streamflow for Tarwin River East Branch at Dumbalk (227226) and Tarra River at Fishers (227225)

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.

Table 2.1 : System summary

Supply System	Towns supplied	Number of connections	Major customers	Primary Bulk Entitlement			Supplementary water sources	
				Annual entitlement	Volume extracted 2019-20 YTD	Volume remaining 2019-20	Annual entitlement	Volume extracted 2019-20
Ruby Creek	Leongatha, Koonwarra	3,150	Murray Goulburn and Steam Generation Plant	2,476 ML	433 ML	2043 ML	• Share of 1800 ML from Tarwin River West Branch (Note 1 and 2) • Share of 386.4 ML from groundwater (Note 3).	0 ML (Note 2)
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	• 238 ML from Lance Ck • 363 ML from Melbourne	• 3,562 ML from Lance Creek • 2,304 ML from Melbourne including carryover	1800 ML from Powlett River (Note 4)	N/A
Tarwin River East Branch	Dumbalk	100		100 ML	2 ML	98 ML		
Tarwin River	Meeniyan	250		200 ML	12 ML	188 ML		
Deep Creek / Foster Dam	Foster	850		326 ML	39 ML	287 ML		
Battery Creek	Fish Creek	200		251 ML	40 ML	211 ML		
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	1,100	Esso	1,617 ML	128 ML	1,489 ML		
Tarra River	Yarram, Alberton, Port Albert, Devon North	1,850		853 ML	81 ML	772 ML	214.2 ML from groundwater	4.3 ML

Table 2.1 Notes: (1) Only available until June 2020

(2) Supply from the Tarwin River West Branch to Leongatha utilises existing obsolete infrastructure that is complex and difficult to operate, and is currently not used.

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

(4) 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 in July and August in the Battery Creek system (supplying Fish Creek) is the notable exception to this, where water consumption was well above average due to temporary changes in treatment plant operation. Consumption in the Battery Creek system is expected to remain close to average for the remainder of the outlook period. Water consumption at Leongatha 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 2019	% Full Supply Volume
Little Bass	Little Bass Reservoir (Note 1)	218	NA	0%
Korumburra	Coalition Creek Reservoir (Note 1)	143	NA	0%
	Ness Gully Reservoir (Note 1)	73	NA	0%
	Bellview Creek Reservoir (Note 1)	359	NA	0%
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	122	122	100%
Foster	Deep Creek Reservoir	14	14	100%
	Foster Dam	200	200	100%
	Raw Water Basin	27	22	81%
Agnes River	Cook's Dam	58	58	100%
Tarra River	Yarram Basin	30	30	100%

