wannonWATER

Urban Water Strategy 2022

Acknowledgement

Wannon Water and the Victorian Government proudly acknowledge Victoria's Aboriginal communities and their rich culture and pay our respects to Elders past and present.

We recognise the intrinsic connection of Traditional Owners to Country and acknowledge their contribution to the management of land, water and resources.

We acknowledge Aboriginal people as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely. We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

Pareeyt Poondee-teeyt.

Water is Life.

Dhauwurd Wurrung language group

Pa poonteeyt paman paman.

And life is sacred.

Keerray Wurrung language group

Contents

Executive summary

Wannon Water's Urban Water Strategy ensures that our long-term planning and investment in urban water services is effective and efficient.

We service South West Victoria, making us the second largest regional water corporation in the state by area. Our origins can be traced back to the 1860s and 1870s when the need for a reliable domestic water supply system became evident in the towns of Hamilton and Warrnambool, primarily to prevent disease and support development.

Water storages and pipe networks were constructed and extended across the region and water was sourced from a wide range of sources – from protected forested catchments, agricultural land and plantation forests to deep and shallow groundwater.

Today, Wannon Water has 14 water supply systems, servicing 34 towns and a regional population of more than 100,000. Each day, we supply more than 30 million litres of drinking water to 44,000 customers.

We are confident in our water supply and demand outlook for guiding our future decisions, however we are aware there is room for circumstances to change over time. While our teams continuously monitor water use and storage levels, we also look at potential risks to our services and how they can be managed or mitigated.

Climate change, bushfires, floods, droughts, a change in population or industry demands, water quality events, the failure of key infrastructure, and changes to water markets and licensing are some of the threats that we have considered. Our response and contingencies include long-term planning, drought and bushfire preparedness plans, emergency response plans, asset performance monitoring and investment, back-up equipment, by-pass systems, water demand modelling and engagement with key industry and community groups.

We have used modelling software to project how much supply is available from our water sources into the future under a range of climate scenarios specified by Department of Environment, Land Water and Planning in the *Guidelines for Assessing the Impacts of Climate Change on Water Availability in Victoria, 2020.*.

Our work has shown that we are in a reliable water resource position under current and medium climate conditions, with appropriate augmentation actions identified to increase water supply when needed in the surface water systems of the Otways, Grampians and Glenthompson. These three systems will be impacted by the reduced rainfall and run-off predicted under the climate scenarios.

We have identified a range of options to boost supply in the Otway system, including increasing the capacity of the Ewen's Hill storage by 300 megalitres, the ongoing expansion of the Warrnambool Roof Water Harvesting System, and bringing a groundwater bore at Curdievale online. Ewen's Hill would be the first augmentation project and this would most likely be required in 2031.

For the Grampians system, the purchase of additional water from the Wimmera – Glenelg System (via Rocklands Reservoir) is likely to be needed by 2045. We'll also be investigating new groundwater sources over the next five years as the reliability of the Rocklands supply is projected to decline due to climate change and the water comes at a relatively high cost. Deep groundwater sources are mostly climate independent and by locating a source, we can further secure our system in the event of drier conditions.

Since the last drought, when Glenthompson was on Stage 4 restrictions for some time, connections have been installed on the transfer pipeline to allow higher flows to be transferred from the Willaura system. There is also a high probability that the Willaura system will be connected to the Wimmera-Glenelg system which will allow additional water to be accessed throughout the year – improving system reliability.

For our groundwater systems, the majority are likely to be minimally impacted by reduced rainfall and run-off due to them being medium to deep confined aquifers with large recharge areas. Our groundwater systems are exceptionally reliable and can be expected to perform to their capacity under the specified climate guidelines.

Even though our supplies are secure, we are striving to be more efficient and sustainable with the water we already have. Our customers are also increasingly discussing a link between water and the impact of climate change. They want us to proactively promote water conservation and efficiency measures, regardless of whether water restrictions are on the horizon for our region or not. Over the next five years, we will be committing to a series of actions to understand how we can assist our customers to be more water efficient and reduce our system losses.

Dunkeld Sewage Treatment Plant

Our community engagement work in recent years has also showed concern about water quality including taste, smell and hardness in Portland, Port Fairy and Heywood where deep groundwater is the source of the drinking supply. We already comply with the Australian Drinking Water Guidelines, but tap water consumption in these towns is currently below the state average and we want to do better. A business case is currently being prepared to demonstrate the viability of treating the water further to reduce salt levels, improving health outcomes and reducing the financial impacts on households and local industry.

Wannon Water operates 17 sewage treatment plants that treat a total of 28 million litres of sewage and trade waste each year for nearly 38,000 domestic, business and industrial customers. There are three plants with ocean outfalls – at Warrnambool, Portland and Port Fairy, and 13 plants with lagoon-based treatment systems, all operating under Environment Protection Authority licences.

The Warrnambool Sewage Treatment Plant (STP) has reached its capacity, prompting a substantial upgrade which has received works approval and will be constructed in the next few years. The upgrade will cater for the anticipated growth in residential and industrial loads over the coming 15 to 20 years.

A condition of the works approval is to further explore the options of reducing the environmental impact of the ocean discharge. The options will include extension of the ocean outfall, a higher level of treatment, and reducing the volume of effluent discharged to the ocean through reuse. The investigation is expected to be completed by 2025 following extensive analysis into the options, and engagement with the community and key stakeholders.

In the next five years at the Portland STP, we will be investigating the sludge management process and how we can be more efficient at managing peak flows and optimise treatment plant efficiency when operating at higher flows.

At Port Fairy, we will be exploring how we can further improve the level of treatment and make our processes more efficient.

Most of the towns with lagoon-based wastewater treatment are experiencing minimal population growth, with decline expected in some areas, so we are confident that the existing treatment capacity at these sites will be adequate in the future. However, we will continue to invest in these systems to ensure we have a sufficient irrigation area and winter storage capacity to cater for wet years.

What is an Urban Water Strategy?

Purpose of the Urban Water Strategy

An Urban Water Strategy is a 50-year strategic plan that identifies the best mix of actions required to maintain a balance between demand for water from our customers and available supply from the environment, now and into the future. This is achieved through:

- Considering all aspects of the Urban Water Cycle across a 50-year planning horizon.
- Ensuring that urban communities are resilient and liveable, now and in the future.
- Being informed by local integrated water planning undertaken by agencies and authorities with roles and responsibilities across water supply, wastewater, flood resilience, urban waterway health and urban landscapes and spaces.
- Balancing social, environmental, and economic costs and benefits.
- Ensuring that our future portfolio of water sources is diversified and resilient.
- Considering the consequences of uncertainty associated with population change, climate change and variability and future potential risks to supply.

Objectives of the Urban Water Strategy

The key objective of the Urban Water Strategy is to ensure that urban water planning and investment by Wannon Water is efficient and effective. This will:

- Ensure safe, secure, reliable, and affordable water supplies that meet society's needs.
- Enable customers to have access to desired water products and services, and to choose to use water for activities they value highly.
- Encourage the sustainable use of water resources – including rainwater, stormwater and recycled water and rainfall-independent supplies - in ways that are efficient and fit-for-purpose, while ensuring that public and environmental health are protected.
- Educate communities on the role of water in our urban communities to enhance liveability, productivity, prosperity and environment of our cities and towns.
- Ensure that water needs of environmental assets are transparently considered and delivered.
- Ensure that water planning is subject to a transparent and rigorous decision-making process, with clear roles and responsibilities and accountabilities, which can adapt to the changing environment.

Where does the Urban Water Strategy fit into the state framework?

Victoria has an adaptive water management framework for water resources established under legislation. In undertaking their functions, the Minister sets expectations through instruments like the Statement of Obligations supported by policies and guidance such as:

- Urban Water Strategies: Developed every five years to outline water supply security over a 50-year outlook.
- Drought Preparedness Plans: Developed every five years (or within 12 months of either the lifting of any period of water restrictions or the augmentation of any water supply system) to define timely and effective preparation and response to anticipated water shortages.
- Annual Water Outlooks: To report upon each supply system's ability to provide sufficient water security in the short term.
- Emergency Management Plans: To respond to emergencies such as bushfires, blue-green algae outbreaks, and other water quality incidents.

Wannon Water's strategic intent

Wannon Water is dedicated to improving the lives of those who live in our service region. The Urban Water Strategy is a platform for us to commit to actions that ensure we are providing value for money services for our customers and achieve our overarching corporate goal of delivering water and sewerage services while improving the lives of people in South West Victoria as shown in figure 1 (next page).

wannonWATER

To deliver water and sewerage services and improve the lives of people in south-west Victoria.

BEYOND WATER FOR *strong* COMMUNITIES

Figure 1 - Wannon Water's strategic intent

Water in South West Victoria

Wannon Water supplies around 14,000 megalitres of water to customers each year.

Our 23,500-square-kilometre region is divided into 34 drinking water localities and various non-drinking water areas. The water comes from a diverse array of sources, including protected forested catchments, agricultural land, plantation forests and groundwater aquifers.

We hold bulk entitlements issued by the Minister for Water to extract surface water and take and use licenses administered through Southern Rural Water for groundwater extraction.

The water we extract is transported from the source to treatment plants where it is treated to safe standards laid out in the Australian Drinking Water Guidelines. The water is then passed through our extensive supply network in each of our townships so our customers can access this water direct from their tap.

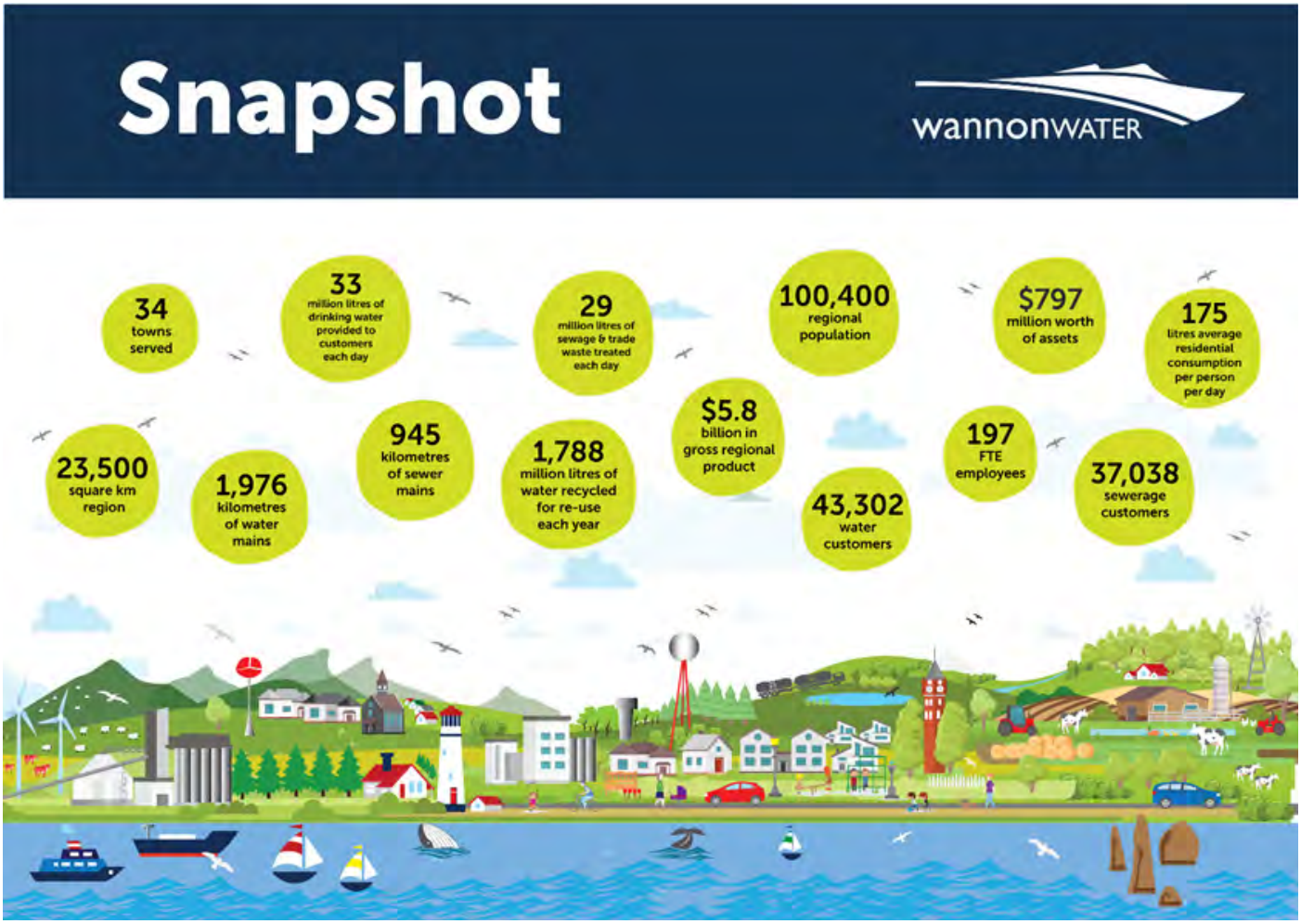


Figure 2 - Wannon Water region snapshot

Our Region

Figure 3 - Wannon Water region map

The table below summarises these water sources by supply system and towns supplied.

