Annual Water Outlook 2016-2017

1 December 2016

Executive Summary

The 2016-17 year has seen average to above average rainfall across of many of GWMWater's water supply systems and has resulted in a substantial recovery to the overall water resource position when compared to the very dry 2015-16 period.

In addition to increased water security that has resulted from these wetter conditions, the region has also seen widespread benefits to recreational water bodies and waterways. The rain of 2016-17 has typified the boom and bust cycle of the Grampians, Wimmera and Mallee regions of Victoria.

At this time, all GWMWater urban customers remain secure with permanent water saving rules in place to ensure the responsible use of the regions water resources. No restrictions to water use for any of GWMWater's urban customers are proposed for the 2016-17 year.

- Groundwater supplied towns remain relatively unaffected by the recent conditions, wet or dry, and the monitoring of the groundwater resources will continue as planned.

- Murray supplied systems remain secure with allocations on the Murray system announced as 100% on 3 October 2016 and the Goulburn system as 100% on 17 October 2016. Although GWMWater's carryover holdings were 'spilled' due to the wet conditions, these allocations are expected to produce useful volumes of carryover to be taken into the 2017-18 period.

- GWMWater's East Grampians and minor supply systems have recovered well due to the wet conditions with the resource situation expected to be able to meet consumptive demands without any issues. Because on the annual supply cycle of some of these systems, however, close and ongoing monitoring of these systems will continue.

- GWMWater's entitlement from the Wimmera-Glenelg system currently has a 100% allocation against its Wimmera-Mallee Pipeline Product. Other Wimmera-Glenelg high reliability entitlements have also achieved 100% allocation this season. GWMWater currently holds carryover volumes from previous years, which together with this years' allocation is expected to secure urban customers for the 2016-17 period. Indeed, GWMWater now holds sufficient allocation plus carryover to secure customers beyond 2018.

TABLE OF CONTENTS

1. Introduction 5

2. Overview 8

3. Climate 9

3.1 Recent Weather 9

4. Water Security Outlook for Reticulated Supply Systems 17

4.1 Recent Demand Trends and Bulk Water Availability 18

4.2 Murray and Goulburn Supplied Systems– NMP, WMP SS5 & Quambatook township 23

4.2.1. Urban and Domestic Water Restrictions 23

4.3 Wimmera-Glenelg System – Grampians Towns, WMP SSs 1, 2, 3, 4, 6 and 7 24

4.3.1. Water Planning 25

4.3.2. Urban and Domestic Water Restrictions 27

4.4 Groundwater Supplied Towns 28

4.4.1. Urban and Domestic Water Restrictions 28

4.5 Pyrenees & Eastern Grampians Supply System 29

4.5.1. Elmhurst Water Supply 30

4.5.2. Buangor Water Supply 30

4.5.3. Urban and Domestic Water Restrictions 30

5. Water Security Outlook for Unregulated and Groundwater licenced users 31

5.1 Unregulated surface water 31

5.2 Groundwater 32

6. Action Plan 33

List of Tables

Table 1: Water security outlook at 24 November 2016 8
Table 2: Main headwork storages supplying urban and rural users. 24
Table 3: Ability to service groundwater supplied towns. 28
Table 4 Water sourced for Willaura supply system. 29

List of Figures

Figure 1: GWMWater Operating area showing major water resource management areas. 6
Figure 2: Victorian rainfall deciles showing a six month summary for 1 May 2016 to 31 October 2016 and a four year summary for 1 November 2012 to 31 October 2016 10
Figure 3: La Niña watch (image courtesy of the Bureau of Meteorology) 11
Figure 4: Comparison of system inflows to the Wimmera-Glenelg system. 12
Figure 5: Cumulative inflow for Wimmera-Glenelg system headwork storages. 13
Figure 6: Wimmera-Glenelg system headworks storage volume. 14
Figure 7: Chance of exceeding median rainfall. 15
Figure 8: Chance of exceeding median minimum temperature. 16
Figure 9: Chance of exceeding median maximum temperature 16
Figure 10: Murray & Goulburn supplied systems. 18
Figure 11: Wimmera-Glenelg supplied systems. 19
Figure 12: Groundwater supplied towns. 20
Figure 13: Pyrenees supply systems. 21
Figure 14: Eastern Grampians supply system. 22
Figure 15: Lake Bellfield outlook. 25
Figure 16: Lake Wartook outlook. 26
Figure 17: Moora Moora Reservoir outlook. 26
Figure 18: Lake Fyans outlook. 27

1. Introduction

GWMWater supplies water to rural and urban customers across four supply regions (refer to Figure 1) over an area of 62,000 km^2, for the following purposes:

1. potable water (drinkable) to 52,000 urban properties in 29 towns;
2. regulated (not suitable for human consumption) to 42 towns and 11,000 rural properties including free-range stock and stock intensive (feedlots, poultry farms, piggeries);
3. recreation activities supplying 11 recreation lakes;
4. compensation flow for stock and domestic purposes to the Glenelg River; and
5. Water to "Supply by Agreement" commercial customers.

As the appointed Storage Manager for the Wimmera-Glenelg and Willaura systems, GWMWater also plays a significant role in the allocation and management of regulated surface water resources.

GWMWater is also the delegated authority to manage groundwater resources, and determines water allocations for groundwater users and undertakes licencing and compliance activities for groundwater and unregulated systems.

As operator of the Wimmera-Glenelg system headworks, Willaura system headworks, Wimmera-Mallee and Northern Mallee pipeline systems, GWMWater also plays an important role in the supply of water to both GWMWater retail customers and other entitlement holders, including:

1. Townships of Glenthompson (Willaura system), Balmoral and Hamilton (Wimmera-Glenelg System) in accordance with the Bulk Entitlements issued to Wannon Water;
2. Townships of Borung, Korong Vale and Wychitella (via Wimmera-Mallee Pipeline) in accordance with the Bulk Entitlement issued to Coliban Water;
3. Environmental water direct from headworks to watercourses in the Wimmera and Glenelg River catchments, in accordance with the Environmental Entitlement issued to the Victorian Environmental Water Holder, and corresponding Seasonal Watering Plans; and
4. Wetlands in the Wimmera, North Central and Mallee catchments (via Wimmera-Mallee Pipeline), in accordance with the Environmental Entitlement issued to the Victorian Environmental Water Holder, and corresponding Seasonal Watering Plans.

The security of supply from groundwater and unregulated watercourse sources is largely dependent upon licensed allocation, water level or available yield (seasonal flow or pumping capacity). The security of supply from headwork reservoirs and regulated watercourses is dependent upon a combination of the broader bulk entitlement arrangements, seasonal water allocations and the carryover managed by individual entitlement holders.

GWMWater's supply systems draw water from a complex array of sources and utilise a combination of groundwater, headwork reservoirs and regulated and unregulated watercourses including the River Murray.

Figure 1: GWMWater Operating area showing major water resource management areas.

This Water Security Outlook (WSO) builds upon GWMWater's Urban and Rural Water Strategy (previously called the Water Supply Demand Strategy, or WSDS). The most recent WSDS was completed in 2012 and assessed long term water demands against supply under a range of future climate scenarios. The WSDS and WSO are submitted to the Department of Environment, Land, Water and Planning and stem from the statement of obligations issued by the Minister of Water to GWMWater.

GWMWater's Water Supply Demand Strategy will undergo a full review and update between 2016 and early 2017.

This Annual Water Outlook provides detail about immediate and continued water security for both GWMWater's domestic and urban customers, and licenced users of unregulated surface water and groundwater resources. This outlook covers the following topics:

1. the current water resource position;
2. a forward 12 month outlook;
3. whether or not agreed levels of service to rural domestic and urban customers are able to be met; and
4. lists actions to be undertaken to improve system performance (for reticulated urban and rural systems) should it be likely that agreed levels of service will not be met.

For the purposes of this Annual Water Outlook, rural domestic and urban use is defined as the supply of water to towns (including that used for residential, industrial, non-residential and municipal purposes) and rural households. Rural use is defined as the supply of water from GWMWater's raw water pipeline distribution systems to rural properties for non-domestic purposes. Licenced use is defined as the extraction of unregulated surface water or groundwater by an individual or company by way of a 'take and use' licence, issued under the Water Act 1989.

Whilst water security is integral to the ongoing supply to licenced users and GWMWater's reticulated customers, this Water Security Outlook does not provide detail about water security for:

1. towns outside of GWMWater's operational area (i.e. towns serviced by Wannon Water and Coliban Water).
2. compensation flow, environmental water or water delivered for recreation purposes.

Information on these matters may be found in respective entitlement holder water security outlooks, annual operating plans (see www.storagemanager.com.au) and seasonal watering plans.

2. Overview

An overview of the water security outlook and response for reticulated domestic, urban and rural customers supplied by headwork reservoirs, regulated and unregulated watercourses and groundwater sources is documented in *Table 1* below.

Table 1: Water security outlook at 23 November 2016

Supply System	Available Water at 23 November 2016 (ML)	Anticipated 2016-17 Bulk Offtake (ML)	Water Security Outlook for 2016-17
Murray & Goulburn *Northern Mallee Pipeline, Wimmera-Mallee Pipeline (SS 5), Quambatook township*	6,802	4,100	Can supply at anticipated level of demand for this water year with carryover of unused water into 2017-18 expected. No water restrictions planned with Permanent Water Saving rules to remain in place.
Grampians *Wimmera Mallee Pipeline (SS 1,2,3,4,7), Stawell, Ararat & Great Western systems*	84,970	15,000	Can satisfy water supply requirements for greater than 2 years at anticipated level of demand. No water restrictions planned with Permanent Water Saving Rules to remain in place. There will be a reliance on the Storage Manager to apportion GWMWater allocation in a way that supports GWMWater requirements.
Groundwater Supplied Towns	3,232 [1]	1,100	Can supply at anticipated level of demand for this water year. No water restrictions planned with Permanent Water Saving Rules to remain in place.
Minor Systems *Pyrenees & Eastern Grampians*	686 [2]	340	Can supply anticipated level of demand for this water year, contingent on physical supply constraints. No water restrictions planned with Permanent Water Saving Rules to remain in place.

Notes to Table 1:

[1] Excludes 1,200 groundwater entitlement available for supplementing Horsham supply.

[2] Includes volume of groundwater supplement available.