Table 2.2 Notes: (1) storage not in use

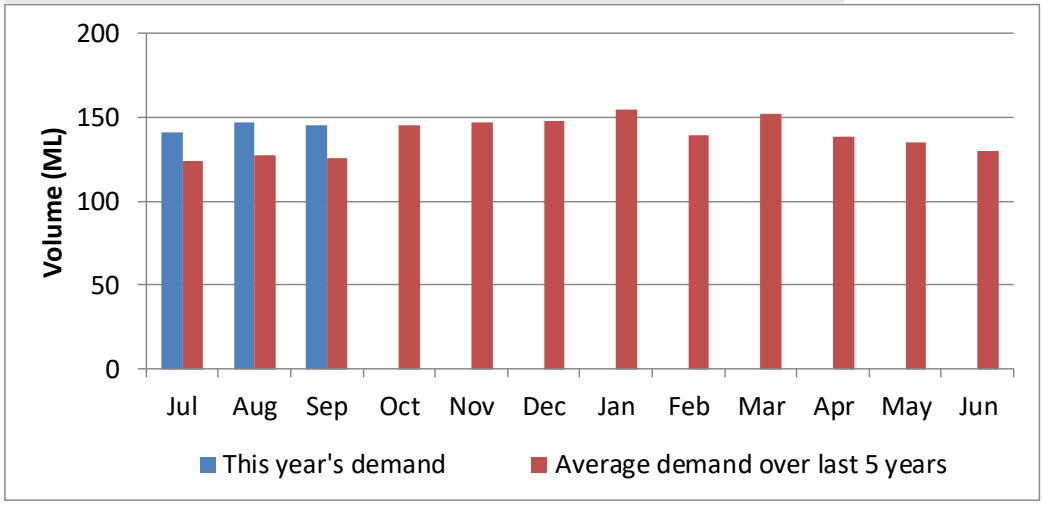


Figure 2-1 : Water consumption in the Ruby Creek System

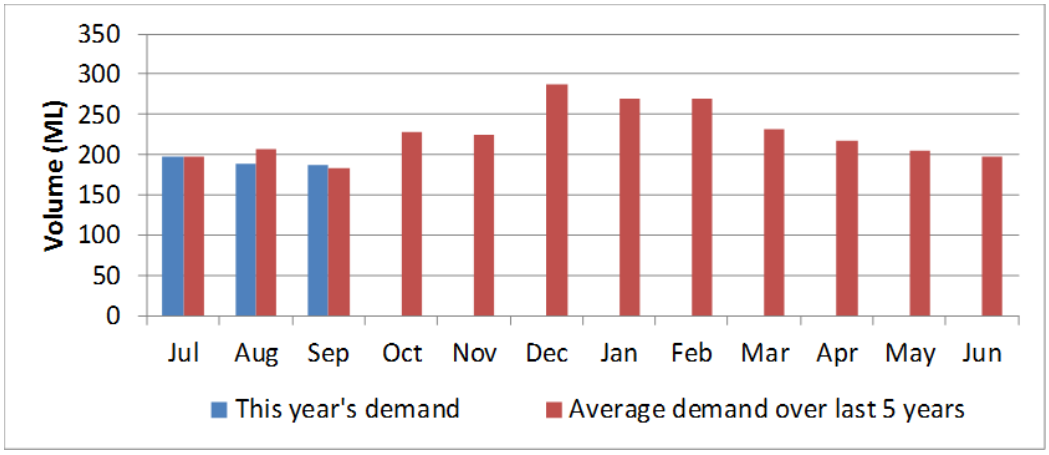


Figure 2-2 : Water consumption in the Lance Creek System

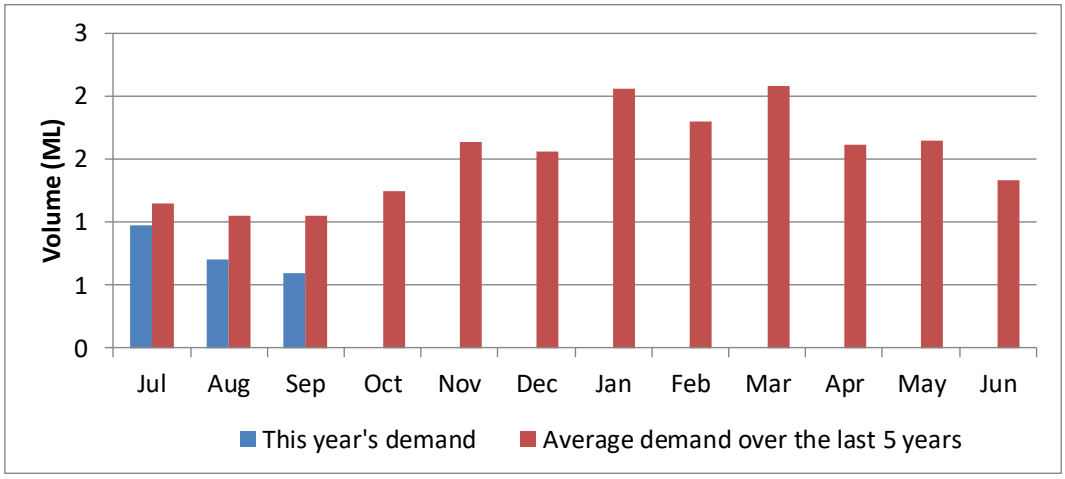


Figure 2-3 : Water consumption in the Dumbalk System

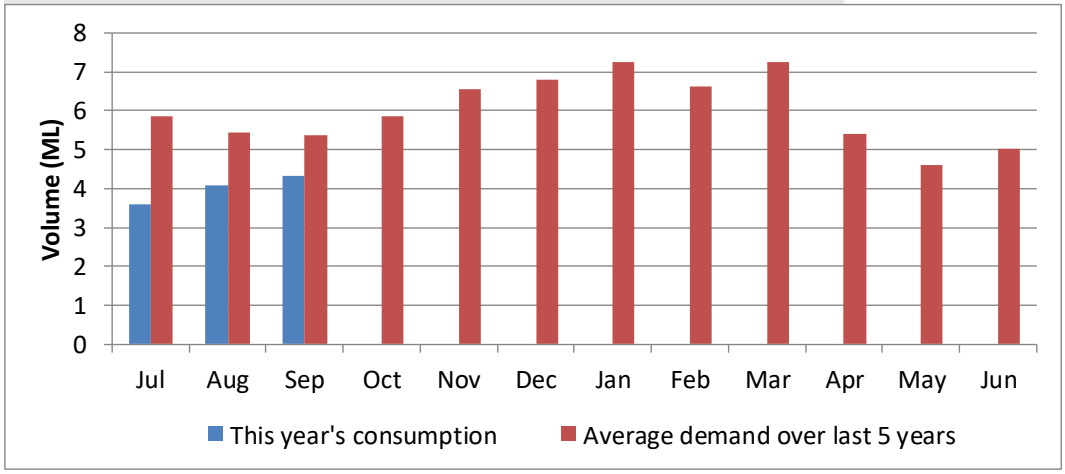


Figure 2-4 : Water consumption in the Meeniyan System

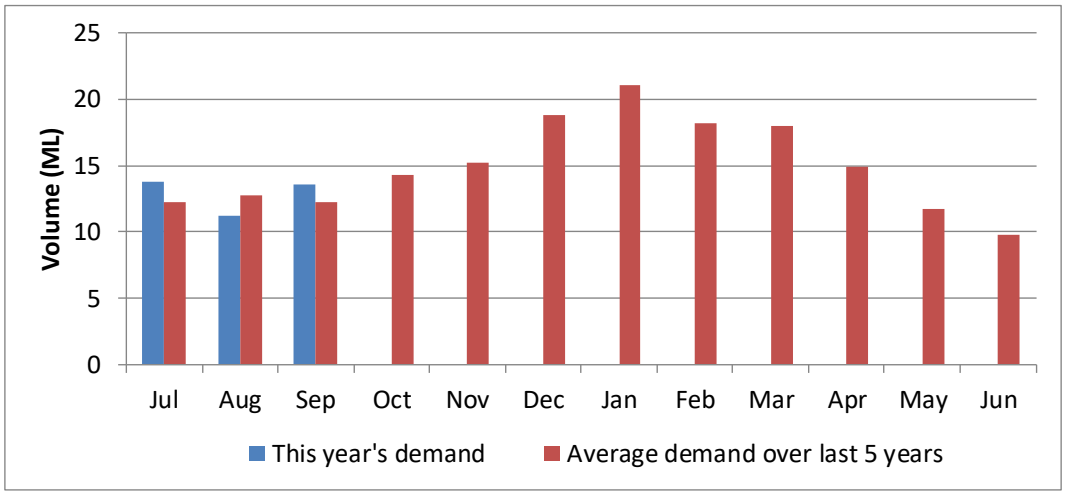


Figure 2-5 : Water consumption in the Deep Creek System

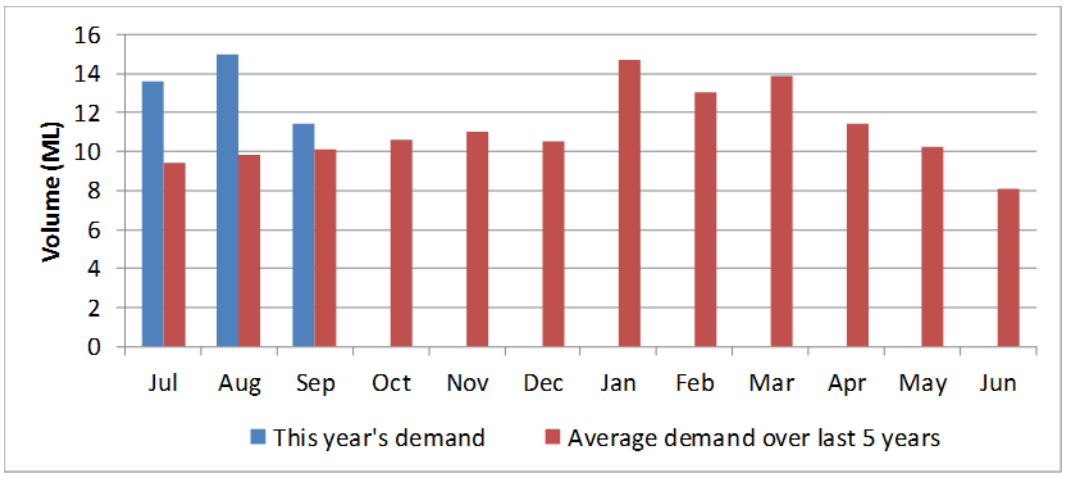