Table 1 - Wannon Water supply system breakdown

Supply system	Water source	Towns supplied
Otways	Arkins Creek catchment Gellibrand River catchment Groundwater flow - extracted from bores near Carlisle River Groundwater flow - extracted from bores at Albert Park in Warrnambool * Roof water harvesting from Warrnambool housing developments*	Noorat/Glenormiston Mortlake Simpson Cobden Camperdown Purnim Terang Warrnambool Koroit Allansford
Dilwyn Aquifer	Groundwater flow - numerous bores in localities serviced	Portland Port Fairy Heywood Dartmoor Port Campbell Peterborough Timboon Paaratte
Grampians	Victoria Ranges catchment (small streams and two bores) and Rocklands Reservoir	Hamilton Tarrington Cavendish Dunkeld Balmoral
Bridgewater Formation	Groundwater flow - extracted at Tullich borefield.	Casterton Coleraine Sandford Merino Henty
Newer Volcanic Aquifer	Groundwater flow - extracted at bores in localities served	Caramut Penshurst Mortlake
Glenthompson	Yuppeckiar Creek catchment and Willaura pipeline	Glenthompson
Clifton Formation	Groundwater flow - extracted from Macarthur bore	Macarthur

** Warrnambool only*

Planning for a secure water future

Planning at Wannon Water

Wannon Water is involved in a multitude of areas that impact our water and sewage services. This section details several of our focus areas and recent achievements.

Integrated Water Management (IWM)

Better planning outcomes are achieved by working together to achieve a common goal – this is the objective of Integrated Water Management (IWM).

We've played a significant leadership role with DELWP in supporting the Great South Coast IWM Forum. Established in 2018, the forum includes members representing local government, catchment management authorities (CMAs), Traditional Owner, state government and Deakin University senior executive representatives from across the region. The forum has committed its best endeavors to achieving its vision: Water is life - we will work together with our communities to deliver integrated water outcomes contributing to the resilience of our environment, culture, and economy.

A regional IWM practitioner network operates in parallel to the forum, comprising key managerial and technical staff from the member organisations who drive the implementation of projects to achieve the forum's vision.

Fifteen project opportunities were identified to achieve the following outcome areas:

- Safe, secure and affordable supplies in an uncertain future.
- Effective and affordable wastewater systems.
- Avoided or minimised existing and future flood risks.
- Healthy and valued waterways and marine environments.
- Healthy and valued landscapes.
- Community values are reflected in place-based planning.
- Jobs, economic benefits, and innovation.

The following collaborative projects have been initiated across the region:

Albert Park IWM Plan - The first process of this kind undertaken in the region involving government and community stakeholders. Several opportunities were identified for the significant passive recreation and sporting precinct including Warrnambool's largest secondary school and a community garden. The plan is well into its implementation phase, with three of the projects from the plan progressing.

Albert Park Centralised Roof Water Harvesting Project - retro-fitting roof water harvesting infrastructure to community buildings on the north-west side of the Albert Park precinct for transfer to our Warrnambool Water Treatment Plant. Establishing this new, very local catchment for water supply will reduce extractions from the environment for potable use and reduce stormwater flows with associated flooding and stream health impacts. A cross-agency project team is overseeing the design and construction of this scheme.

Japan Street IWM construction - The diversion of stormwater from the residential catchment to the south on the park has progressed to detailed design and costing. This project aims to redirect stormwater from the over-burdened stormwater network for transfer to the public open space along the southern boundary of Albert Park for natural infiltration along vegetated swales, providing amenity, native habitat, and groundwater recharge.

Great South Coast Urban Water Atlas - A project spanning five councils supporting a GIS-based process for data sharing of water consumption, identification of potential alternative water sources, and opportunities to build greater climate resilience. A process for ongoing data sharing was developed with commitment from responsible agencies.

Hamilton IWM Plan - A collaborative process across whole of council, other agency stakeholders and the community that produced a water balance for the city. Concept designs and costings were produced for four priority initiatives relating to water security, diversity of water supply sources, economic development, and improving water quality in Lake Hamilton.

Great South Coast Urban Drainage Community of Practice – This group, comprising drainage engineers, asset managers, sustainability officers and river health officers from councils, CMAs and Wannon Water met several times. Peer-to-peer relationships were formed and opportunities were identified for coordination across the region to deliver better value for our communities with collaborative water management. An action plan was developed for future opportunities.

Enabling IWM in development planning – This project aims to facilitate developer uptake of integrated water planning for green-field developments. Wannon Water has led discussions with local government and developers in our region to draft a project proposal for this work that will have relevance for regional development across the state.

Adaptive Wastewater for Small Towns – This project tackles the issue of inadequate domestic wastewater systems in unsewered towns. An adaptive, neighborhood-scale cluster approach for wastewater treatment in Penshurst has been proposed, with concept design and a cost benefit analysis complete. A pilot project to construct one of the neighborhood clusters is being planned in collaboration with key agency stakeholders, with a view to expanding and servicing the whole town.

Non-revenue water

Non-revenue water is water that enters customer districts but cannot be accounted for through customer meters. Customer districts begin at the outlet of the water treatment plant or the branch off a trunk pipeline, or are nominated between locations along trunk pipelines. Every customer district (except rural districts on trunk pipelines) has its own reticulation pipe network, which can leak. Reticulation networks are flushed on a regular basis for water quality reasons which adds to the non- revenue water volume.

The UWS 2017 set a target for volumetric reductions in non-revenue water from 2015/16 levels. Non-revenue water has fluctuated over the period (as shown in Figure 4 below) with the target not being achieved in a few years, but trending in the right direction to achieve the target of 1328 ML. Much work has been done since 2017 to streamline the analysis of night-flow monitoring to identify new system leaks faster which then prompts further investigation. Further improvement to the data analytics being done in 2022 will allow faster response in the future.

The use of acoustic leak detection techniques to locate leaks continues to be a primary method to detect leaks. COVID has restricted the availability of these contractors during 2020 and 2021, but substantial areas of reticulation have been assessed. Since 2015/16, more than 650 leaks have been detected using acoustic methods and then repaired.

An assessment of the Economic Level of Leakage (ELL) was undertaken for the Warrnambool, Hamilton, and Portland systems. This revealed that the current level of spending and leakage is around the economic level. Accordingly, the plan is to maintain our current level of expenditure in these activities with a target not to increase beyond 1328 ML as our systems grow.

Annual monitoring and reporting

The best water and sewerage planning decisions are developed on the back of good data and performance monitoring. We have live monitoring of all our water and sewerage systems via SCADA technology. This data is captured and stored so we can review long-term system performance trends and plan any actions if a system deviates from its expected performance.

Some key data we record includes:

- Volumes extracted from our water sources and passing through key infrastructure.
- Volumes of sewerage passing through key infrastructure.
- Pump performance through run times, and starts and stops.
- Levels in our storages and sewerage pump stations.
- Treatment process performance.

Each year, we derive an internal annual report from the above data which we use to flag any anomalies in the system and plan corrective actions if they are required.

Bulk water use and storage levels are reviewed quarterly and accompanied with a reflection on recent climatic conditions. These reports are key to our adaptive planning approach and highlight how our water

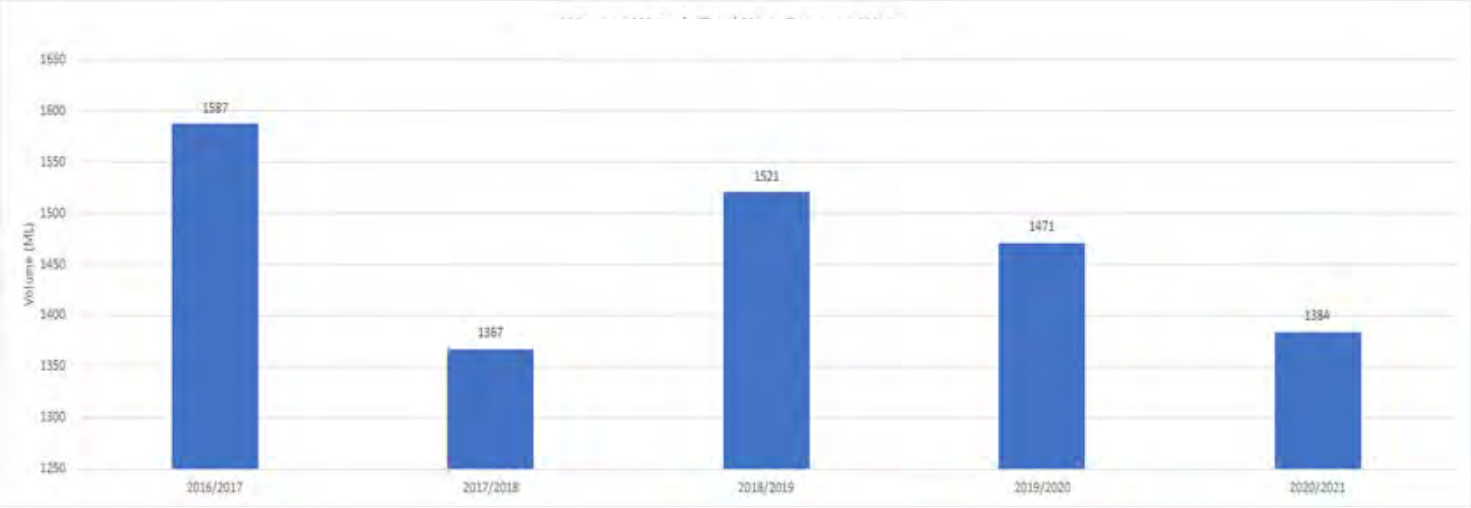


Figure 4 - Wannon Water's non-revenue water volumes

systems are performing in real time. Additionally, we use climate outlooks developed by the Bureau of Meteorology to forecast what will happen to our storages in the coming months. Any decisions on water restrictions for our systems or the timing of key actions will be backed by this data.

In conjunction with DELWP, we prepare an Annual Water Outlook which is published on our website around December each year. The outlook provides an opportunity to reflect on the achievements and actions we have implemented for the previous year while affirming our water security position for the coming year. Each system undergoes a review to ensure it is in a secure water resource position. We also review the commitments we have made in this strategy to ensure they have been adhered to for that year.

How to interpret security of supply

The Urban Water Strategy aims to define our water security position using demand and supply curves. This section summarises how to read a supply demand curve and the inputs and assumptions that have been made to make up these curves.