3. Climate

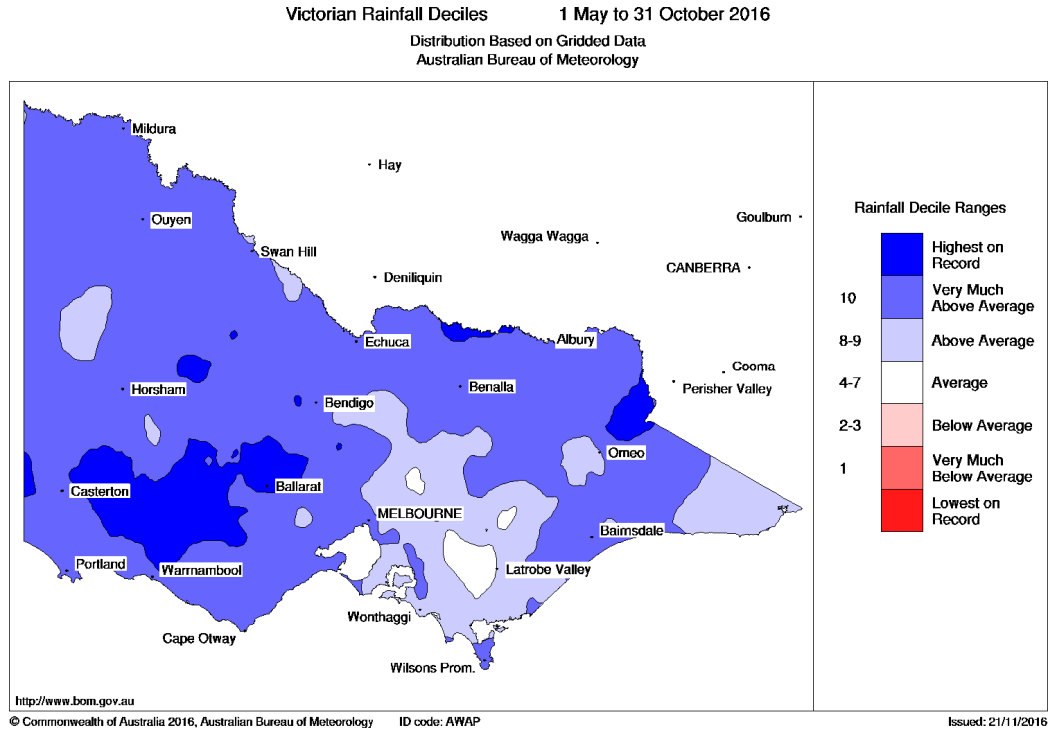
Climate, in particular rainfall and temperature, has a large influence on inflows to and evaporative losses from water storages, and also on the demand from consumptive users. It is often during drier seasons when rainfall and inflows to storages have been low, that consumptive demands are the highest. During dry climatic conditions, urban and other domestic users increase consumption as a result of greater evaporative cooling and outdoor water use for gardens and recreation. Rural consumption increases as other sources of water, such as farm dams and rainwater tanks are depleted.

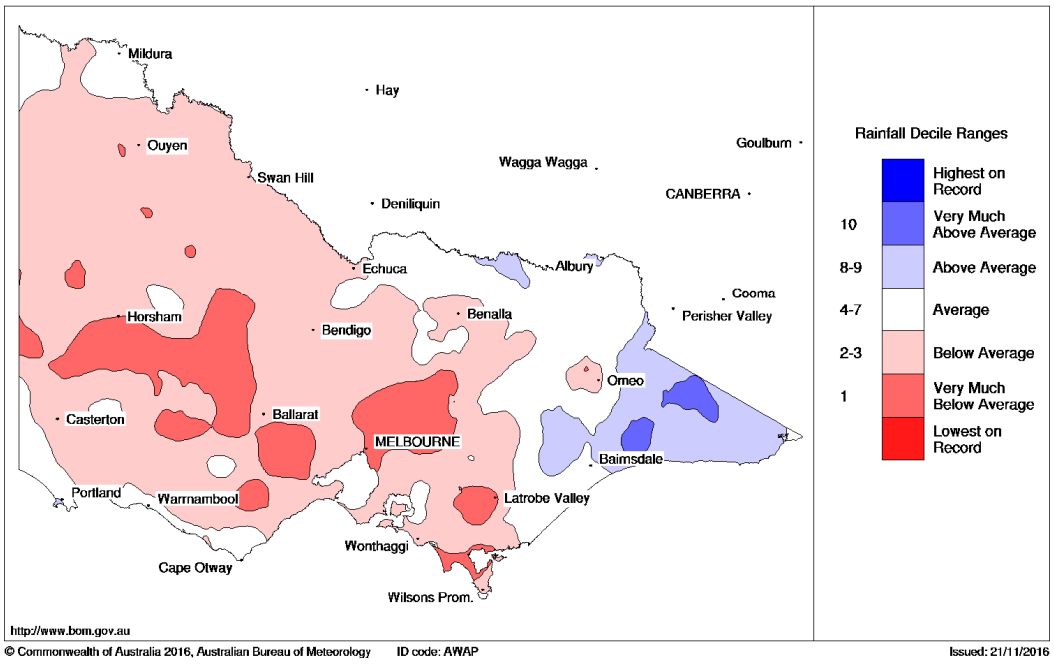
GWMWater incorporates seasonal outlooks provided by the Bureau of Meteorology for rainfall, temperature and global climate events, such as El Nino, to inform short term (0-2 year duration) water resource planning. Analysis of historical data is used to identify longer term trends and guide multi-year water resource planning and outlooks.

3.1 Recent Weather

For much of Victoria, including GWMWater's operational area, winter and spring rainfall has been equivalent to the long term average or even above average, resulting in a substantial recovery to the water resource position across the State. The 2015-16 year saw some of the driest conditions on record, and the wet winter and spring of 2016-17 had seen a dramatic change to the rainfall deficits for the western parts of Victoria, as shown in *Figure 2*.

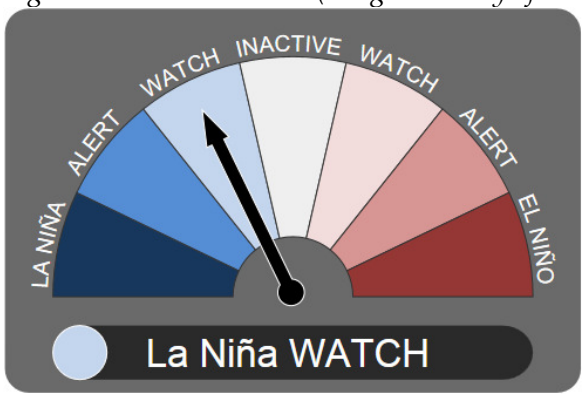
Figure 2: Victorian rainfall deciles showing a six month summary for 1 May 2016 to 31 October 2016 and a four year summary for 1 November 2012 to 31 October 2016





The significant El Ninõ event of 2015-16 ended in the early parts of 2016 with neutral conditions subsequently persisting throughout the remainder of the 2016 calendar year. A La Niña 'watch' has been in place by the Bureau of Meteorology (BoM) for several months but has not moved any further towards full La Niña conditions. The most noticeable weather feature of the winter and spring of 2016 has been the Indian Ocean Dipole (IOD)which has been in a very strong negative phase for the past several months and which the BoM report as being a key influence and reason for the average to above average rainfall across GWMWater's operational area.

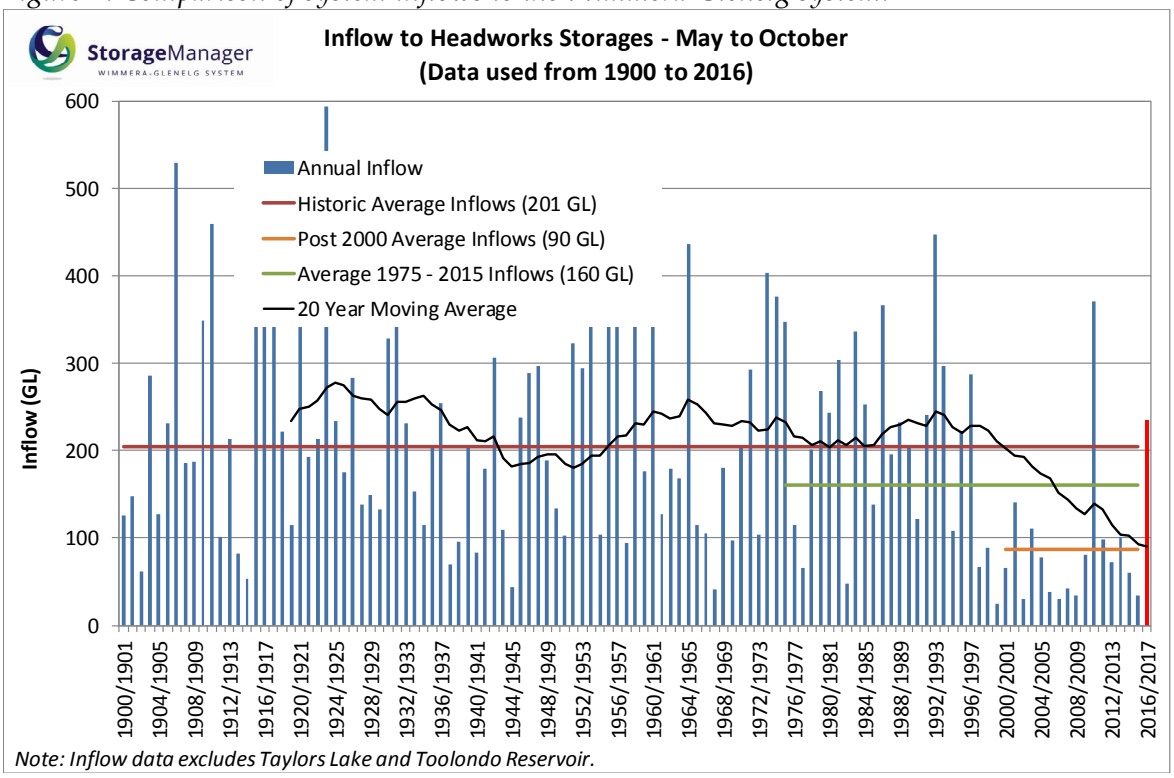
Figure 3: La Niña watch (image courtesy of the Bureau of Meteorology).