Figure 2-6 : Water consumption in the Battery Creek System

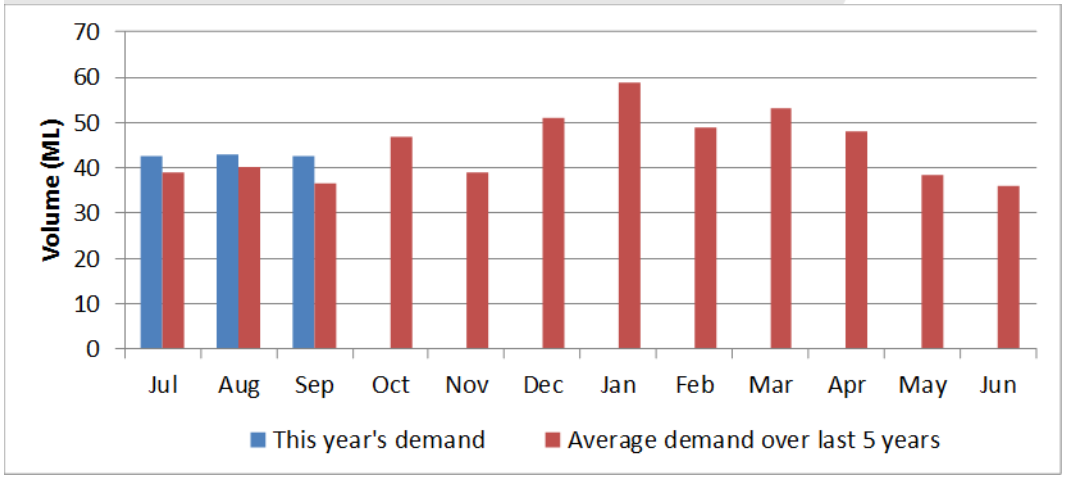


Figure 2-7 : Water consumption in the Agnes River System

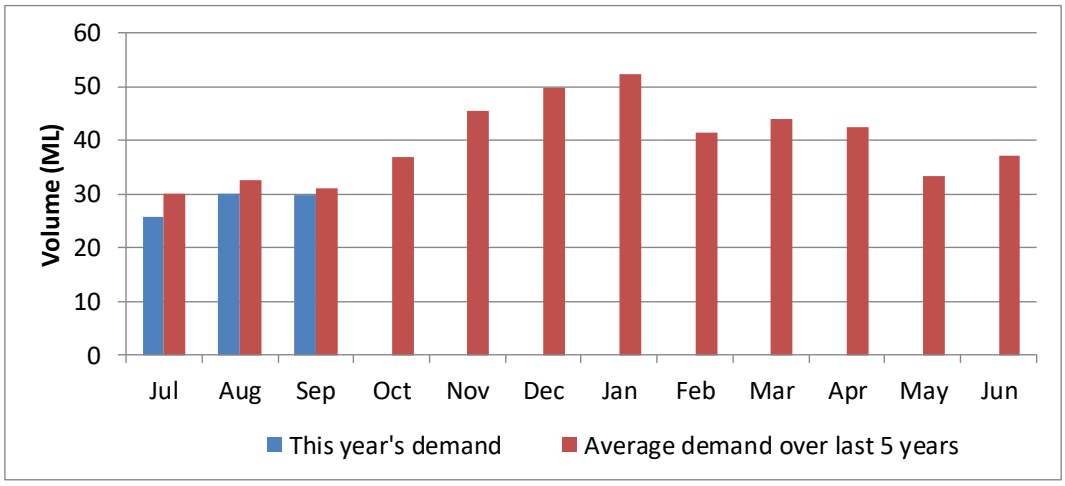


Figure 2-8 : Water consumption in the Tarra River System

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 below average, with most systems forecast to have a 30-35% chance of exceeding median rainfall conditions during November to January. That is, it's likely to be a drier three months for most of SGW's systems. Figure 3-1 presents the Bureau outlook for the region.