Demand projections

Shifts and trends in water use are subject to a multitude of factors. Key influences are:

- Growth or decline in population – a growing town will require more water.
- Household water efficiency – households with rainwater tanks, dual flush toilets and/or awareness about smart water use will contribute to a lower average level of township water consumption. New dwellings built to modern water efficiency standards also contribute.
- Weather and rainfall – coastal towns subject to frequent, regular rainfall may use less reticulated water on gardens than towns further inland. Hotter weather lifts the demand for water. Where towns have been on severe water restrictions, household water use may stay low for some time as habits and more efficient water use practices are retained.
- Growth or decline in key industries – many key industries rely on water for their production processes. As their production increases, so does their water demand and vice versa.

We have assessed our current water demand using our most up-to-date customer usage data. We then use both the *Victoria in Future 2019* population growth projections and dedicated engagement with our key industries to inform what our water demand will be in the future. A yearly growth factor is applied across the 50-year outlook period to produce a baseline 'expected' demand dataset. To account for uncertainty in these projections, we determined an upper and lower bound that results in our highest and lowest demand growth projections.

From this dataset, a water demand curve is produced for each of our water systems which shows the expected annual water demand across the 50-year time span.

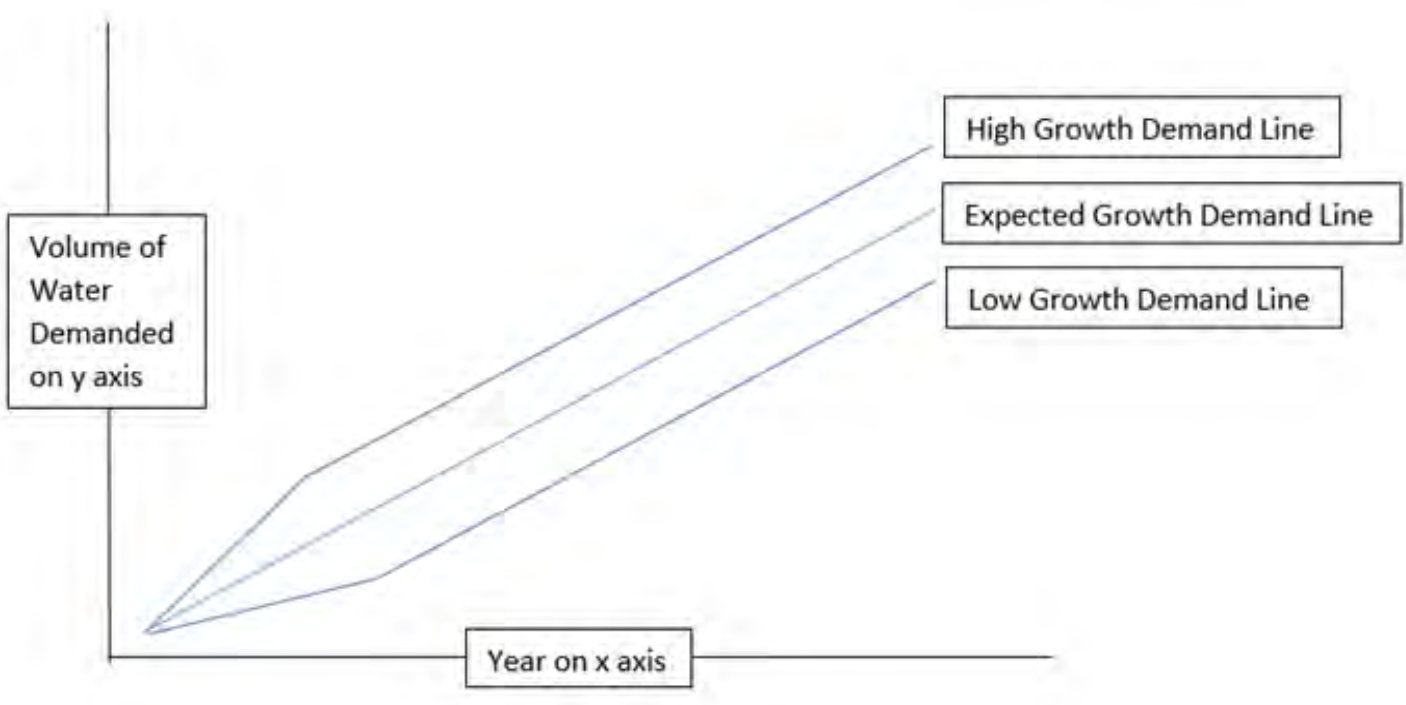


Figure 5 - Interpreting demand projections

Supply projections

The yield (supply available) of a water supply system is defined as the average annual level of raw water extractions that can be supplied from the system subject to resource availability, operational rules, demand patterns and reliability criteria. We have used eWater Source modelling software to project how much supply is available from our water sources into the future under a range of climate scenarios, identified by DELWP in the *Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria, 2020*. These scenarios have been informed using current carbon emission projection datasets and developed further by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to directly translate into the effects on surface water.

Our surface water systems in the Otways, Grampians and Glenthompson will be impacted by the reduced rainfall and run-off predicted under these scenarios. Each of these systems has undergone modelling to understand the impacts under a high, medium, and low climate change impact with an outlook of 50 years using the DELWP guideline assumptions. Additionally, a post-1975 and post-1997 step change in surface water performance has been modelled to represent any permanent impacts on our surface water systems following the millennium drought.

The majority of our groundwater systems are likely to be minimally impacted by reduced rainfall and run-off due to them being medium to deep confined aquifers with large recharge areas. Our groundwater systems are exceptionally reliable and can be expected to perform to their capacity under the specified climate guidelines.

For each of our systems, we produce a dataset and graph that details how much water is available across the 50-year outlook period assuming the system is only subject to restrictions one year in 20 on average. The resulting yield is not how much water can be expected in a particular year, but an assessment of the minimum volume available in the worst two years of the 50-year streamflow record (adjusted for climate impact) with restrictions applied. For example, the high climate change scenario for the Otways in 2040 assumes the historic streamflow record is reduced by 25.3 per cent. The model is run with this reduced streamflow, gradually increasing the volume extracted, until two years of restrictions are experienced over the 50-year period. This results in a system yield of 9,104 ML.

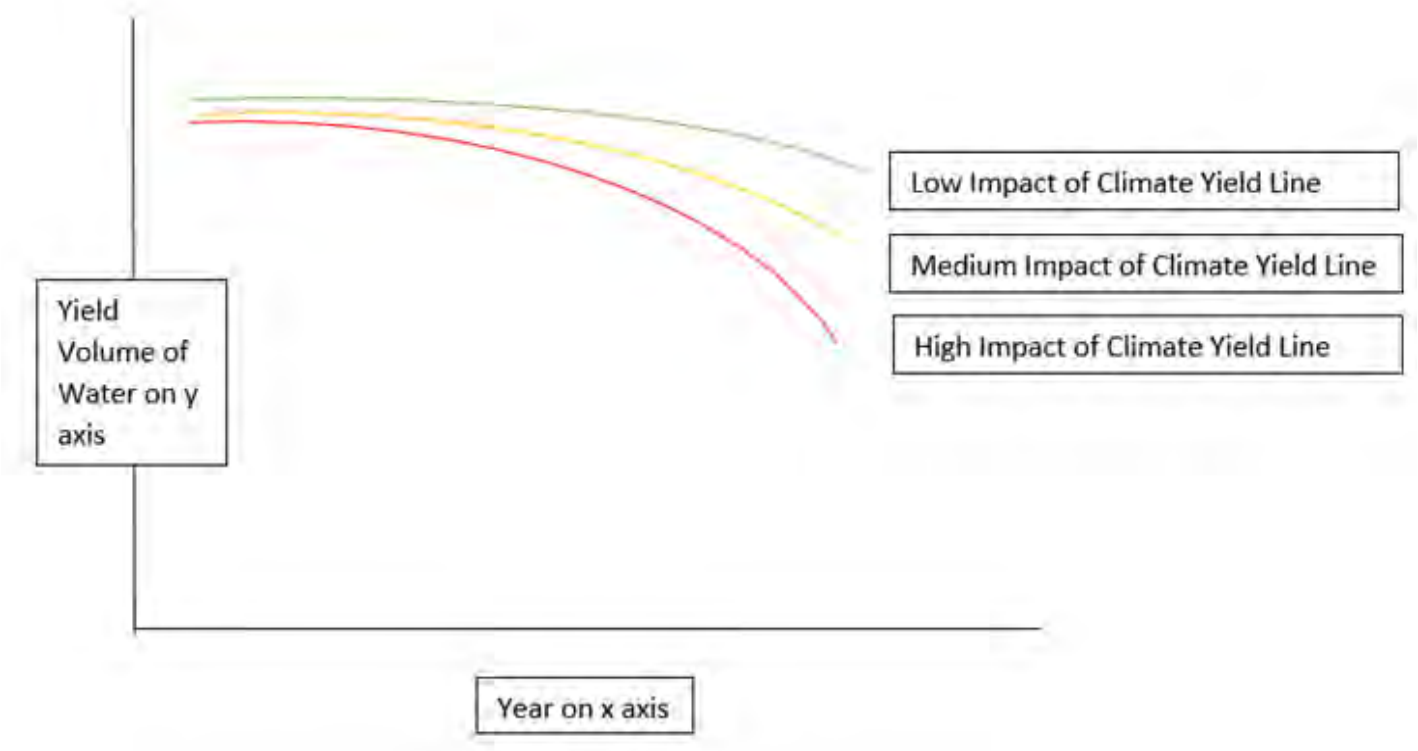


Figure 6 - Interpreting yield projections

Interpreting the demand-supply curve

To determine the overall security of a water system, we compare the demand projections against supply projections to determine key timeframes and events. We overlay the high, medium, and low demand curves with the high, medium, and low climate modelling to determine the earliest date of action and the latest date of action. The post-1975 and post-1995 step change scenarios are both better than the medium climate scenario so are removed from the graphs for simplicity.

This graph is critical in informing us of our current and future water resource position. A graph is prepared for each system and analysed to determine the best actions and timing of these actions. With such a range of alternative outcomes, the question is: what scenario should trigger the augmentation option to increase supply?

Adopting the high climate change and high demand scenario is the most conservative and could result in system augmentation occurring earlier than needed.

Given that there is capacity to meet any shortfalls through system reserves, or by bringing forward the next augmentation through adaptive planning measures, it is considered reasonable to plan our augmentation based on the medium climate and the high demand scenarios. Where applicable, this has been explained further as we delve into each system further on in this strategy.

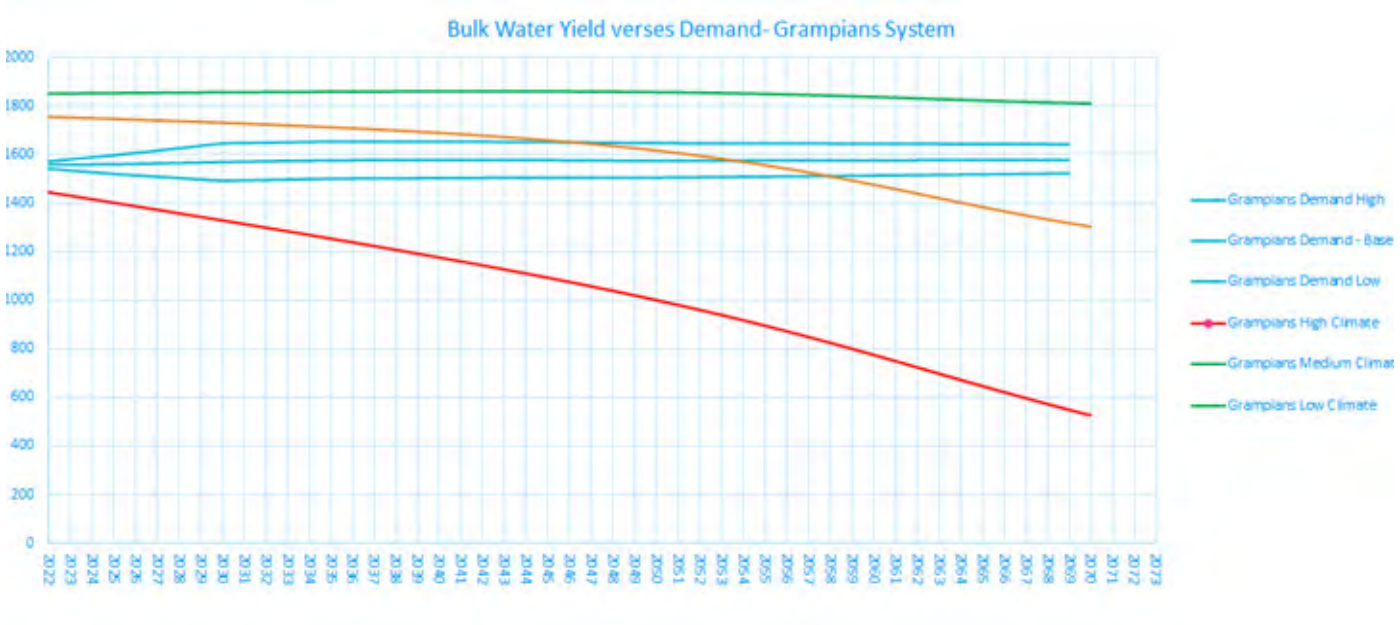


Figure 7 - Interpreting the yield versus demand curve

Our engagement practices

The engagement process

Engagement for the 2022-2027 Urban Water Strategy started in 2018 as part of our annual Wannon Water Engagement Cycle (WWEC), and each year has built on feedback from customers and community from the previous year(s). Incorporating the UWS engagement into our annual engagement cycles helps us develop a richer understanding of our customers' and communities' priorities over time while minimising engagement fatigue.