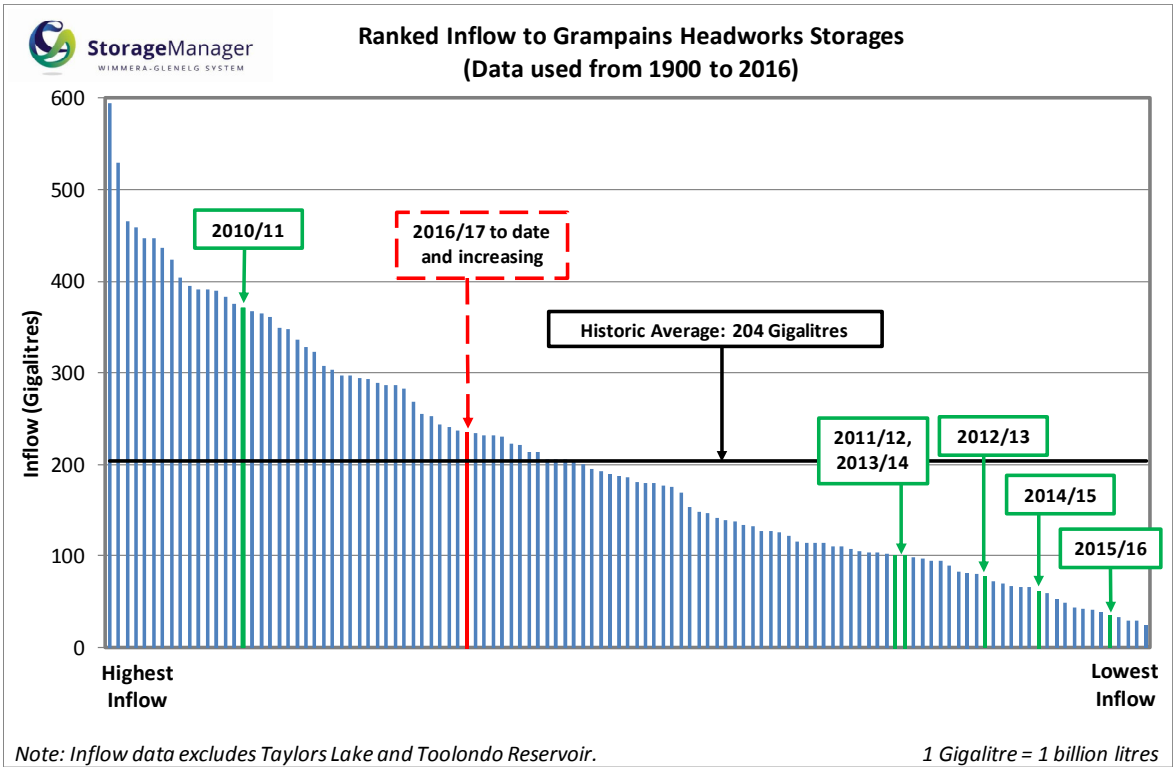


For the Wimmera-Glenelg System storages in particular, the effect of the current IOD event has been prominent. Inflows from 1 July 2016 to 1 November 2016 were approximately 156% of the historic average for that period, or about 232,500 ML, with further inflows forecast for the remainder of the year.

Figure 4 presents two graphs comparing the inflows of the Wimmera-Glenelg system. The first graph shows how all inflows in sequence with the 2016/17 year showing a significant increase compared to the 2015/16 year. The second graph presents the ranked inflows into the Wimmera-Glenelg system where is can be seen the most recent 5 years have been well below average and the 2016/17 year is currently tracking slightly above the historical average, with the further inflows expected.

Figure 4: Comparison of system inflows to the Wimmera-Glenelg system.

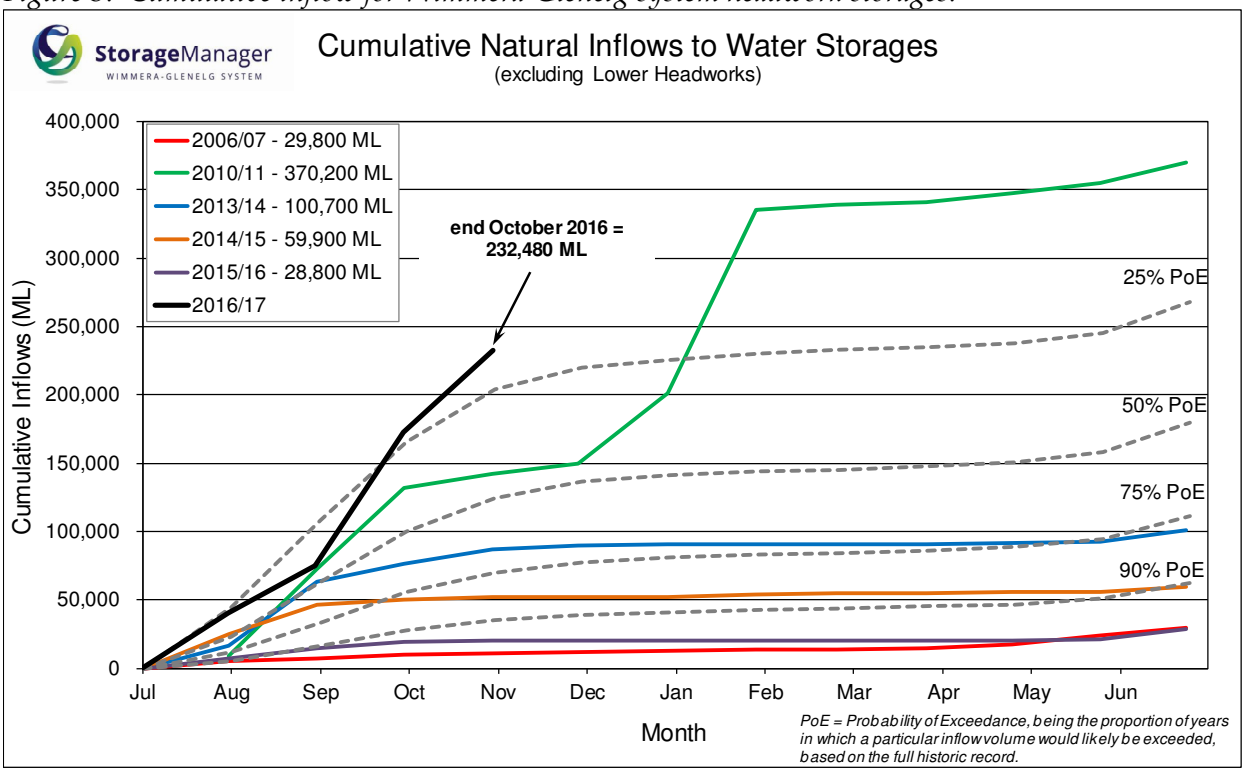




Courtesy of www.storagemanager.com.au.

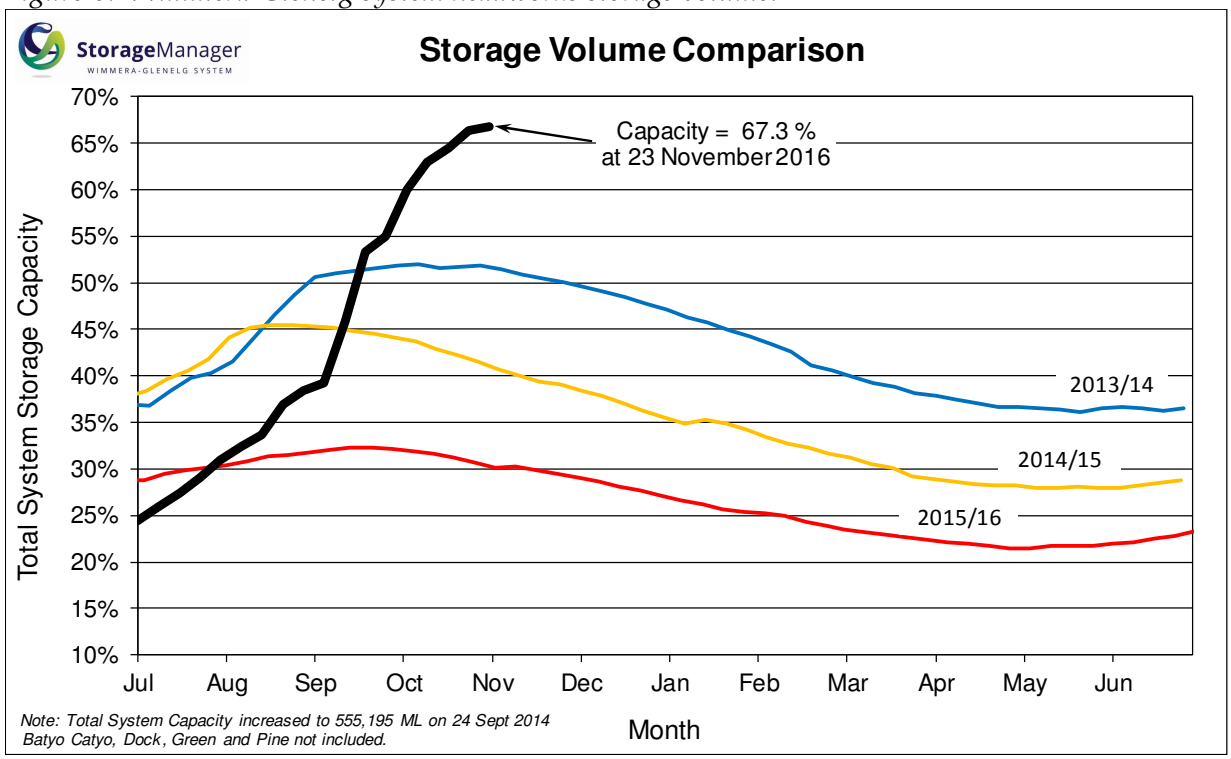
Figure 5 shows the cumulative inflows into the system and benchmarks this against some probabilities of exceedance (PoE). The 2016/17 inflow year to date is tracking around the 25 % PoE or what is colloquially called 'wet' conditions.

Figure 5: Cumulative inflow for Wimmera-Glenelg system headwork storages.



The impact of these inflows into the system headworks storages can be seen in *Figure 6* where a comparison of total system storage volumes is presented. It can be seen that over the recent dry years the system has been drawn down by entitlement holders and evaporation to a point where 2015/16 saw volumes decrease to almost 20% of capacity. Inflows during the first four to five months of 2016/17 have resulted in volumes sky rocketing to over 65% of capacity with the system holding more water than at any time since 2011.

Figure 6: Wimmera-Glenelg system headworks storage volume.



Weather Outlook

The Bureau of Meteorology weather outlook for the period November 2016 to January 2016 over much of western Victoria is for an medium chance of exceeding the median rainfall (*Figure 7*) and a medium chance of exceeding the median maximum and minimum temperatures (*Figure 8* and *Figure 9*). These predicted conditions are milder than those observed in recent summers, and should see GWMWater's water resources remain in a relatively good position.

An outlook beyond February is difficult at this time and GWMWater will continue to monitor Bureau of Meteorology information as it becomes available as well as other providers of information such as the Wimmera-Glenelg Storage Manager (www.storagemanager.com.au) and the Northern Victorian Resource Manager (www.nvrm.net.au) for allocation and resource outlooks.

Figure 7: Chance of exceeding median rainfall.