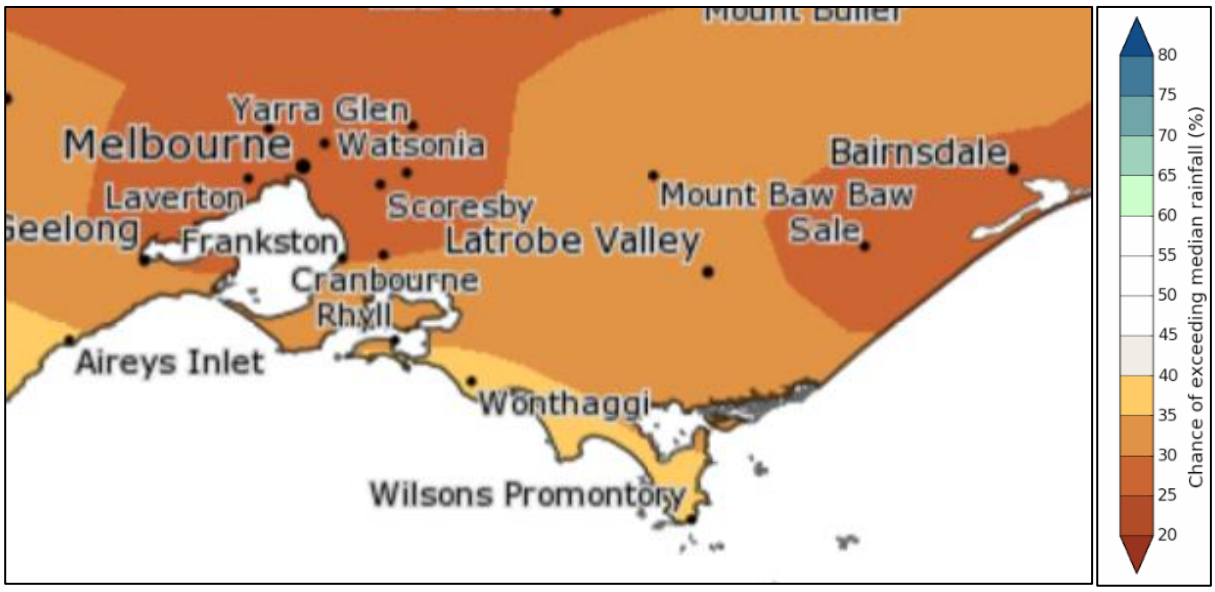


Figure 3-1 : The chance of above median rainfall for November to January (sourced from the Bureau of Meteorology: http://www.bom.gov.au/climate/ahead/outlooks/)

The maximum daytime temperature across the region is forecast for the coming three months to be close to the long-term average. The Bureau outlook indicates around a 50% likelihood that maximum daytime temperatures will be above long-term median values (Figure 3-2). December to February temperature outlooks indicates a greater than 60% likelihood of exceeding median temperatures.