From 2018-2021, we specifically engaged the following stakeholders for the Urban Water Strategy engagement:

- Regional Advisory Forum (Wannon Water's peak advisory body)
- Traditional Owners
- Aboriginal Water Officers
- Water users
    - Residential property owners / renters
    - Rural property owners
    - Businesses
    - Non-paying customers
- Property developers
- Major customers (industry)
- Vulnerable customer representatives
- Small communities including Penshurst
- Port Fairy, Heywood and Portland communities
- Local government
- Neighbouring or connected water corporations
- Catchment Management Authorities.

The feedback and engagement outputs from our community have been analysed and taken into consideration when developing this Urban Water Strategy.

We believe the actions identified for completion in the next five years align with the wishes and attitudes of our customers. We will continue to engage and check in with our customer base and, if attitudes do change, we will reflect and make suitable changes to ensure we are serving the community's best interests.

Figure 8 - Wannon Water's engagement processes

Table 2 - Wannon Water's engagement results summary	
Topic	**Customer feedback**
Water quality	Concern with water quality including taste, smell and hardiness continues to be the leading reason for the level of dissatisfaction and lower perceptions of value across some service regions.
Climate change and carbon neutrality	Actions to address climate change in relation to water security, and Wannon Water becoming carbon neutral are increasingly topics being discussed and prioritised by our customers and community.
Water conservation	Our customers and community have continually shown that they value water saving, conservation initiatives and education.
Water sources	Customers value the investigation of recycled water as a water supply option into the future.
Water restrictions	Customers were generally satisfied with the current level of water restrictions (currently permanent water savings rules only).

Summary of engagement results

At a high level there were some stand-out themes for us to consider. These are detailed above.

For further information on our engagement results, please refer to the full report attached in the appendices.

Levels of service

Our engagement with the community highlighted that, overall, our customers were satisfied with the level of service that we provided when it comes to water and sewage. Based on engagement results and what the community has told us, we are recommitting to our current level of service and have tailored our option assessments and future planning to align with current service levels.

Specifically, our water services are planned around only incurring water restrictions in a one in 20-year period, with no significant increases in water bills without prior community consultation. Additionally, we strive to make the best value-for-money planning decisions which is in line with the wishes of our customers.

If we were to implement stage four water restrictions, our customers would be subject to our minimum level of service. This would occur under extreme drought conditions. Under these conditions, we would prioritise the use of water for critical human needs and enforce usage restrictions. The volume of water supplied under stage four restrictions is laid out for each supply system in our drought preparedness plan in the appendices of this strategy.

Managing future challenges

While we are confident in our water supply and demand outlook for guiding our future decisions, we are aware there is room for circumstances to change over time. We therefore use an adaptive planning approach. We are continuously monitoring water use and storage levels for behavior that does not fit the norm. Where behavior differs from what is expected, we question the data, run hydrological models and hypothetical scenarios, and look at shifting timeframes for key projects to manage any rapid change or shift in our set plans.

To complement our monitoring of each system, we also look at what the risks are to our services and how to be prepared for them. Below is a list of foreseeable threats to our water supply and the response and contingencies we have in place to manage and mitigate these.

Table 3 - Managing future challenges and risks

What is the risk?	Why is this a risk?	How are we prepared for this?
Changing populations and industry	A sudden change in population or key industry can greatly affect the total water consumed or loading on our sewerage services.	The water demand modelling we use for forecasting water supply is based on population forecasts from the Victoria in Future 2019 dataset which is informed by the latest census data for our townships. We specifically engage with our key industry and community groups to understand their changing needs and account for these in our planning processes.
Climate change and variability	The water industry is set to be greatly impacted by climate change, however not all the effects have been fully researched. Therefore, there is a risk that our planning measures today, while using the most up-to-date science, will be incorrect in the future if circumstances or science research change.	We use the latest datasets, science and guidance on climate change when understanding the impacts to our water and sewerage supplies. The Guidelines for Assessing the Impacts of Climate Change have been used in this strategy to ensure we have the most current climate datasets consistent with governing bodies across Victoria.
Bushfires	In a drying climate, the frequency of high-risk bushfire seasons increases. Some of our critical infrastructure required for water supply lies within forested and isolated areas. Therefore, there is a risk that a bushfire could pass through our catchments and sites, causing loss of access and site operation.	We have several bushfire preparedness plans as well as emergency recovery plans of our major infrastructure. If a bushfire occurs, we are well placed to respond accordingly.
Water quality events	Circumstances within our water catchments and storages can change due to external events that could lead to contamination of our water e.g. blue green algae outbreaks, bushfires impacting water quality etc.	We have installed bypass systems on major storages which allow us to isolate poor quality water while maintaining supply. Additionally, we have a range of alternative supply arrangements for our systems which can be implemented in case of an emergency. We would never allow unsafe drinking water to pass through to tap without issuing a boiled water notice as a minimum.
Changes to water markets and licensing	We currently hold many different surface water and ground water entitlements which are the foundation of our water supply systems. If the regulations and licensing regulations change, the conditions of our water supply and available volumes could also change.	We are intricately linked to our regulating bodies of Southern Rural Water and DELWP. By participating in open engagement and communication with these bodies, we believe that decisions regarding our licensing will be made with our input.
Failure of key infrastructure	We are reliant on our infrastructure to get water from source to tap, and sewage to the treatment plants. If a key piece of infrastructure along the journey fails (e.g. through a power outage, burst pipe, loss of storage etc), we could lose the ability to provide services.	Our dedicated asset management team monitors the performance of our key assets and identifies when key infrastructure is due for repair or replacement. Additionally, much of our key infrastructure has back-up equipment, emergency power generators and diverse supply arrangements to ensure the resilience of our water supply and sewerage systems.
Extreme wet periods and flooding	By their nature, sewerage pump stations are at the lowest areas of towns meaning they are at risk of flooding. Access to other infrastructure may be impacted by extreme run-off or flooding.	We have a number of emergency response plans that deal with flooding events and a good operational awareness of sites at risk. Our preparedness for such events is achieved through regular emergency exercises and climate adaptation planning.
Droughts and dry periods	In the water industry, no system is drought proof. When drought or extended periods of dry weather occur, it is likely that demand will exceed our supply due to reduced water availability from the environment. This results in lowered storage levels that threaten to run empty if no action is taken.	Good long-term planning that takes account of the drying climate is undertaken in the preparation of this UWS to determine when augmentation of systems needs to occur. Drought preparedness plans have been updated to ensure they are still appropriate. These allow for an appropriate level of restrictions to be applied as available water diminishes.

Ewen's Hill storage east of Terang

Augmentation options

Augmentation options for the Otway and Grampians supplies are described in the following tables. The timing of these is discussed in Sections 5 – 7 as part of the review of the supply and demand for each system.

Augmentation options identified in the last strategy have been reviewed for relevance and, where appropriate, updated to reflect current costs. For the Otway System, the options assessment conducted in 2012 remains appropriate and only the shortlisted options are described here.

The cost of each option is expressed in $NPV/ML (net present value of option per megalitre). Net present value is a financial assessment that allows the capital and operating costs over the life of the project to be expressed as a single value in current day dollars. The assessment is done over a 50-year period using a discount rate of 3.12 per cent - aligning with the current Wannon Water regulatory rate of return. The number of megalitres is the sum of all megalitres over the 50-year period.

For each of the options, purchase of 'green power' was allowed to account for our commitment to be carbon neutral by 2040.

The robust sustainability assessment that was completed for these options in 2007 is still considered relevant to this strategy. The assessment of options was undertaken by an environmental sustainability panel composed of groundwater management, catchment and river health representatives, a municipal sustainability officer, a senior EPA manager and a regional DELWP manager (with minority Wannon Water officer involvement).

The options were assessed against the following sustainability criteria:

- Cost per megalitre
- Effect on regional GDP and development
- Greenhouse gas emissions
- Impact on environmental flow objectives
- Impact on surface water, groundwater and marine water quality
- Effect on terrestrial ecosystems, cultural heritage and recreational values
- Social acceptability
- Distribution of costs and benefits
- Confidence of success.

Table 4 - Otway system augmentation options					
Options		**Max yield (ML/a)**	**Capital cost ($ millions)**	**Operational cost ($,000s) at year 50**	**NPV ($/ML)**
Additional bore at Albert Park	Warrnambool's water is shandied with groundwater from the sandstone aquifer in Warrnambool. The mix is one unit groundwater to 10 units Otway water to provide a good quality water for all users. This project involves the construction of an additional groundwater bore to maintain the shandy as usage increases.	250	1.0	41	$162
Curdievale bores	Curdievale is located about 40km from Warrnambool on the South Otway pipeline. We hold a 2,150 ML/year groundwater licence from the Paaratte Aquifer at this location. The existing bore is an emergency relief bore. This option would involve bringing all of this resource online as Warrnambool grows. Development of this option involves construction of a collector storage and transfer pipeline and pumping stations at Curdievale and Nullawarre.	3,400	10.8	2,011	$394
Roof water harvesting (Russell Creek growth corridor)	The Russell Creek growth corridor is upstream of the Brierly Water Storage before the Warrnambool Water Treatment Plant. Residential land is to be developed adjacent to and upslope from this storage. Roof water harvesting is providing 100% of the water needs for this growth corridor while not adding to catchment flood risk, thus providing significant community benefit.	460	8.4	16	$292
Gellibrand River winter flow harvesting	Harvest Gellibrand River water during winter when flows are very high and store in new off stream reservoir for use during summer.	1,600	119.1	2,524	$923
South Otway pipe duplication (bores)	South Otway pipe duplication and construction of new bores close to the South Otway offtake (assuming water quality is of equivalent standard to Otway water).	6,000	119.1	2,524	$923
Desalination of deep groundwater at Warrnambool	Desalination of groundwater at Warrnambool involving sourcing water from the Dilwyn aquifer at Warrnambool, RO and shandy with existing Otway supply increasing water saltiness slightly. Discharge of brine to existing ocean outfall.	2,000	29.9	4,329	$1,289
Desalination of sea water at Warrnambool	Desalination of seawater at Warrnambool involving the construction of a desalination plant, inlet and outlet pipelines to the ocean and connection to the existing water treatment plant.	5,000	93.7	16,497	$1,897

NOTES: The column for $NPV/ML includes allowing for the use of 'green power' using additional cost of 5 cents/kWhr. Capital cost is total over 50 years.