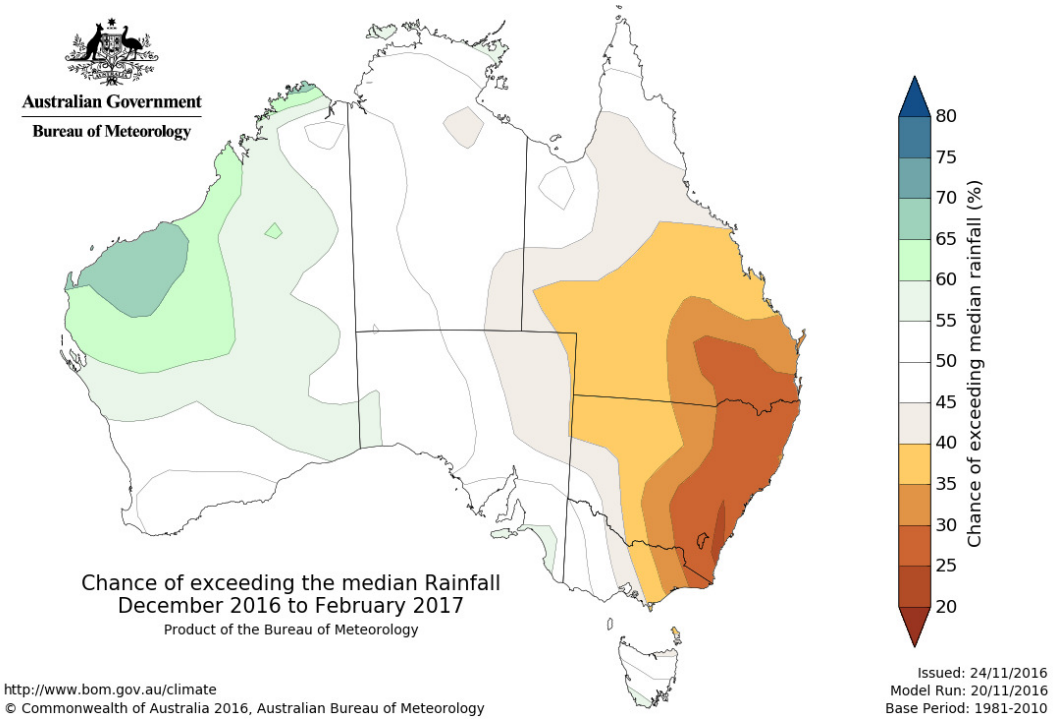


Figure 8: Chance of exceeding median minimum temperature.

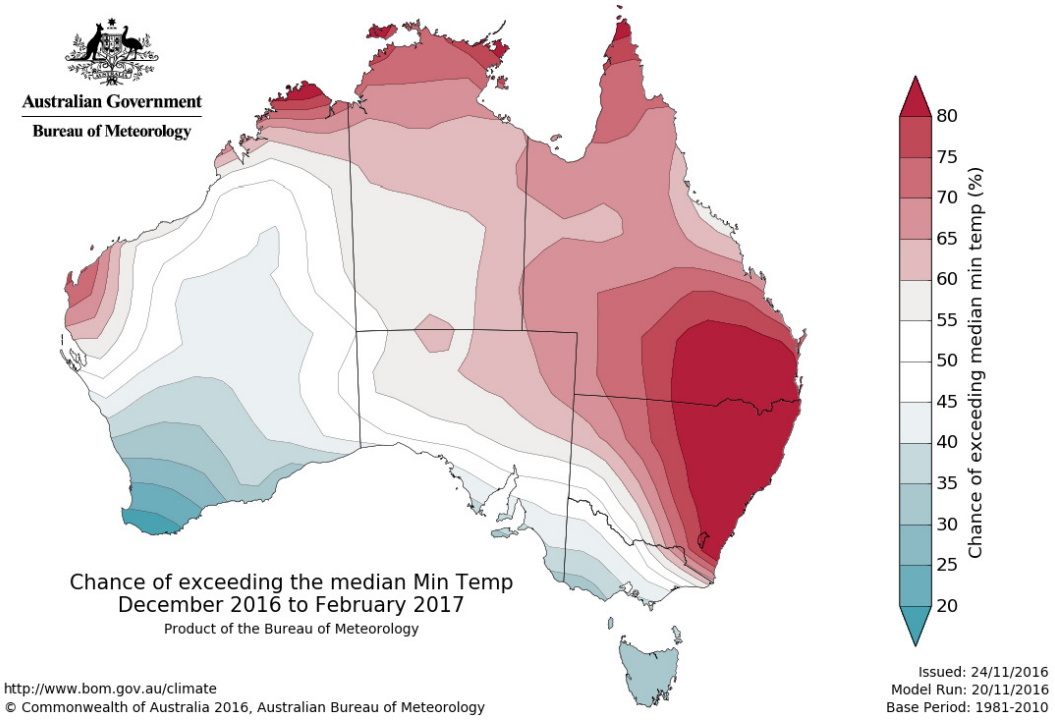
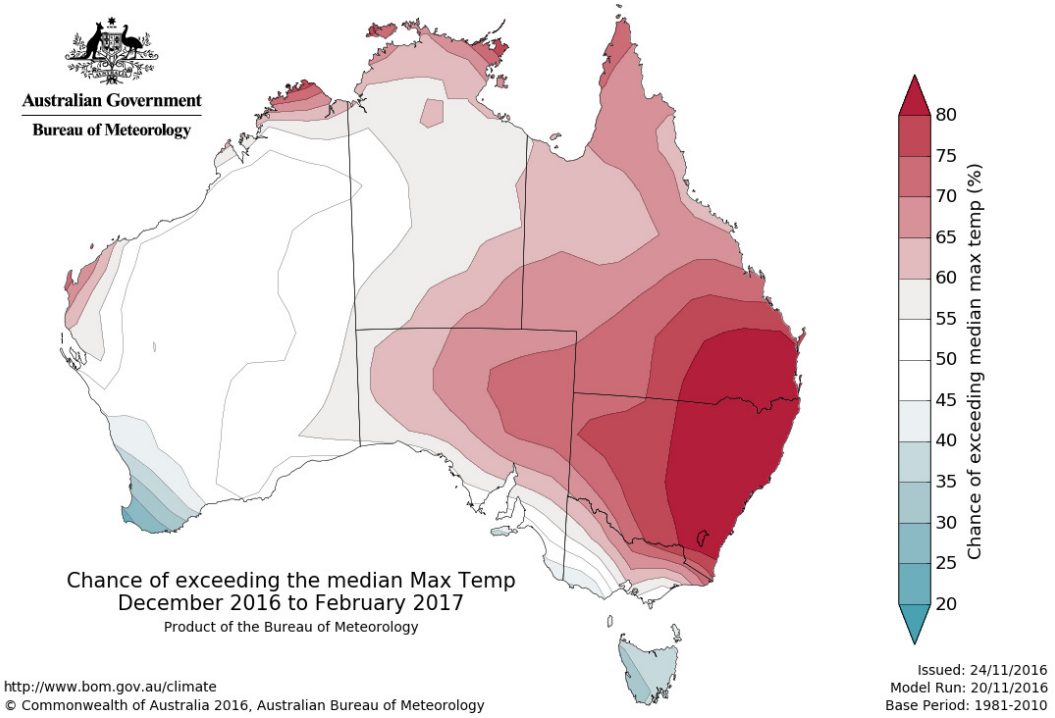


Figure 9: Chance of exceeding median maximum temperature



4. Water Security Outlook for Reticulated Supply Systems

A water security outlook for each supply system supporting GWMWater's urban and rural pipeline supplied customers is detailed below. It should be noted that methodologies to determine water security vary between supply systems, as different supply systems derive water from different (or mixed) sources with varying reliability. This requires a broad set of considerations with the aim of being adaptive and integrated in the approaches taken to manage GWMWater's urban and rural supplies.

From time to time unforeseen natural events can occur, such as bushfire, flood, and high concentrations of potentially toxic Blue-Green Algae. These events can directly and indirectly impact raw water quality and subsequently the quality of water supplied to non-drinking water users. Poor quality raw water also requires more intensive water treatment, and in severe events can reduce the volume of drinking water a treatment plant is able to produce each day. During such events GWMWater may implement alternate supply arrangements in the interest of maintaining the best possible quality of water to its urban and rural pipeline customers. During such events, demand management strategies, such as temporary restrictions, may be used to ensure supply is maintained to all users.

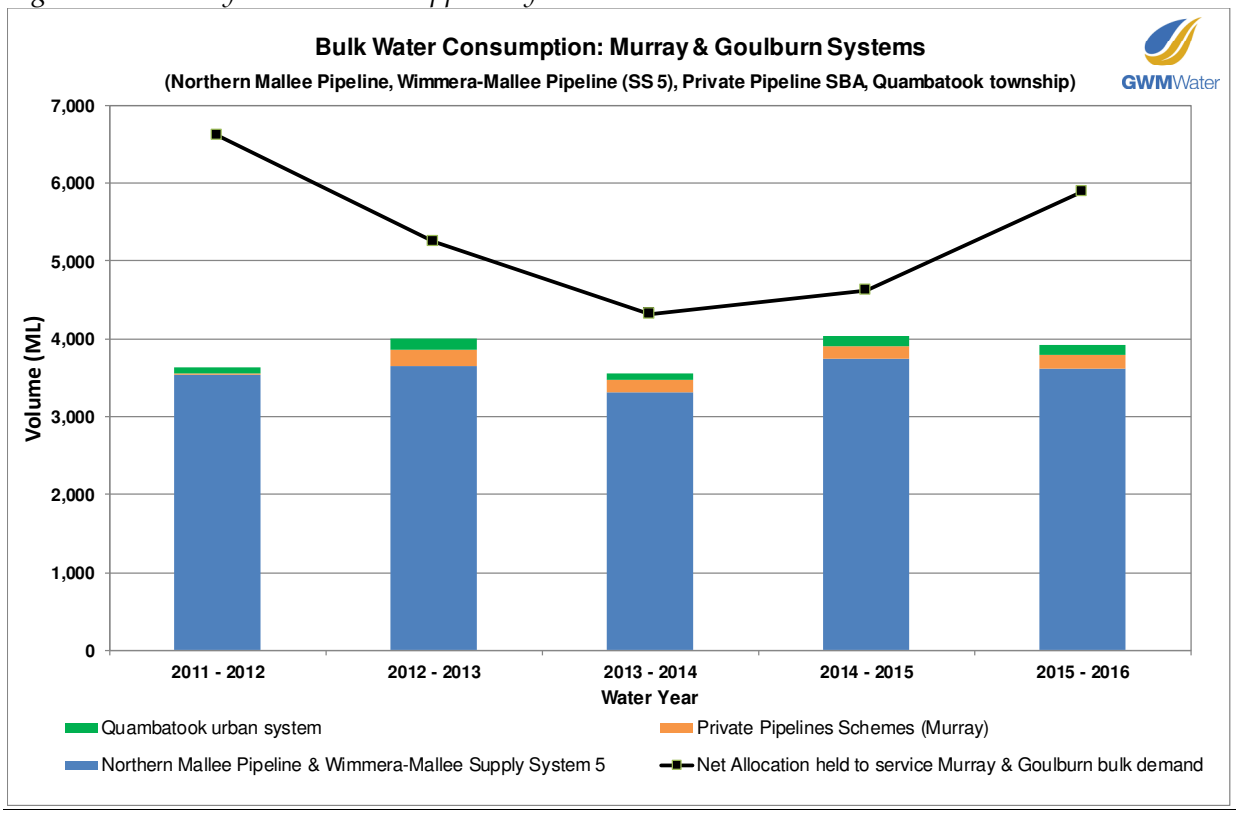
4.1 Recent Demand Trends and Bulk Water Availability

Consumption by GWMWater's urban and rural customers is largely influenced by climatic factors (explained in Section 3). The experience of a relatively 'wet' season in 2010/11 followed by increasingly dry seasons through to 2015/16 has provided invaluable insight into demand trends under a variety of climatic scenarios.