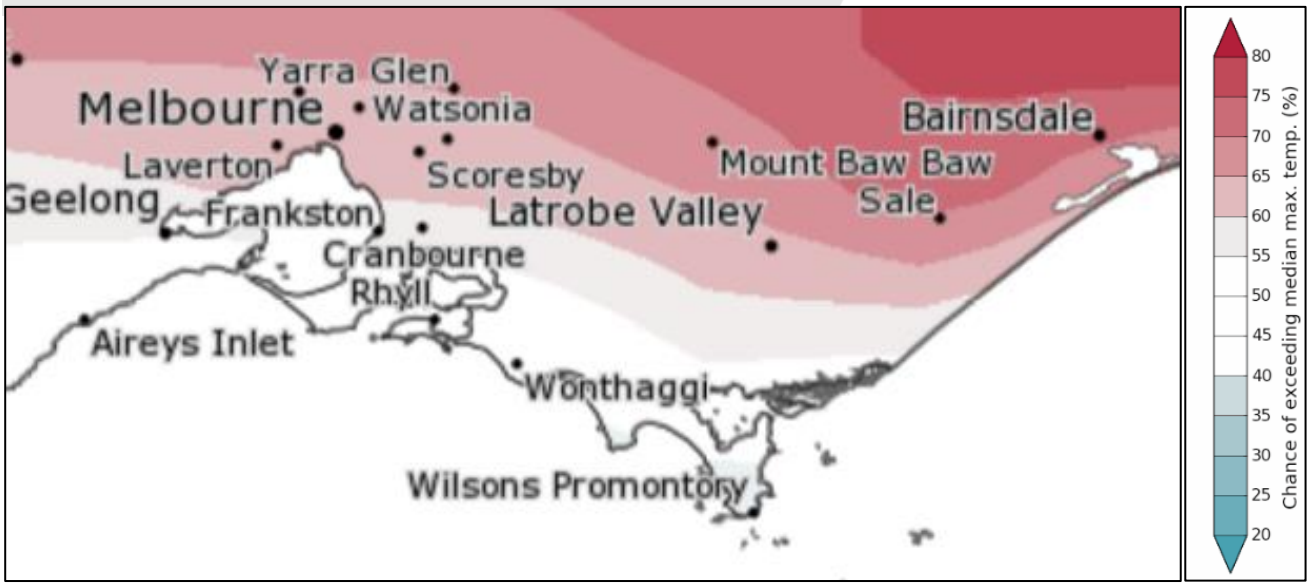


Figure 3-2 : The chance of above median maximum temperature for November to January (sourced from the Bureau of Meteorology: http://www.bom.gov.au/climate/ahead/outlooks/)

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 ≥90% chance of exceeding median rainfall
- Average conditions that have >40% to <90% chance of exceeding median rainfall
- Dry conditions that have ≤40% chance of exceeding median rainfall

Climate influences on southern Australia this year include a strong positive Indian Ocean Dipole and 'sudden stratospheric warming', both of which are typically associated with below average spring rainfall in southern Australia. Sudden stratospheric warming is a relatively rare phenomenon of rapid heating in the stratosphere high above the South Pole throughout Spring. This phenomenon is incorporated into the Climate Outlooks produced by the Bureau of Meteorology and therefore incorporated into these outlooks. The El Nino Southern Oscillation, typically associated with drier conditions in southern Australia, is currently neutral and is not expected to significantly influence climate conditions over the coming months.

Table 3.1 : Climate Outlook across SGW's systems

Supply System	Towns supplied	Bureau of Meteorology Forecast (Nov-Jan)		Winter and spring rainfall for 2019-20 YTD	Likely Outlook Scenario
		Chance of exceeding median rainfall	Chance of exceeding median maximum temperature		
Ruby Creek	Leongatha, Koonwarra	30-35%	45-55%	Average	Dry
Lance Creek	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	35-40%	45-55%	Average	Dry
Tarwin River East Branch	Dumbalk	30-35%	55-60%	Average	Dry
Tarwin River	Meeniyan	30-35%	45-55%	Average	Dry
Deep Creek / Foster Dam	Foster	30-35%	45-55%	Average	Dry
Battery Creek	Fish Creek	35-40%	45-55%	Average	Dry
Agnes River	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	30-35%	45-55%	Average	Dry
Tarra River	Yarram, Alberton, Port Albert, Devon North	30-35%	55-60%	Average	Dry