Full utilisation of the current Bulk Entitlement will require the North and South Otway pipelines to transfer the Bulk Entitlement volumes of 22.5 and 21.5 ML/day respectively and have sufficient balancing storage to meet the peak summer demands. Enlargement of Ewen's Hill storage is planned in 2031 to provide the additional balancing storage.

Table 5 - Grampians system augmentation options					
Options		**Max yield (ML/a)**	**Capital cost ($ millions)**	**Operational cost ($,000s) at year 50**	**NPV ($/ML)**
Duplicate Hamilton pipeline (Grampians to Wannon River)	Duplicate eight kilometres of pipeline from the Grampians stream to Wannon River. Allows full Hamilton Bulk Entitlement to be accessed – Increasing pipeline capacity from 11.5 to 12.8 ML/d.	70	3.3	26	$1,114
Bores at Branxholme	Bores at Branxholme and shandy with existing Grampians supply via 32-kilometre pipeline to existing storages	850	37.2	297	$1,235
Dunkeld system (groundwater - full treatment)	New bores at Dunkeld and new treatment plant piped six kilometres to the existing clear water storage.	300	9.4	609	$1,627
Additional allocation from Rocklands Reservoir	Purchase an additional 5700 ML allocation from Rocklands reservoir to increase our allocation to 7800 ML	1,100	11.4	4,377	$2,272
Bore into Dilwyn Aquifer	Bore into Dillwyn Aquifer (Myamyn), reverse osmosis and shandy with existing Grampians supply via 47-kilometre pipeline to existing storages.	850	60.2	943	$2,574

NOTES: The column for $NPV/ML includes allowing for the use of 'green power' using additional cost of 5 cents/kWhr. Capital cost is total over 50 years.

The Camperdown Water Treatment Plant and Donald's Hill Reservoir

Otway system

Overview

The Otway Water Supply System is by far the largest of Wannon Water's systems.

The system obtains its primary supply from two pumped offtakes on the Gellibrand River and by gravity diversions from weirs on three Arkins Creek tributaries.

The allocation of water is governed by the Bulk Entitlement and mirrored in the Gellibrand Streamflow Management Plan 1998 which sets out environmental issues and defines water sharing arrangements between the environment, rural extractors and Wannon Water. Water is diverted westwards via two pipelines to supply the towns of:

- Simpson
- Camperdown
- Cobden
- Derrinallum
- Lismore
- Terang
- Noorat
- Glenormiston
- Mortlake
- Purnim
- Allansford
- Warrnambool
- Koroit
- A number of smaller townships and numerous rural properties.

Figure 9 - Otway supply system schematic

Table 6 - Otway system groundwater and Bulk Water Entitlements				
Source/location	**Bulk Entitlement Order or Water Register number**	**Entitlement volume (ML)**	**Annual extractions (2020/21)**	**Comments**
Gellibrand River Arkins Creek	Otway System 1998	12,580	8,450	Subject to flow sharing rules
Curdievale	BEE026252	2,150	0	Dilwyn zone 2 - ermegency source
Otway North (Carlisle River)	BEE 029488	1,800	5	Dilwyn zone 3
Warrnambool	BEE024155	750	450	Southwest limestone
Koroit	BEE029066	5524	0	Southwest limestone - emergency source
Mortlake	BEE030858	295	21	Newer volcanics

The Otway system is supplemented from two groundwater bores at the north Otway main pump station (Carlisle River bores). Supply to Warrnambool, Koroit and Allansford is augmented by a shallow groundwater borefield adjacent to the Warrnambool Water Treatment Plant at Albert Park contributing approximately 9 per cent of the supplied water. The Otway supply to Mortlake is shandied with 17 per cent groundwater from bores in Prentices Lane Mortlake (Absaloms bore).

In addition to urban supplies, there are close to 1,000 rural connections to the North Otway pipeline. Approximately 460 services supply farms and the small rural communities of Carlisle, Carpendeit, Cudgee and Garvoc direct from the North Otway pipeline. The Camperdown (Otway) Rural District is an area mostly to the north and west of Camperdown providing around 400 services with a domestic, stock and dairy supply. This reticulated system is supplied by pipeline from the Camperdown Water Treatment Plant.

As of 2021, there are no permanent connections to the South Otway pipeline.

Diversions from the Gellibrand River at Carlisle and extractions from the Carlisle River bores are used to supplement flows from Arkins Creek into the North Otway pipeline. The maximum capacity of the North Otway pipeline is 22.5 ML/day, and the maximum capacity of the South Otway pipeline is 21.5 ML/day.

The borefield at Carlisle River is licensed for a maximum daily extraction of 6 ML/day. This enables diversions from the Gellibrand River to be partly or completely replaced by bore water during a river contamination event or diversion limitation as part of the flow sharing rules. The groundwater licence entitles Wannon Water to a maximum annual extraction of 1,800 ML.

The Albert Park borefield has a groundwater licence of 750 ML pa, and extraction of about 400 ML per year. The Mortlake bore has a groundwater licence of 295 ML pa, and extraction of about 24 ML per year.

Water storages located throughout the system (summarised in Table 12) are used to balance supply during peak periods. The active on-line storage is equivalent to less than 20 per cent of the average annual demand. Consequently, during the peak summer demand period when storages are drawn down, less than one month of unrestricted demand may be available in storage. The operational trigger for drought response in the Otway system is a set of restriction rule curves based on total storage in the system, including all the storages listed in Table 7.

Table 7 - Otway system storages	
Storage name	**Volume (ML)**
Simpson storage	34
Donald's Hill storage	207
Cobden basin	51
Ewen's Hill storage	625
Tank Hill reservoir	774
Warrnambool basin	611
Plantation Road storage	100
Brierly basin	52
TOTAL STORAGE	**2,454**

Current use and trends

The Otway system provides the bulk of its water to residential customers followed by major industries.

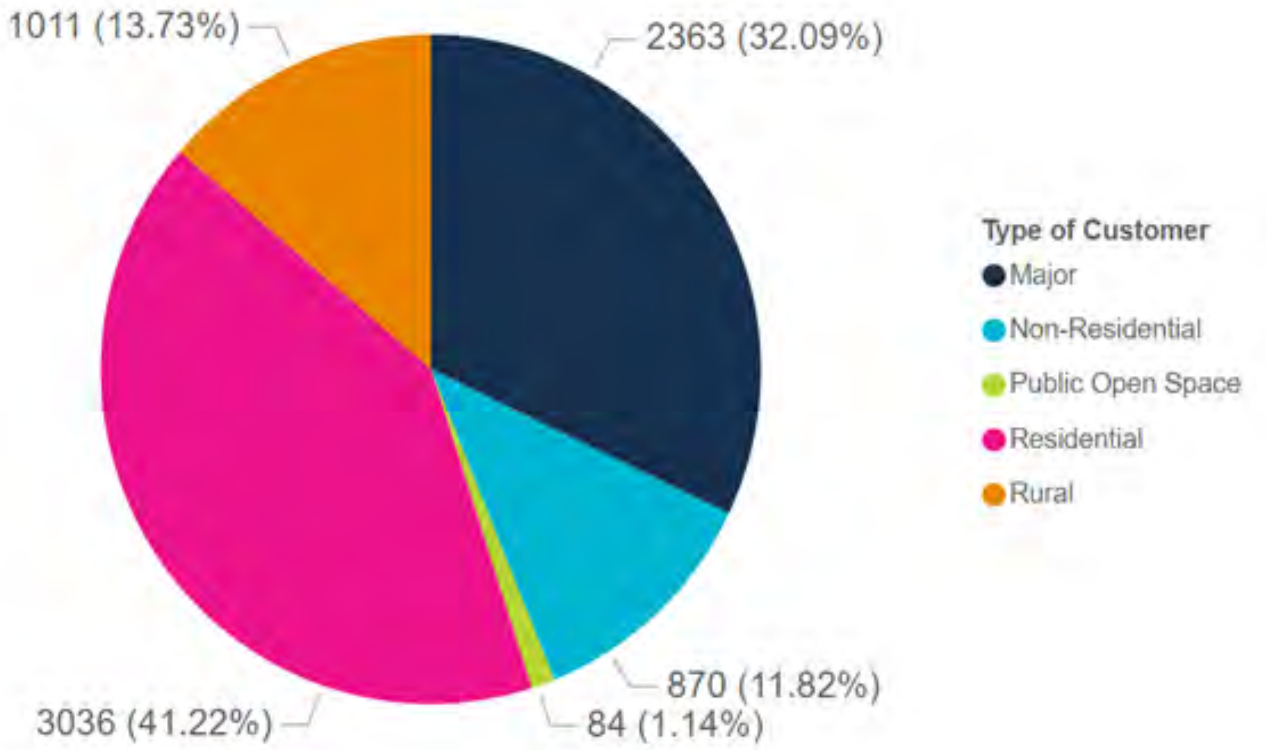


Figure 10 - Otway system breakdown of customer water usage (ML) based on customer type

The Otway system extracts most of its annual water volume from surface water sources with our groundwater entitlements and the Brierly roof water harvesting program being used to supplement and support this surface water supply. As the roof water program expands with Warrnambool's new developments, so will the volumes we are able to harvest.