In regulated water supply systems such as the Wimmera-Glenelg, Murray and Goulburn systems, GWMWater has consistently maintained a 'carryover' reserve of bulk water allocation to provide multi-year water security. Smaller unregulated surface water supply systems are reliant on natural flows occurring each year to replenish town supply storages, however by virtue of demand being less than storage capacity, or through groundwater supplements, a level of security is provided. Groundwater management plans which aim to provide long-term sustainability of groundwater resources along with the size of GWMWater's groundwater entitlements give good security to its groundwater supplied towns.

FigureFigure ***10*** to *Figure 14: Eastern Grampians supply system.* below detail the volume of bulk water consumed in supplying urban, rural domestic and rural non-domestic demands for the water years 2011/2012 to 2015/2016. The volume of allocation available to service the bulk demand is shown for comparison.
trends for

Figure 10: Murray & Goulburn supplied systems.



The net allocation values shown in *Figure 10* reflect how allocations have been managed each year and include any sale of unused allocation on the temporary water market. GWMWater 'spilled' all of its Murray system carryover in the 2016/17 year due to the very wet conditions and is unlikely to sell unused water, instead looking to bolster its water holdings for 2017/18 and beyond.

Figure 11: Wimmera-Glenelg supplied systems.

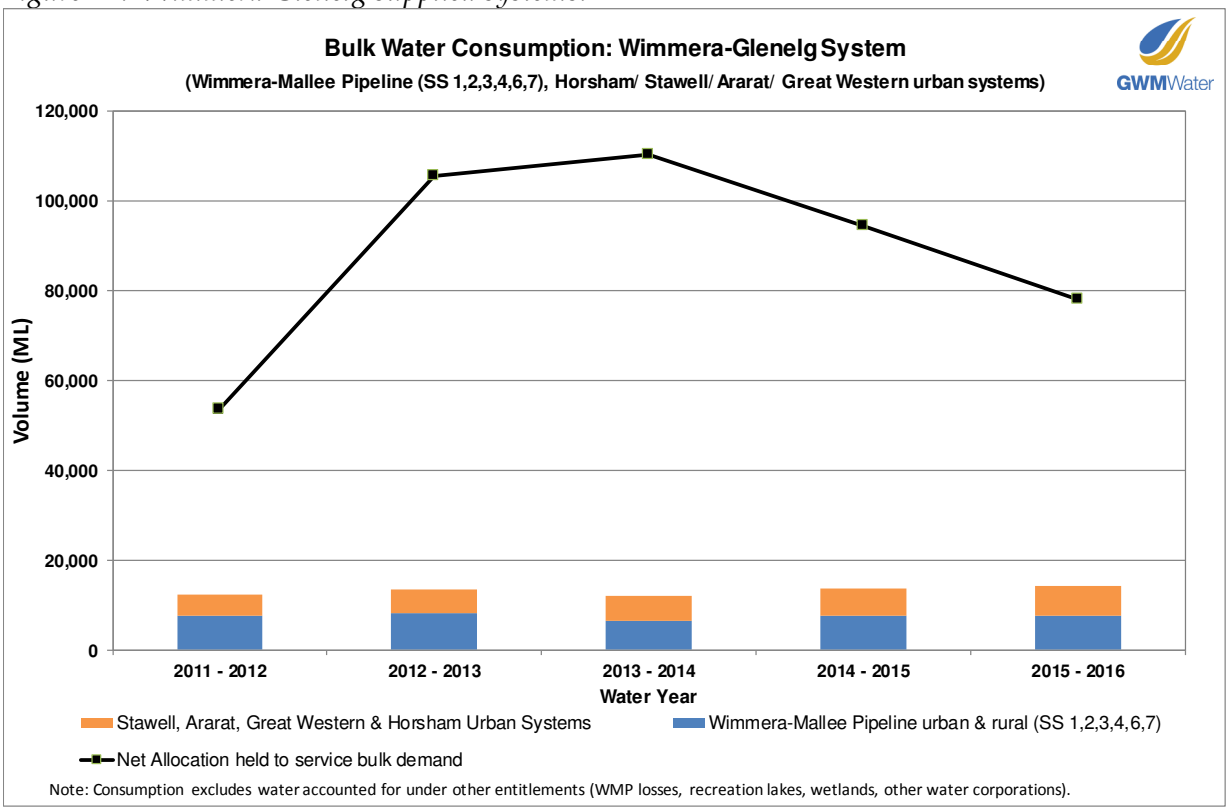


Figure 11 shows a large volume of carryover available under GWMWater's bulk entitlement. At least two years of supply is available to GWMWater without any action being taken to secure that supply. Beyond 2 years, the management of the spread of the water resource across the headworks system will become more important to ensure that the correct volumes are available at the correct time. GWMWater as an entitlement holder, will work with the Wimmera-Glenelg system Storage Manager (www.storagemanager.com.au) to keep track of its apportioned allocations across the system.

Figure 12: Groundwater supplied towns.

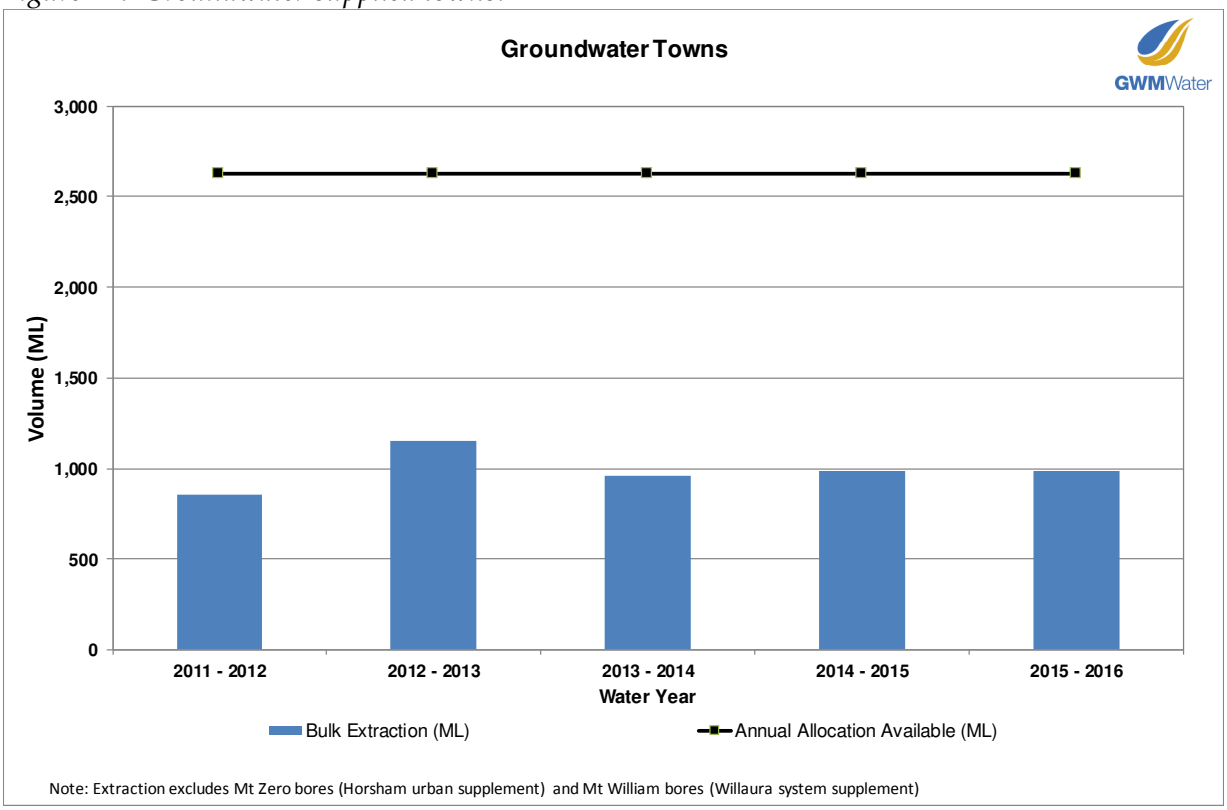
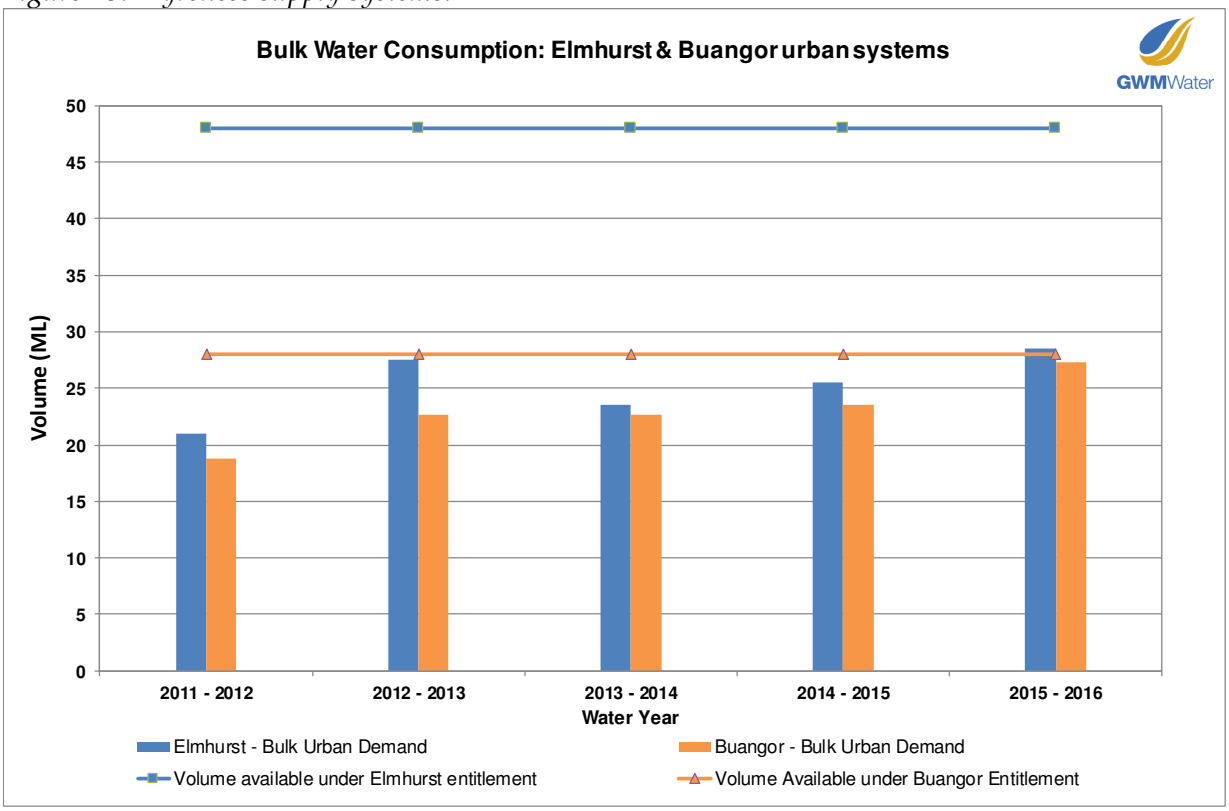


Figure 12 shows that the level of water allocated from GWMWater's groundwater systems is well in excess of the bulk volumes used. GWMWater continually monitors groundwater levels across its area of operations and administers various local and groundwater management plans to ensure the sustainable use of these resources.