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 2019 Outlook Period

Supply Sources	Towns Supplied	Outlook Period	Likelihood of Restrictions
Ruby Creek Reservoirs	Leongatha, Koonwarra	1 Nov 2019 to 30 Nov 2020 (13 months)	Possible
Lance Creek Reservoir and the Melbourne system	Wonthaggi, Cape Paterson, Inverloch, Korumburra, Poowong, Loch, Nyora	1 Nov 2019 to 30 Nov 2020 (13 months)	Very Rare
Tarwin River East Branch	Dumbalk	1 Nov 2019 to 31 Jan 2020 (3 months)	Rare
Tarwin River	Meeniyan	1 Nov 2019 to 31 Jan 2020 (3 months)	Rare
Deep Creek Reservoir and Foster Dam	Foster	1 Nov 2019 to 30 Nov 2020 (13 months)	Very Rare
Battery Creek Reservoir	Fish Creek	1 Nov 2019 to 30 Nov 2020 (13 months)	Possible
Cook's Dam (Agnes River)	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach	1 Nov 2019 to 30 Nov 2020 (13 months)	Possible
Tarra River and groundwater	Yarram, Alberton, Port Albert	1 Nov 2019 to 31 Jan 2020 (3 months)	Rare

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

- Run of river systems have been assigned a likelihood of rare, rather than very rare, due to the inability to forecast beyond three months, even though the likelihood of restrictions over the 3 month forecast period is very rare.
- For the Battery Creek and Agnes River systems, restrictions are possible if extremely dry conditions were to eventuate over summer/autumn.
- For the Ruby Creek system, restrictions are not forecast over the coming 12 months for the expected climate outlook. However, this system already required the development of supplementary options due to reduced storage levels in 2017. Longer-term 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 all other systems, the likelihood of restrictions is estimated to be rare to very rare 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.