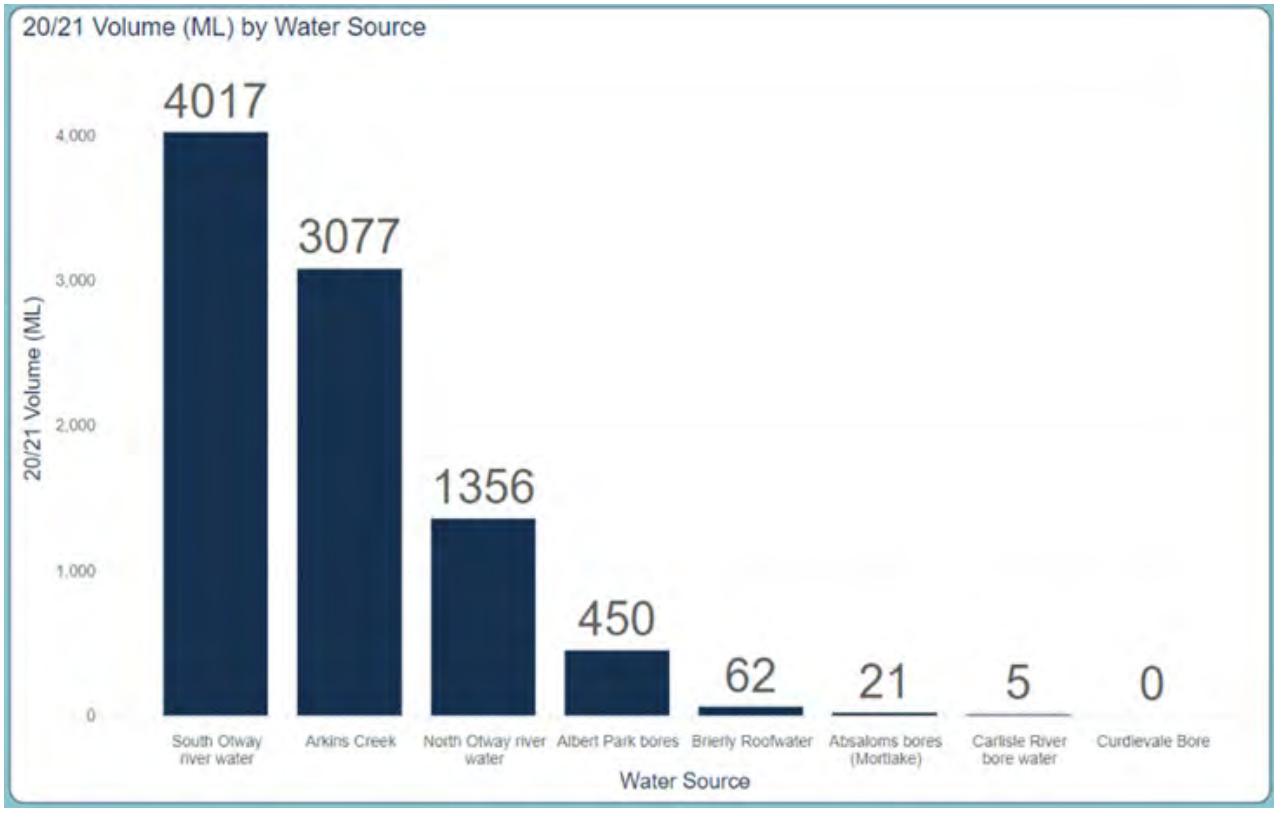


Figure 11 - Breakdown of Otway water supply source

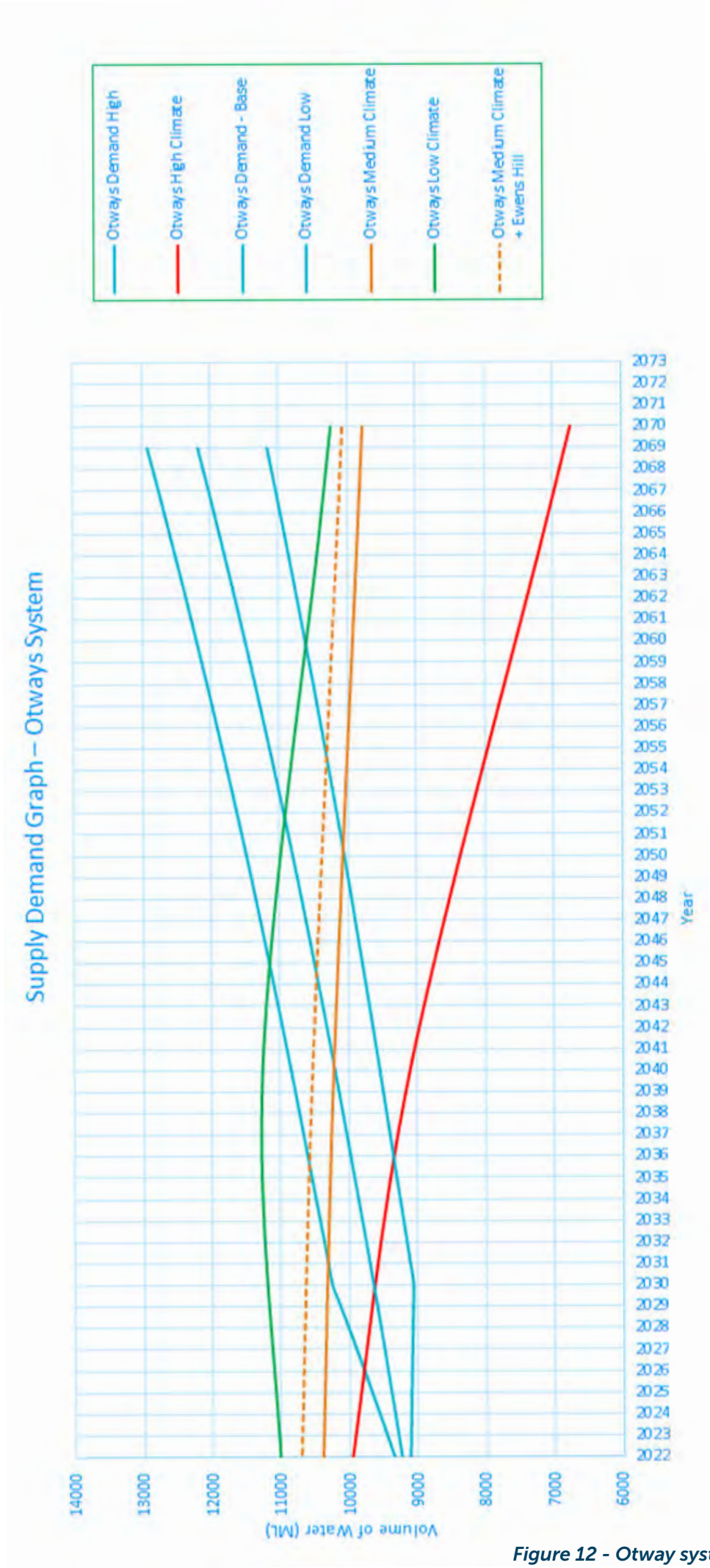


Figure 12 - Otway system supply and demand curves

Projections

Based on the yield projection for medium climate impacts and high demand growth for the Otway system, the earliest date of required augmentation is 2031. Experience over the past five years is that the Otway system is not approaching any extraction limits, with many months of the year when pumps are not operating at their capacity.

The next major augmentation for the system is to increase the capacity of Ewen's Hill storage by 300 ML. This will immediately boost the system yield by at least 300 ML allowing more water to be stored in winter for use in summer.

As discussed previously, the medium climate scenario is being used to determine the timing of the next augmentation - being 2031. This is on the basis that there is water readily available if very dry conditions occur over multiple years. There is additional water available from the Curdievale bore, which could be equipped within one month, if extraction is limited due to low stream flows.

The Curdievale bore supply is the next major augmentation proposed for the Otway system which, based on the graph (opposite), will not be required until 2035.

The West Arkins weir

Action plan

Table 8 - Otway system identification of augmentation options

Action	Description	Earliest year required	Probable year required
Augmentation of Ewen's Hill	Expansion of existing storage on the North Otway pipeline. This expansion will increase our system yield by 300 ML.	2031	2031
Expansion of Warrnambool's roof water harvesting	We will work with new developments to install our award-winning roof water harvesting infrastructure.This captures water from Warrnambool's rooftops which are then used to supplement our supply.	Ongoing	Ongoing
Curdievale borefield	We have a groundwater bore in the South Otway pipeline that can be bought online in case of periods of water shortage and drier climatic conditions. This bore will be required to be bought online following the Ewen's Hill augmentation in 2035 and will add 2,150 ML to the system yield.	As required if a drier climate eventuates	2035

Hartwichs Reservoir

Grampians system

Overview

The Grampians Water Supply System provides water to the five urban zones of Hamilton, Balmoral, Cavendish, Tarrington and Dunkeld as well as rural customers located along the main supply pipelines. Water is secured by two Bulk Entitlements and a bore licence.

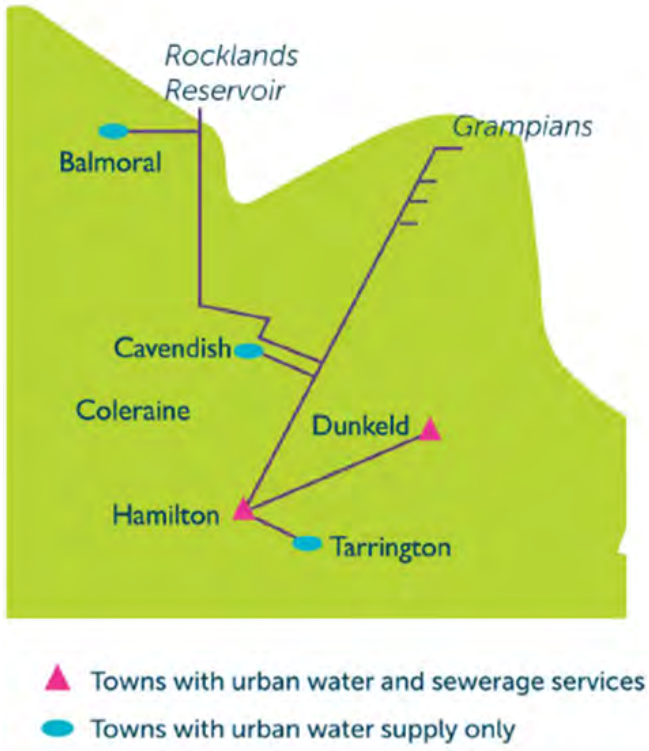


Figure 13 - Grampians supply system schematic

Water is obtained from the western slopes of the Victoria Range in the southern part of the Grampians National Park and Rocklands Reservoir, fed from the headwaters of the Glenelg River in the northern part of the park.

For the southern part, water is diverted from eight small streams and the Headworks bore. The first diversion, on Headworks Creek, has been in place since 1904 and the most recent diversions, on No's 2 and 3 streams, since 1960. The water flows by gravity through 47.4 kilometres of pipeline to five storages north of Hamilton. The maximum capacity of the supply system is approximately 12.8 ML/d. The total capacity of the storages is 2,714 ML. There are several tappings along the main supply line serving adjacent properties.

Water from Rocklands Reservoir is supplied to Balmoral via a 10-kilometre pipeline, constructed in 1964, and to the southern part of the system via a 52-kilometre pipeline constructed in 2009/10. The supply from Rocklands is under a Bulk Entitlement Order with the storage owned and operated by Grampians Wimmera Mallee (GWM) Water. The six other Grampians storages are owned and operated by Wannon Water (refer below).

Table 9 - Grampians system storages

Southern storages	Volume (ML)
Hayes Reservoir	1,200
Cruckoor Reservoir	990
Hatwichs Reservoir	330
No. 1 and 2 storages	132
TOTAL OF SOUTHERN STORAGES	**2,652**
Rocklands Reservoir*	**261,510**

** NOTE: The Rocklands Reservoir has a full supply level of 195.47 m AHD which corresponds to a capacity of 348,300 ML. However, current operating guidelines restrict its maximum operating level to 194.1 m AHD which corresponds to a volume of 261,510 ML*

Current use and trends

The Grampians system is largely made up of residential use.

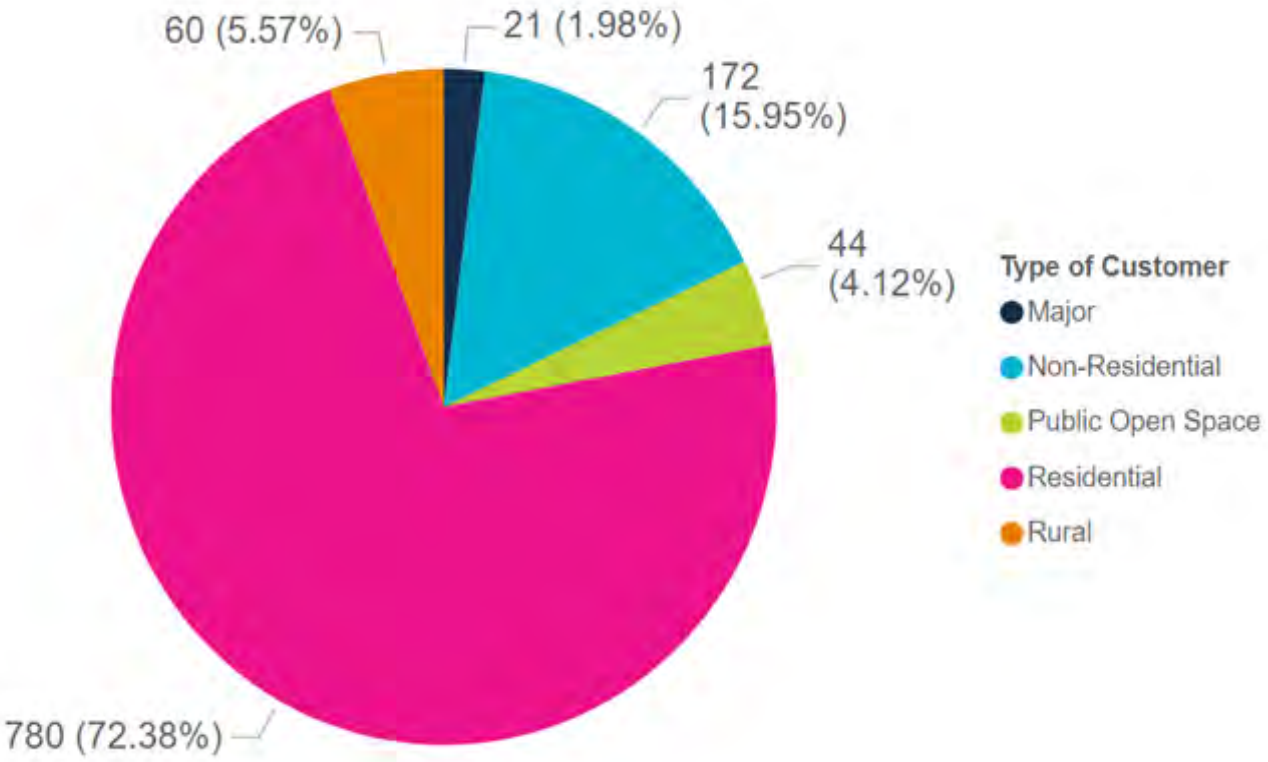


Figure 14 - Grampians system breakdown of customer water usage (ML) based on customer type

The Grampians system sources the majority of its water by gravity from its surface water bulk entitlement from eight streams. The Rocklands entitlement has been used minimally for supply to our Hamilton Water Treatment Plant. Our licence to extract water from Rocklands is subject to carry-over rules. This means that a portion of the water we do not extract in one year will be carried over to our total available volume the following year, subject to bulk entitlement rules. This means the Grampians system has the potential to take a larger volume of water from Rocklands Reservoir than what is shown below.