Figure 13: Pyrenees supply systems.

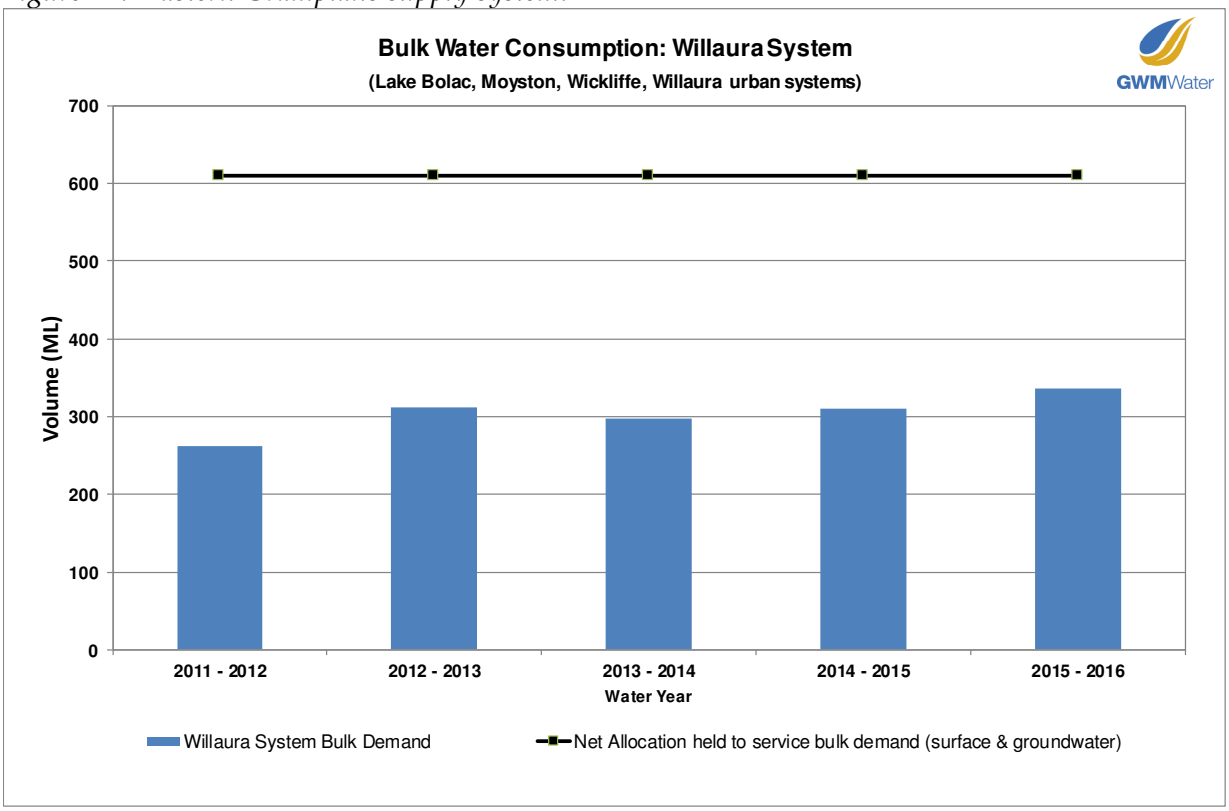


The Pyrenees located supply systems of Elmhurst and Buangor are small and do not have well defined reliabilities of supply. The volumes available under the entitlement shown in *Figure 13* represents the maximum capacity to divert water and does not show the actual water available to divert for each year, as this is unknown. However, experience shows that these systems can withstand reasonably dry years without risk of water shortages and so these systems are not expected to have any issues following the wet conditions for 2016-17 so far.

Diversion for Buangor during 2015-16 approached the maximum allowable under its entitlement, due to increased consumption and high evaporation from its raw water storage. With a wet start to 2016-17, significantly reduced consumption and storage losses have been observed in comparison to the previous season, and it is therefore not anticipated that restrictions will be necessary to manage demand during 2016-17.

Regular monitoring is undertaken of storages, diversion weirs and bulk deliveries to ensure that supply continues to meet expected levels of service for Elmhurst and Buangor. Supplementary water carting is a viable contingency for these towns due to the relatively low volumetric usage within the reticulation system.

Figure 14: Eastern Grampians supply system.



The net allocation reflects the combined maximum volumes able to be diverted from surface water weirs together with groundwater pumps. It does not reflect the actual water that was available for each year. Limited stream flow monitoring also prevents a detailed understanding of the reliability of supply from the Willaura system headworks. The groundwater component of the system is critical in underpinning the overall system security. Largely due to the highly reliable groundwater resource available, this system is not expected to be resource constrained this year.

Another known issue with the Willaura headworks system is the fixed hydraulic capacity to move water around in the system. This sometimes creates limitations to how much water can be supplied to towns and customers, particularly during peak demand periods. Monitoring of supply is continually undertaken to ensure supply is maintained.

At 21 November, water storages supporting the Willaura system remained full as a result of continued unregulated streamflow. At the same time in 2015, storages held 78% and with streamflows having largely ceased, groundwater was being used to supplement supply.

4.2 Murray and Goulburn Supplied Systems– NMP, WMP SS5 & Quambatook township

Under the *Bulk Entitlement (River Murray – Grampians Wimmera Mallee Water) Order 1999*, GWMWater holds a high reliability entitlement of 3,486 ML that services Northern Mallee Pipeline and Murray supplied component of the Wimmera-Mallee Pipeline (SS5). In addition to this Bulk Entitlement, GWMWater holds 2,923 ML of high reliability water shares, which provide additional security for both these supply systems as well as the Quambatook urban system (via water trading).

Under the *Bulk Entitlement (Quambatook – Grampians Wimmera Mallee Water) Order 2006*, GWMWater holds a very high reliability entitlement of 100 ML which services the supply to Quambatook township from the Normanville Pipeline system. Water available under this entitlement is able to be supplemented via water trading from GWMWater's Murray Bulk Entitlement or water share holdings.

Water allocations to these entitlements are determined by Goulburn Murray Water, as the appointed Resource Manager for Northern Victorian river systems (see www.nvrm.net.au).

As detailed in *Table 1*, GWMWater presently has 100 % of allocation, with over 6,800 ML available to service the expected 4,100 ML combined bulk demand from the Northern Mallee Pipeline, Wimmera-Mallee Pipeline supply system 5, and the Quambatook urban system. The volume of bulk water available to GWMWater to service these supply systems can be supplemented with purchases of temporary allocation from the water market if and when required. This provides a further mechanism by which security for these systems can be managed and maintained, even during times of reduced bulk water allocations.

It is noted that due to the wet conditions this year, GWMWater 'spilled' its carryover water held in the Victorian Murray system. However, given allocations have now reached 100% for both the Murray and Goulburn systems, this will not impact on security of supply to any of GWMWater's customers in this season. There is expected to be a useful volume carried over into 2017/18, and GWMWater are unlikely to consider temporary water transactions this season.

4.2.1. Urban and Domestic Water Restrictions

Permanent Water Saving Rules (PWSR) are applicable in Quambatook township and all townships serviced by the Northern Mallee Pipeline and Wimmera-Mallee Pipeline supply system 5. Rural domestic users supplied from these systems are also asked to abide by PWSR.

It is not anticipated that water restrictions will be imposed in these supply systems during 2016/17 water year due to resource constraints, as current allocation holdings exceed the anticipated bulk demand by a large margin.

Since the significant Blue-Green algae event along the River Murray during early 2016, GWMWater has invested heavily in infrastructure augmentation to increase its ability to meet demand during such situations in the future.

4.3 Wimmera-Glenelg System – Grampians Towns, WMP SSs 1, 2, 3, 4, 6 and 7

Under the *Bulk Entitlement (Wimmera and Glenelg Rivers – GWMWater) Order 2010*, GWMWater holds a bulk entitlement of 44,720 ML. Of this entitlement, 32,720 ML is for the supply of urban and rural demands (including smaller users supplied by agreement), as outlined in *Table 2*, below. The remaining 12,000 ML is held by large commercial users, and supplied direct from headworks storages.

Water allocations to all entitlements in the Wimmera-Glenelg system are determined by the Wimmera-Glenelg system Storage Manager (see www.storagemanager.com.au), which is a role that an independent division of GWMWater fulfils under appointment by the Minister for Water.

As detailed previously in *Table 1*, GWMWater presently holds over 84,970ML of allocation (including carryover) to service the expected bulk demand (urban and rural) of 15,000 ML.

The headwork reservoirs that predominately supply water for urban and domestic purposes are detailed in *Table 2* below:

Table 2: Main headwork storages supplying urban and rural users.

Headwork Reservoir	**Contents at 23 November 2016**	**Supply System and Townships supplied**
Lake Bellfield	72,090 ML (92%)	Wimmera-Mallee Pipeline Supply Systems 1, 2, 3, 4 & 7. *Antwerp, Beulah, Birchip, Brim, Charlton, Dimboola, Donald, Dooen, Glenorchy, Hopetoun, Jeparit, Jung, Lascelles, Marnoo Minyip, Murtoa, Nhill, Pimpinio, Rainbow, Rupanyup, St Arnaud, Tarranyurk, Warracknabeal, Watchem, Woomelang, Wycheproof, Yaapeet.*
Moora Moora Reservoir	6,220 ML (99%)	Wimmera-Mallee Pipeline Supply System 6. *Clear Lake & Noradjuha.*
Lake Wartook	29,300 ML (100%)	Horsham urban system (inc. Natimuk) & secondary source for Wimmera-Mallee Pipeline Supply System 6 . *Clear Lake & Noradjuha.*
Lake Fyans	16,030 ML (87%)	Ararat, Great Western, Stawell & Supply By Agreement rural users.
Mt Cole	800 ML (100%)	Ararat & Supply By Agreement rural users.

Whilst it is recognised that the other reservoirs and a bore field located at Mt Zero are able to supply or supplement urban and domestic needs, it is the volumes held in the headwork reservoirs listed in *Table 2* that are most directly linked to the reliability of urban and rural domestic supply.