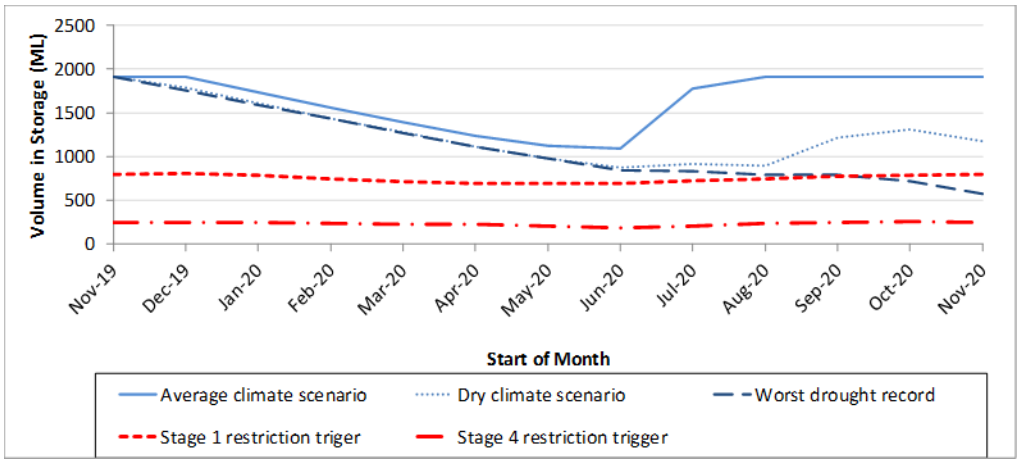


Figure 4-1 : Urban water restrictions outlook for the Ruby Creek system

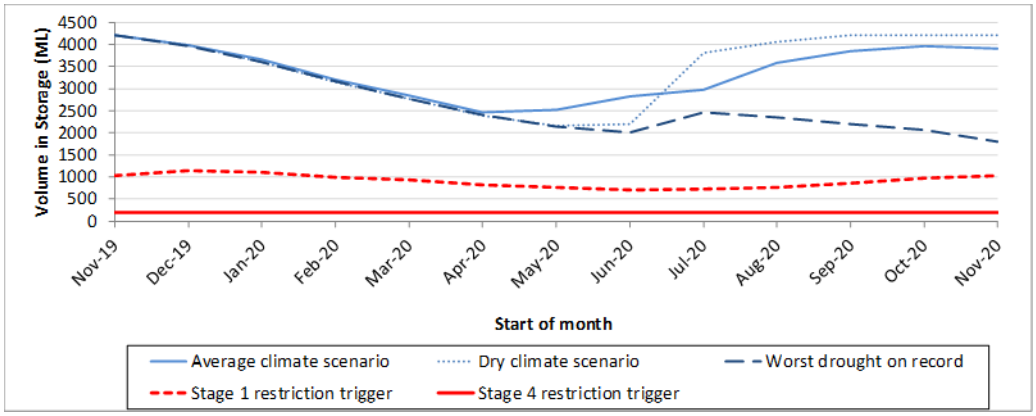


Figure 4-2 : Urban water restrictions outlook for the Lance Creek system

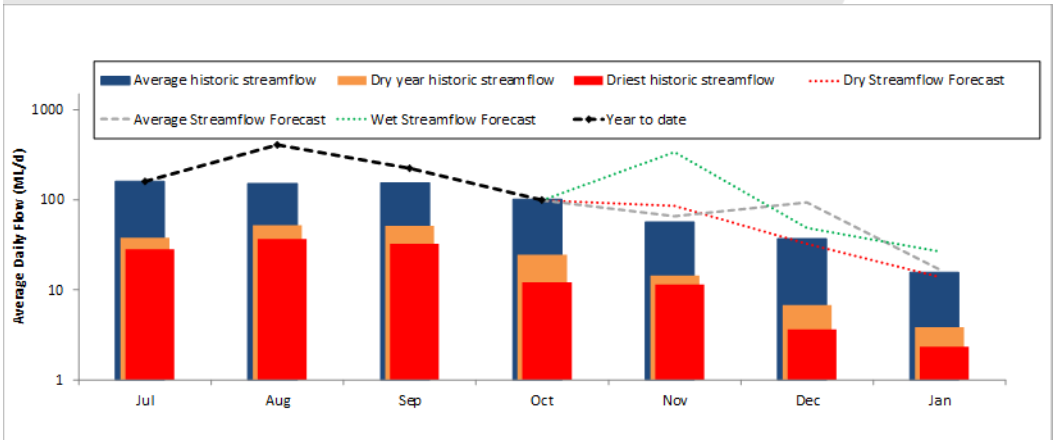


Figure 4-3 : Streamflow outlook for the Dumbalk system

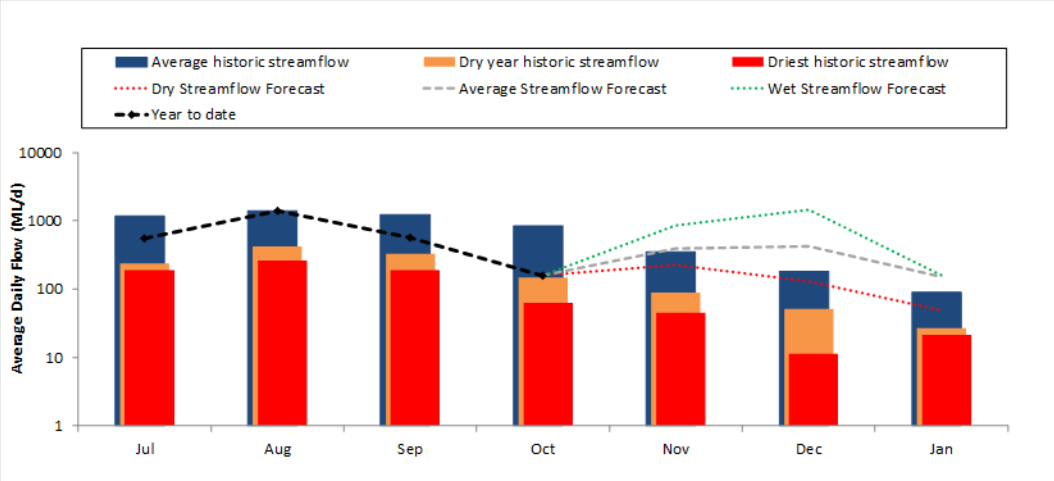


Figure 4-4 : Streamflow outlook for the Meeniyan system

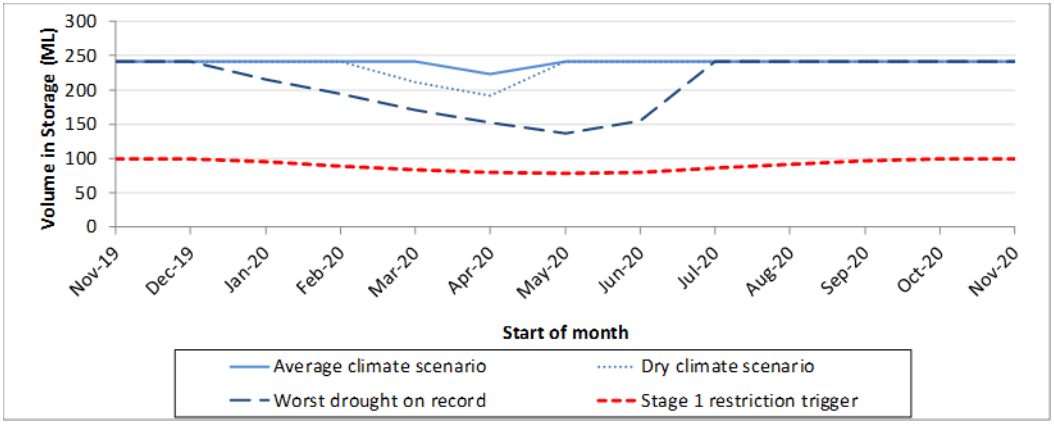