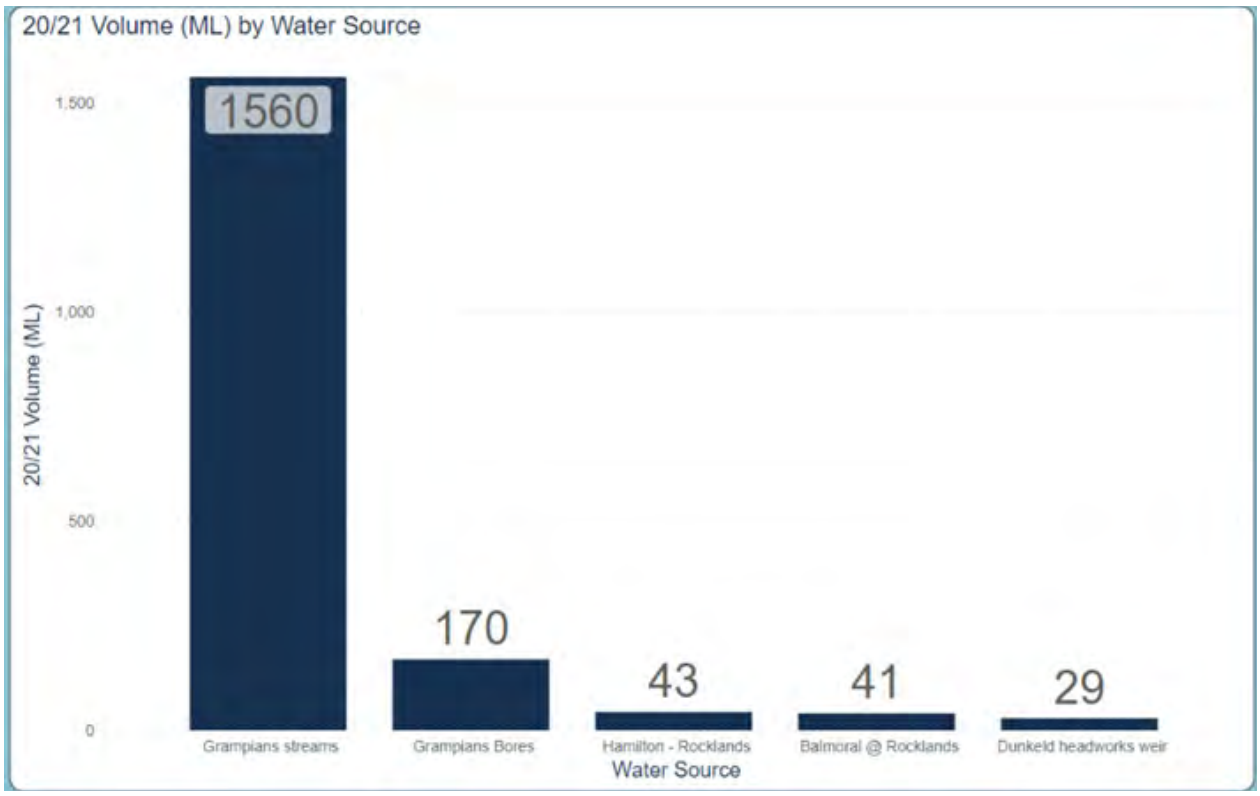


Figure 15 - Breakdown of Grampians water supply source

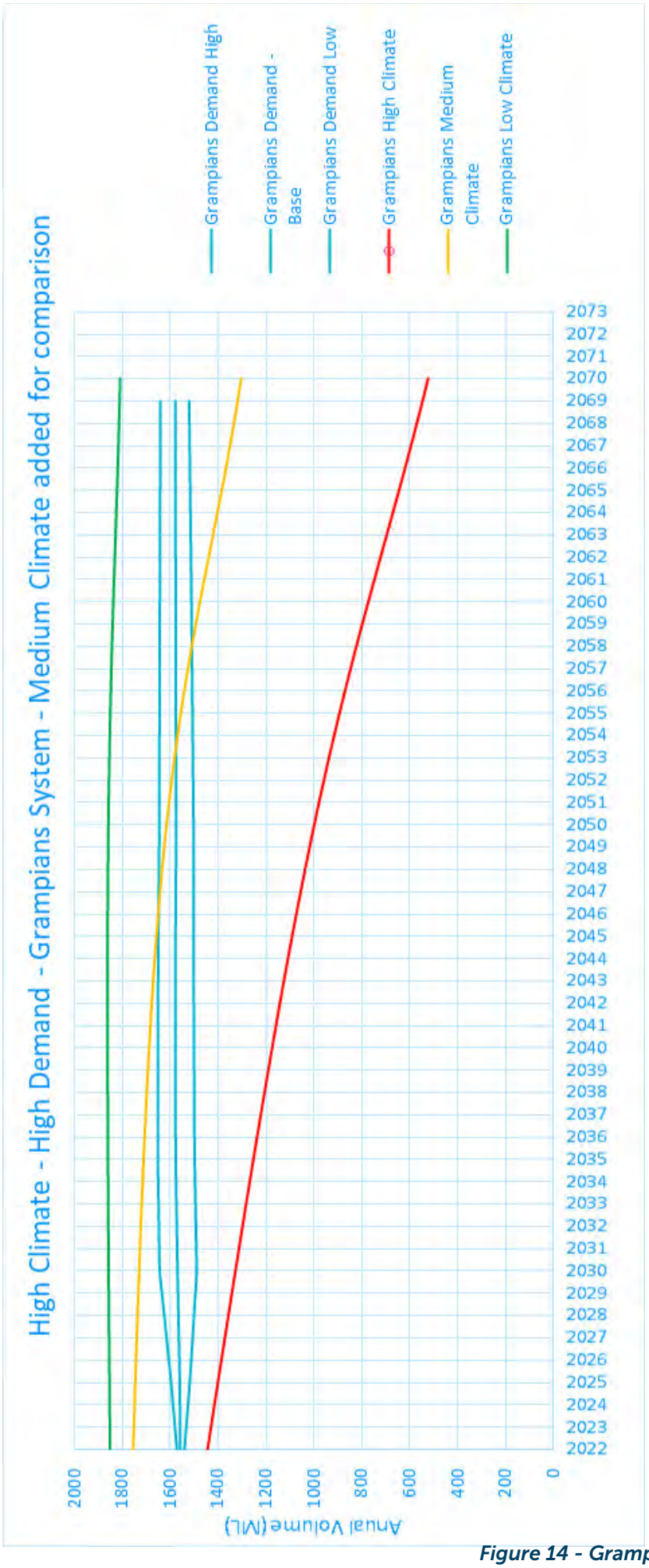


Figure 14 - Grampians system supply and demand curves

Projections

The Grampians system is highly susceptible to the impacts of climate change - as shown by the steeply falling line in the yield projections (refer graph on previous page).

As discussed in section 4.2.4., the timing for augmentation is being determined using the high demand and medium climate change intersect which is 2047. After the last drought, when Hamilton was on Stage 4 restrictions for some time, a pipeline was constructed to obtain supply from Rocklands. We currently hold more than 7,000 ML of allocation and carry-over water in Rocklands. This provides a significant reserve if there are multiple dry years with low yields. There has been no need to transfer water from Rocklands to supply Hamilton in the past five years due to good inflows from the southern Grampians streams. Therefore, there is no compelling case to act now to increase system yield, with water held in reserve to cater for consecutive dry years.

The next augmentation planned at this stage is to purchase further entitlement from the Wimmera – Glenelg System (via Rocklands). Other options will be investigated over the coming five years as the reliability of this supply is projected to decline due to climate change and is a relatively high cost.

Additionally, these yield results highlight that our Grampians system is highly climate dependent, as shown by the significant degrees of variation in the high medium and low climate yield lines. Because of this, we have decided to launch an investigation into groundwater sources surrounding the Grampians system in the coming years. Deep groundwater sources are mostly climate independent and by locating a source, we can further secure our system in the event of drier conditions.

Action plan

Table 10 - Grampians system identification of augmentation options

Action	Description	Earliest year required	Probable year required
Purchase additional Rocklands Reservoir entitlement volume	Purchase of an additional 1,100ML to be added to existing bulk entitlement arrangements.	2045	2045
Investigation of groundwater sources in the area	An investigation into groundwater sources around our Grampians system so we can increase the security of supply for this system if a dry climate eventuates. The goal would be to find a location suitable for water supply. Construction and consideration as an augmentation item will be considered in the next strategy review.	2027	2027

Glenthompson

Overview

The Glenthompson supply system is shown in Figure 17. The reservoir has a capacity of 110 ML, is located close to the township, and has a small surface catchment. Infrastructure to harvest water from a nearby catchment (Railway Reservoir) was decommissioned in 2015 following a cost-benefit analysis that identified its use did not substantially improve system security but required significant works.

The Willaura pipeline is used to supply 30 rural customers and supply the reservoir when levels are low. The pipeline is supplied from GWM Water's Willaura system. The source for this is surface run-off from offtakes on Mount William Creek and Masons Creek in the Grampians National Park, supplemented by supply from a borefield adjacent to Mount William Creek. The borefield capacity was increased significantly to 1 ML/d in the Millennium Drought.

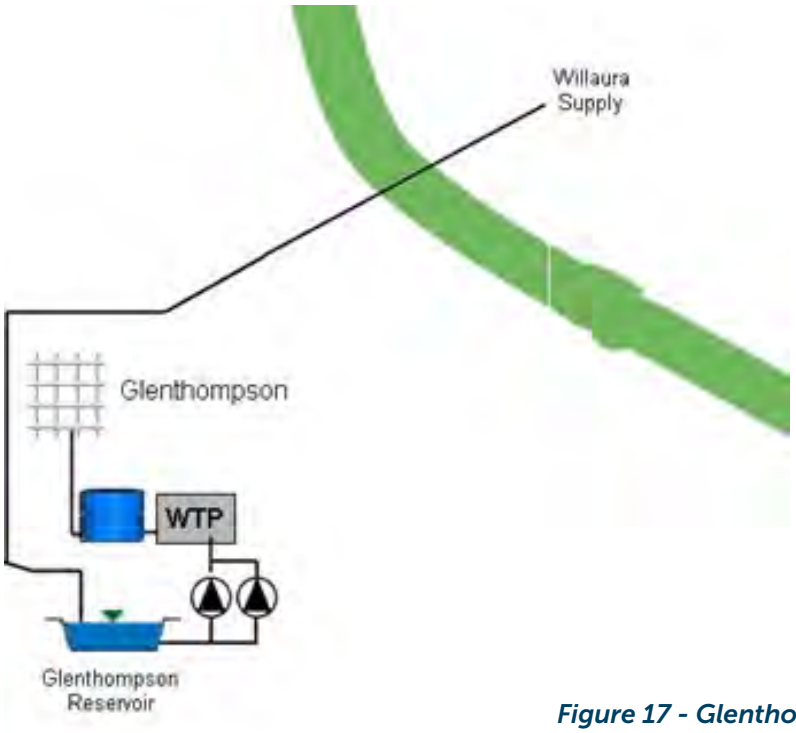


Figure 17 - Glenthompson supply schematic

An important feature of the system is that half of the demand is from the rural users along the Willaura pipeline, before the pipeline reaches the Glenthompson reservoir. These customers have the same access to water as GWM Water's rural customers on the upstream pipeline, being from the creeks during winter and bores over summer.