4.3.1. Water Planning

The average to above average rainfall and inflows for the region has resulted in storage levels recovering significantly (refer to *Figure 4* and *Figure 6*). With the expectation of continued favourable weather, at least in the short term, GWMWater is using 'average' to 'wet' PoEs for its planning purposes. Modelled storage level projections for the main headwork reservoirs supplying urban and rural demands are shown below as *Figure 15* through to *Figure 18*.

These modelled forecasts have been taken from the Wimmera-Glenelg system Storage Manager and uses assumptions contained with its 2016 – 2017 annual Operating Plan (refer to www.storagemanager.com.au). Inputs to the models include projected demands from the reservoirs, evaporation, inflow based on historic probability and where applicable, planned transfers to downstream reservoirs.

Figure 15: Lake Bellfield outlook.

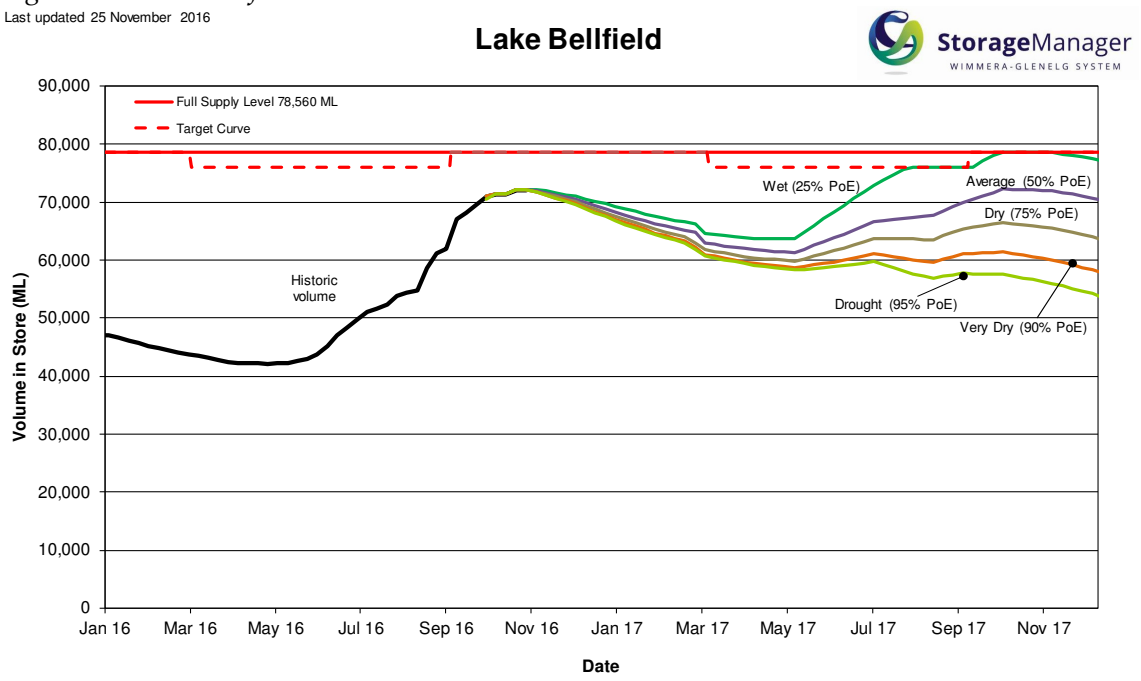


Figure 16: Lake Wartook outlook.

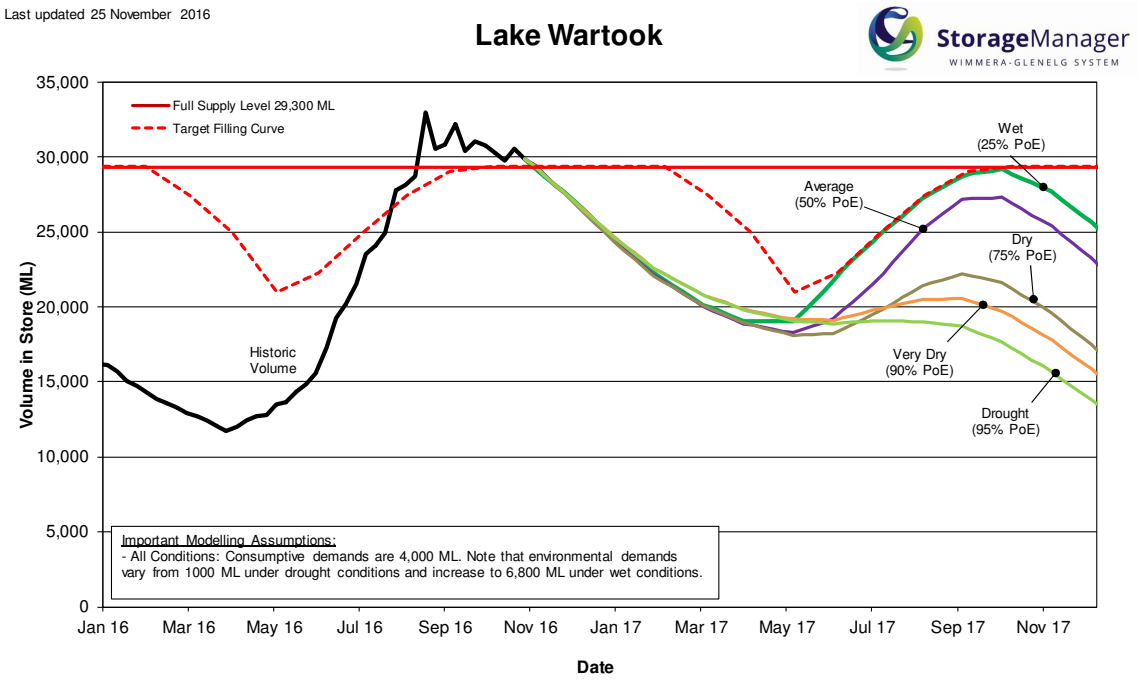


Figure 17: Moora Moora Reservoir outlook.

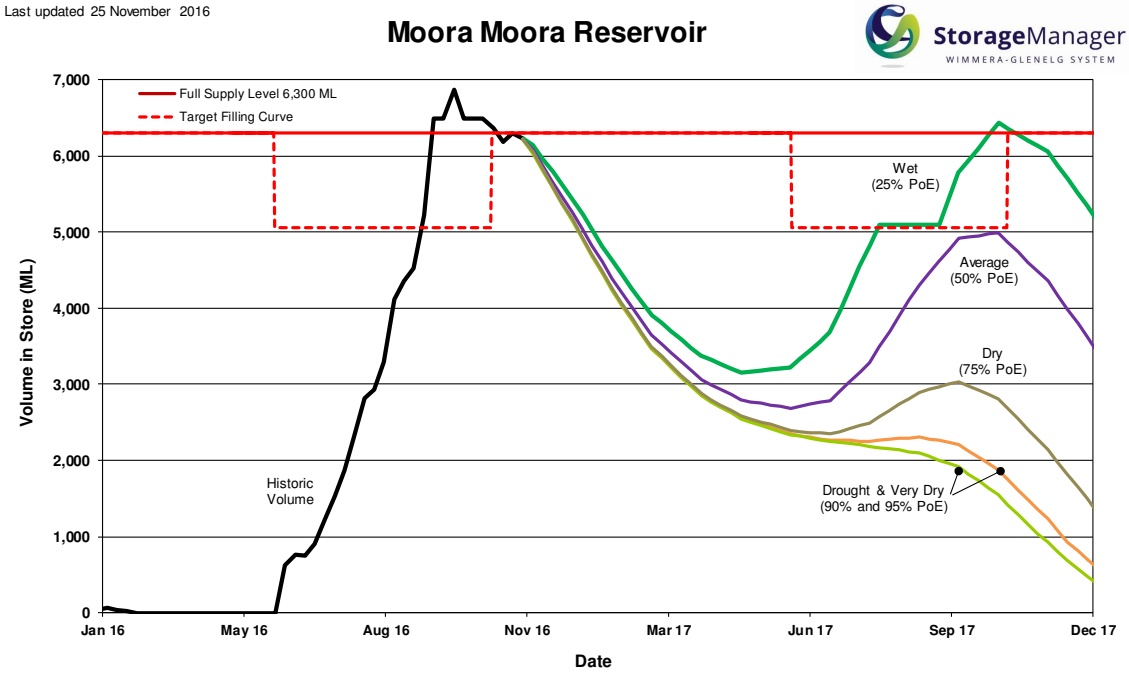
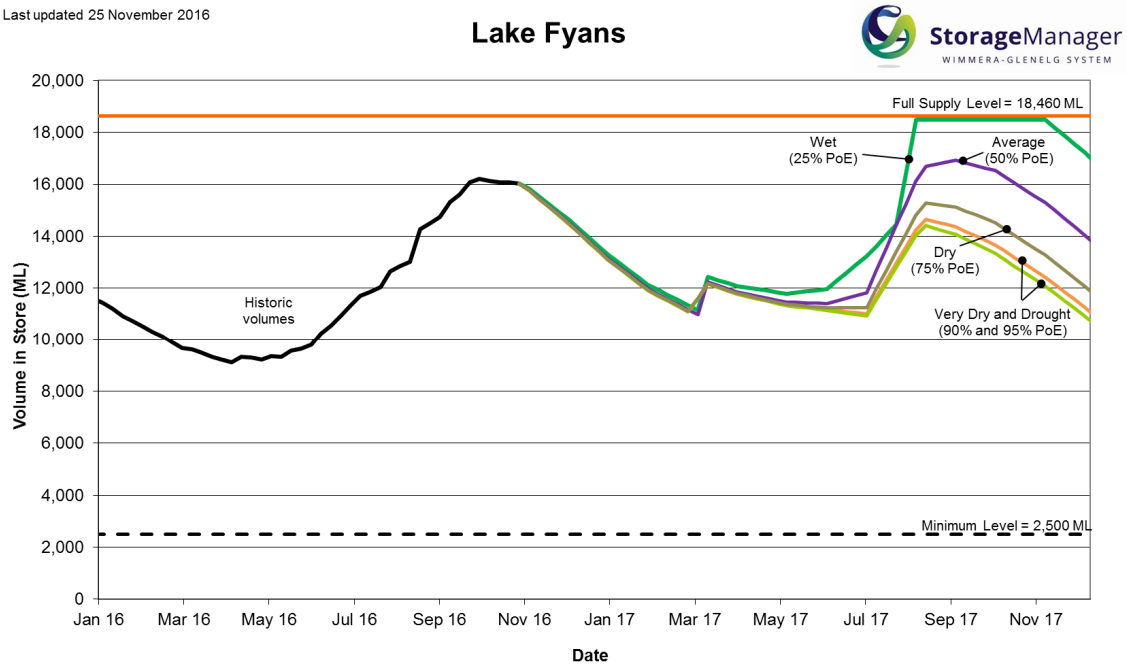


Figure 18: Lake Fyans outlook.



Whilst storage levels will oscillate, especially as they are shared with other entitlement holders whose demand are not described in this document, it is expected that storage volumes will remain at sufficient levels to ensure continued supply for all GWMWater urban and domestic rural demands.