Figure 4-5 : Urban water restrictions outlook for the Deep Creek system

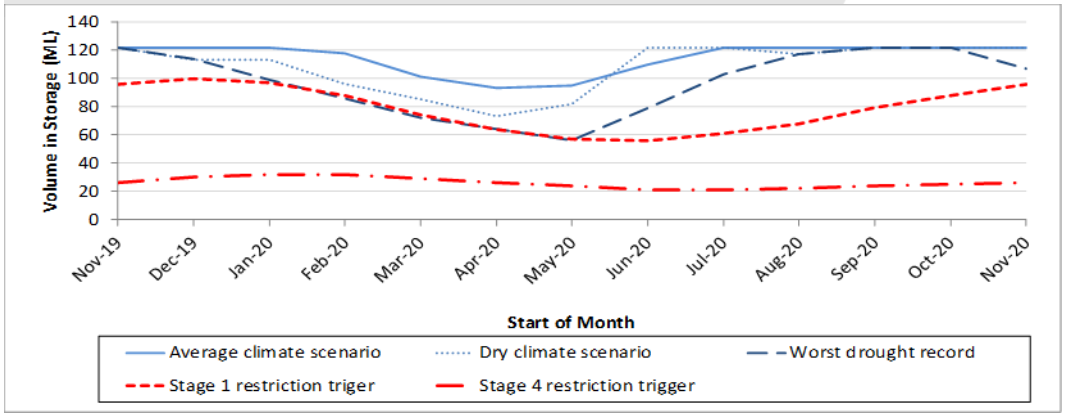


Figure 4-6 : Urban water restrictions outlook for the Battery Creek system

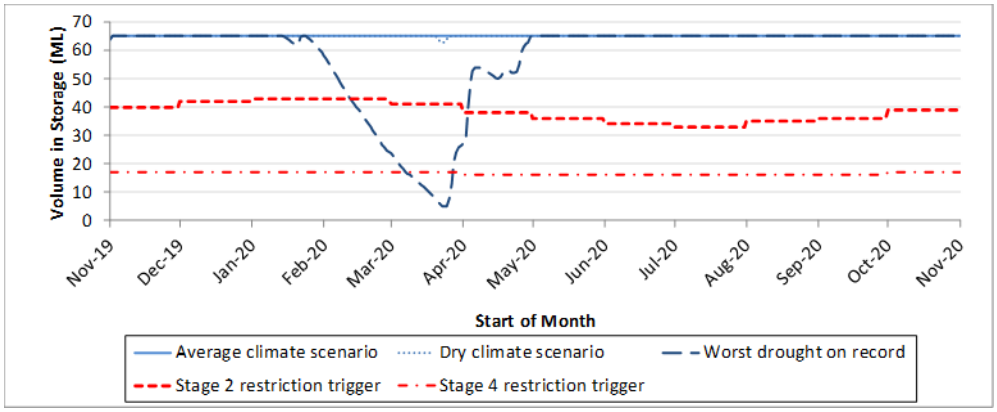


Figure 4-7 : Urban water restrictions outlook for the Agnes River system

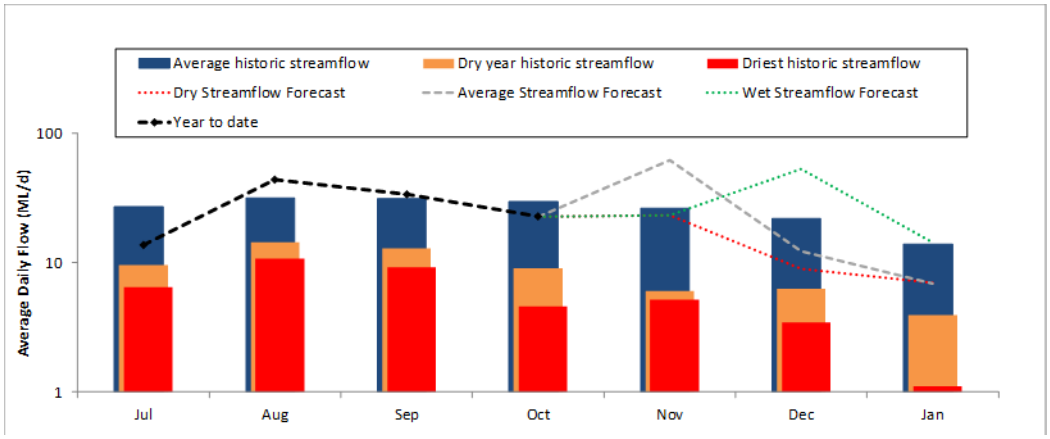


Figure 4-8 Streamflow outlook for the Tarra River system

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	2017-2020
Tarra River	Continue to purchase groundwater licences as required	Ongoing