4.3.2. Urban and Domestic Water Restrictions

It is noted that GWMWater's most recent Water Supply-Demand Strategy (available at www.gwmwater.org.au) described the combined urban and rural demand for the Wimmera-Glenelg supply system as 13,777 ML per year. While recently observed actual demand has been mostly consistent with this, demand has generally been increasing annually, and increased significantly in some areas during 2015/16 as dry climatic conditions persisted across the region. With extensions being made to the Wimmera-Mallee Pipeline and new connections occurring (e.g. Landsborough pipeline), it is likely that small, gradual increases in annual demand will be observed in the years ahead.

As detailed in *Figure 15* to *Figure 18*., it is anticipated that reservoir volumes will remain at a level sufficient to satisfy all demands, including urban and rural users, for the remainder of the present season and well into the next water year, even under dry conditions.

Permanent Water Saving Rules remain in place across all urban supply systems, including groundwater supplied towns. GWMWater is not anticipating the introduction of water restrictions to any town during the remainder of the water year under normal operating conditions.

4.4 Groundwater Supplied Towns

A number of bores supply water to 14 towns in GWMWater's operational area. GWMWater holds take and use licences authorising the take of groundwater to service the commercial, municipal and residential needs of each township. For further information about groundwater resources, refer to Section 5, Water Security Outlook for Unregulated and Groundwater licence. Details of groundwater supplied towns are presented in *Table 3* below:

Table 3: Ability to service groundwater supplied towns.

Groundwater Management Unit	Sub - zone	Township	Licence Volume (ML)	Total 2015/16 Use (ML)[1]	Physical supply capacity (ML/yr)[2]
West Wimmera	Northern	Kaniva	600	234	1,200
		Kiata	40	5.8	22
		Lillimur	32	9.3	45
		Miram	7	0.8	33
		Nhill[3]	1,000	221	605
		Serviceton	25	7.7	36
	Southern	Apsley	40	29.4	46
		Edenhope[4]	250	168	134
	Gymbowen	Goroke	86	61.4	265
		Harrow	29	41.2	104
Murrayville	Murrayville	Cowangie	40	12.7	36
		Murrayville	475	133	167
Eastern Grampians	Eastern Grampians	Streatham& Westmere	60	26.3	28

[1] For the 2015 – 2016 water year; industrial, municipal and residential purposes.
[2] Over 4,000 hrs (~ 6 months) continuous pumping.
[3] Connected to Grampians – Wimmera Mallee Pipeline Supply System in October 2013 but with dual supply and groundwater being used for irrigation of community and recreational assets.
[4] Supply capacity does not include "Foreshore bore" which was used to satisfy non-urban demands during 2015/16.

4.4.1. Urban and Domestic Water Restrictions

Permanent Water Saving Rules are applicable to use water for urban and domestic purposes for all groundwater supplied towns. Present available supply volumes and supply capacity are considered adequate to meet existing and immediate future demand. It is not anticipated that water restrictions will be introduced in any groundwater supplied town within the next 24 months.

4.5 Pyrenees & Eastern Grampians Supply System

Water to these supply systems is managed by GWMWater. Under the *Bulk Entitlement (Willaura, Elmhurst and Buangor Systems - GWMWater) Order 2012*, GWMWater may take up to a maximum annual volume of:

a. 390 ML from the weirs located on Mt William Creek, Stoney Creek and Mason's Creek between June to December inclusive to supply Willaura.
b. 48 ML from Hickmans Creek to supply Elmhurst.
c. 28 ML from McLeods Creek to supply Buangor.

GWMWater also holds a take and use licence authorising the take of up to 220 ML per year of groundwater from the Mt William bore field to supplement the Eastern Grampians (Willaura) supply system.

Willaura Water Supply

This system supplies 4 townships (Moyston, Willaura, Wickliffe and Lake Bolac) via weirs located on Mt William Creek, Stoney Creek and Mason's Creek, generally between June and December with additional capacity from 4 bores between January and April or when low watercourse flows occur between late autumn and mid-summer. Water is harvested into 3 off stream storages of 125 ML capacity. An entitlement of 58 ML held by Wannon Water for Glenthompson township is also supplied from the Willaura system.

The combination of watercourse flow, bore yield and off stream storages have been able to meet rural, urban and domestic demand, including a supply to Wannon Water to service the demands of Glenthompson.

Table 4 Water sourced for Willaura supply system.

	2012/13	2013/15	2014/15	2015/16	4-Year Average
Diversion Weirs (ML)	193.6	244.1	231.0	173	210
Groundwater (ML)	117.7	73.9	80.2	162	109
Total	**311.3**	**318.0**	**311.2**	**335**	**319**

At 21 November 2016, the Willaura system off-stream storages were effectively full. This is a better resource position than at the same time last year, and with the favourable weather outlook, together with the allowance provided for within the existing groundwater licence, will provide a high level of security over the remainder of the 2016/17 year.

However, GWMWater notes the limited hydraulic capacity within the Willaura system may at times constrain the rate at which water can be moved from the headworks and bores into the town storages. This means that while the resource position is favourable, monitoring of supply rates and storage levels will continue to ensure there is no shortfall in supply. Ongoing negotiations with Wannon Water (a joint entitlement holder dependent on the Willaura system) will be required to ensure equitable sharing of the available supply rates between

GWMWater towns and Wannon Water's Glenthompson system. While it is not anticipated that water restrictions will be required during 2016/17 as a result of hydraulic constraints, the possibility remains in future years where conditions are very dry with high demand for water.

4.5.1. Elmhurst Water Supply

This system is supplied by a weir located on Hickmans Creek that typically flows during winter and spring where water is harvested into a 34 ML capacity off stream storage to meet summer and autumn demands. The combination of watercourse flow and the off stream storage have been able to consistently meet rural, urban and domestic demands.

At mid-November 2016, the off stream storage was near full capacity, holding 32 ML, with no resource issues or shortfalls predicted for the remainder of the 2016/17 season at this stage.

4.5.2. Buangor Water Supply

This system is supplied by a weir located on McLeods Creek that typically flows during winter and spring where water is harvested into a 30 ML capacity off stream storage to meet summer and autumn demands. The combination of watercourse flow and the off stream storage have been able to consistently meet rural, urban and domestic demands.

At mid-November 2016, the off stream storage was holding 23 ML. The annual urban demand for Buangor is 12-14 ML and so no resource issues or shortfalls predicted for the remainder of the 2016/17 season. The small volume of water consumed in Buangor means that supplementing supply through water carting is a viable contingency.

4.5.3. Urban and Domestic Water Restrictions

Permanent Water Saving Rules will remain in place for urban and domestic purposes within the Pyrenees & Eastern Grampians supply systems.

It is not anticipated that water restrictions will be imposed in this supply system for the remainder of the water year under normal operating conditions.

5. Water Security Outlook for Unregulated and Groundwater licenced users

5.1 Unregulated surface water

The outlook for the unregulated systems is difficult to forecast, with many of the unregulated rivers and streams in the Wimmera-Mallee region generally only flowing in response to good winter-spring rainfall, and sporadically at other times. In drier seasons, unregulated rivers often do not flow along the majority of their length. As access to unregulated surface water has historically been opportunistic and largely unreliable in the Wimmera-Mallee, users in most cases have alternate supply options.

GWMWater is responsible for licencing and resource management activities for the following unregulated river systems throughout the Wimmera Mallee area:

- Wimmera River
- Avoca River
- Richardson & Avon Rivers
- Glenelg River upstream of the Moree township.

There are 334 licences across these four unregulated systems, totalling 5,229.4 ML.

Streamflows between 2010/11 and 2015/16 were below average in all unregulated river systems (and tributaries) listed above. During this period only Stock and Domestic licence holders were permitted to extract water, based on the presence of water at the point of access. The current season (2016/17) is the first year since 2010/11 that irrigation diversions have been permitted on all unregulated river systems, as a result of wetter conditions and good streamflows.

Under 'average' or 'wet' conditions the likelihood of restrictions are generally low. The drier the season, the higher the likelihood of reduced river flow and the greater chance of restrictions being implemented.

Flows in the Wimmera and Avoca Rivers during the 2016/17 season have been sufficient to meet irrigation flow triggers, and irrigation licence holders have been notified of their ability to access water. Access for the remainder of the season will remain opportunistic, with the majority of unregulated rivers and streams in the region generally ceasing to flow over the summer months, or deteriorate in quality at low flows. Stock and Domestic licences are able to access water based on its availability at the point of take.

5.2 Groundwater

GWMWater is responsible for licencing and resource management activities in relation to groundwater resources across the Wimmera Mallee and Avoca Catchments, as well as areas of the Glenelg and Millicent Catchments. GWMWater administer and manage 253 groundwater irrigation licences, totalling 75,993.8 ML

Groundwater areas of particular interest are the West Wimmera Groundwater Management Area and the Murrayville Water Supply Protection Area, due to the greater level of development in terms of groundwater extraction for irrigation, relative to areas such as the East and West Grampians.

Groundwater users throughout GWMWater's area have reliable access to water under their entitlements by virtue of the sheer volume of groundwater reserves in these areas. As a result, groundwater allocations are largely independent of short term climatic conditions. Groundwater management plans are in place for key groundwater areas across GWMWater's area of responsibility. These plans are tailored to manage the resource for each area in a way which provides long term access and security for groundwater users, both urban and rural.

All groundwater licence holders in GWMWater's area of management have been permitted to access 100% of their entitlements for 2016/17 season, with the exception of Neuarpur Zone 1. Allocations in this area are restricted to 80% as part of a long term management plan to address declining groundwater levels. Restrictions in the Neuarpur Zone 1 area are detailed in the West Wimmera Groundwater Management Strategy, which will undergo a review during the 2016/17 financial year.

GWMWater does not anticipate the introduction of any restriction to groundwater allocations during 2016/17, with the exception of Neuarpur Zone 1 which will remain at 80%.

Any future decisions regarding groundwater restrictions will be based on groundwater levels and the perceived risk to the resource, groundwater users and the environment, and therefore may not be linked to climatic conditions. Such restrictions are not anticipated in the foreseeable future (12-24 months).

6. Action Plan

GWMWater supplies urban water to 71 towns in which permanent water saving rules apply, and raw water to over 11,000 rural customers. The outlook status (*Table 1*) for each supply system provides a summary of whether the imposition of restrictions greater than permanent saving rules is necessary or likely.

At this time GWMWater does not consider it necessary to impose a restriction regime greater than permanent water saving rules as there is sufficient bulk water allocation, storage volume, and/or licence entitlement to meet anticipated demands for this water year and into the next water year. Despite current water security, GWMWater continues to encourage responsible water use. Further information on water efficiency can be found via Target Your Water Use (www.targetyourwateruse.vic.gov.au).

GWMWater continuously monitors the status of all of its supply systems and will review the need for restrictions or other actions throughout the year.