However, due to the relatively high elevation of the Glenthompson storage and the associated hydraulics, Glenthompson storage is only supplied for limited periods over Winter. We liaise with GWM Water in respect of the timing of delivery from the Willaura pipeline to Glenthompson Reservoir. The security of the town supply is heavily reliant on this delivery because the local catchment for Glenthompson Reservoir does not produce run-off in dry years.

The Willaura system is managed by GWM Water. The Glenthompson township and our pipeline customers only constitute a small proportion (15 per cent) of the overall demand on the Willaura system.

A schematic of the proportion of the supply system we manage is shown in Figure 17. Connections for the rural properties are provided along the 24-kilometre pipeline that connects the Willaura system to Glenthompson Reservoir.

The water supplied into the Glenthompson system is taken under entitlements set out in the Water Act 1989. Surface water is subject to Bulk Entitlements, and groundwater is subject to groundwater licences owned by GWM Water. The Wannon Water entitlements are listed in Table 11.

Table 11 - Glenthompson Bulk Water Entitlements				
Source/location	**Bulk Entitlement Order or Water Register number**	**Entitlement volume (ML)**	**Annual extractions (2020/21)**	**Comments**
Glenthompson (Yuppeckiar Creek)	Glenthompson 1997	94	3.6	Extraction rate not to exceed 0.9 ML/d
Glenthompson	Willaura system – Wannon Water 2012	58	40	Extraction rate not to exceed 0.55 ML/d

Current use and trends

Glenthompson's water use is largely made up of rural customers on the Willaura – Glenthompson pipeline.

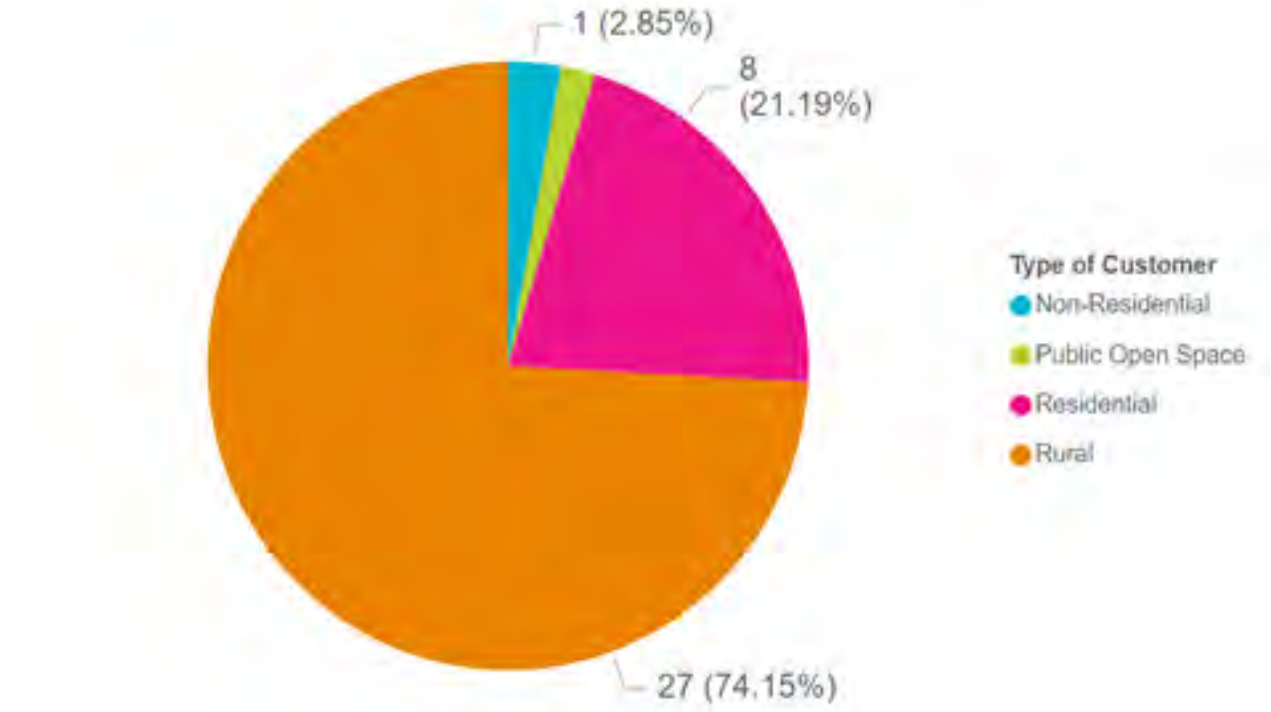


Figure 18 - Glenthompson breakdown of customer water usage (ML) based on customer type

The bulk of Glenthompson's water is sourced from the Willaura transfer entitlement with only a small amount being generated by the reservoir's local catchment.

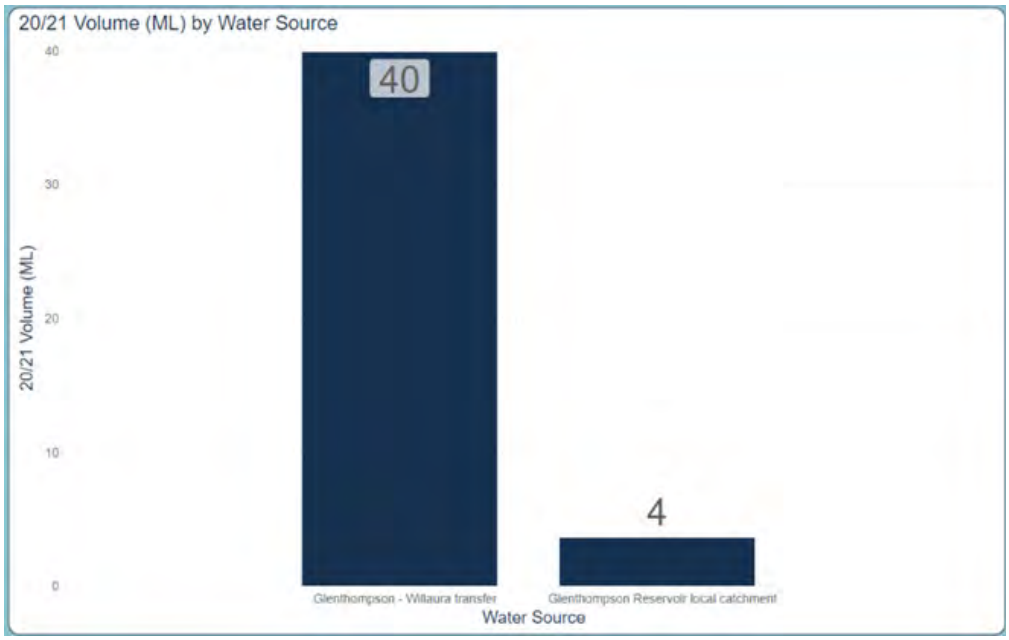


Figure 15 - Breakdown of Glenthompson supply sources

Projections

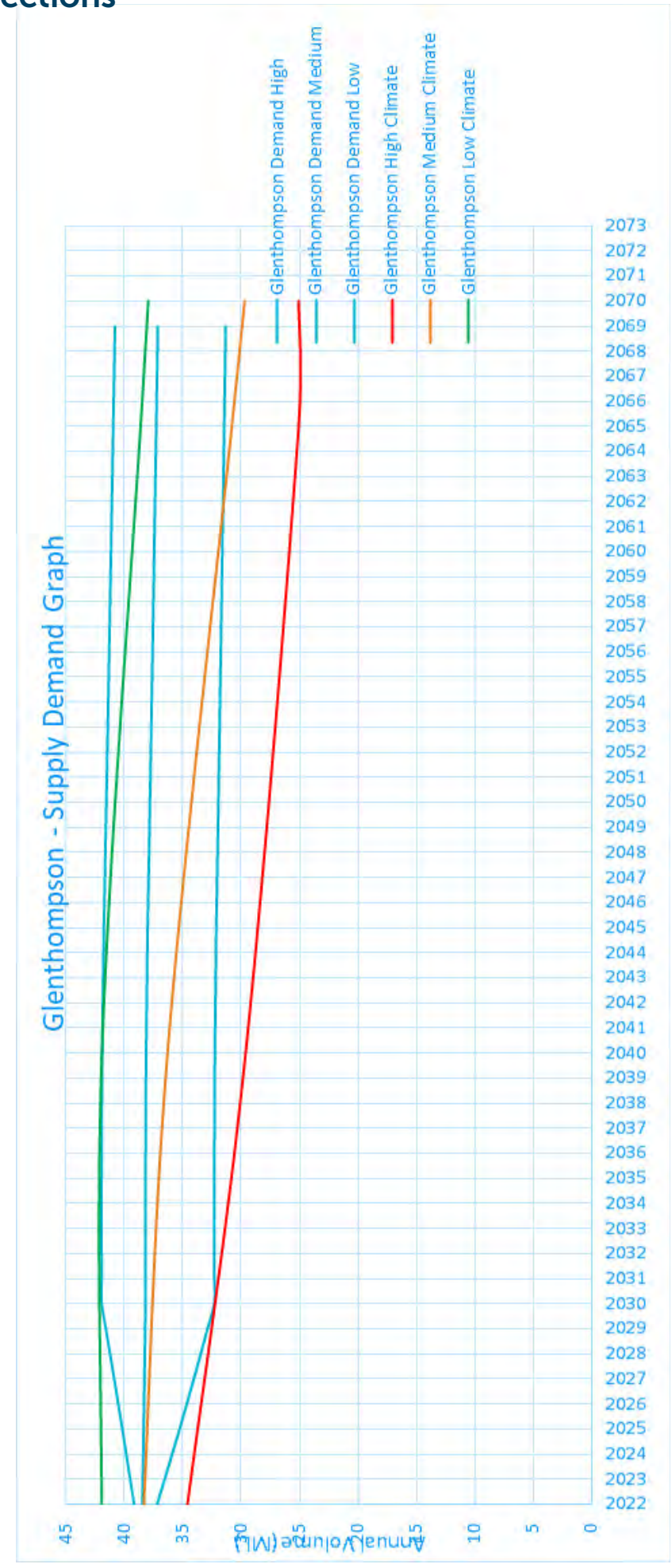


Figure 14 - Glenthompson supply and demand curves

Glenthompson Reservoir

Action plan

As discussed in section 4.2.4, the timing for augmentation is being determined using the high demand and medium climate change intersect which indicates that augmentation should have already occurred. It should be noted that there is little information of the stream flows in the Grampians creeks that supply the Willaura system making accurate modelling of future system yield difficult. The reality is that this is a small system, with the township not growing and expected to continue to use around 12 ML/yr.

Since the last drought, when Glenthompson was on Stage 4 restrictions for some time, connections have been installed on the transfer pipeline to allow higher flows to be transferred from the Willaura system. This enables the transfer of the required volumes from the Willaura system if there is no inflow to the storage from the local Glenthompson catchment.

There is also a high probability GWM Water will connect the Willaura system to the Wimmera-Glenelg system which will allow additional water to be accessed throughout the year – improving system reliability.

Given the above, and the fact that water could be trucked into the town if required, there is no need to augment the system in any way.

Port Fairy

Overview

Two 800-metre deep bores constructed in 2008/09 provide water from the Dilwyn Aquifer via cooling towers and a pumped main to a 2.3ML tank on high land to the south-west of the township. Water gravitates to the town from this tank.

Current use and trends

Just over half of Port Fairy's water supply is residential use, and just over a quarter is used by major industries.

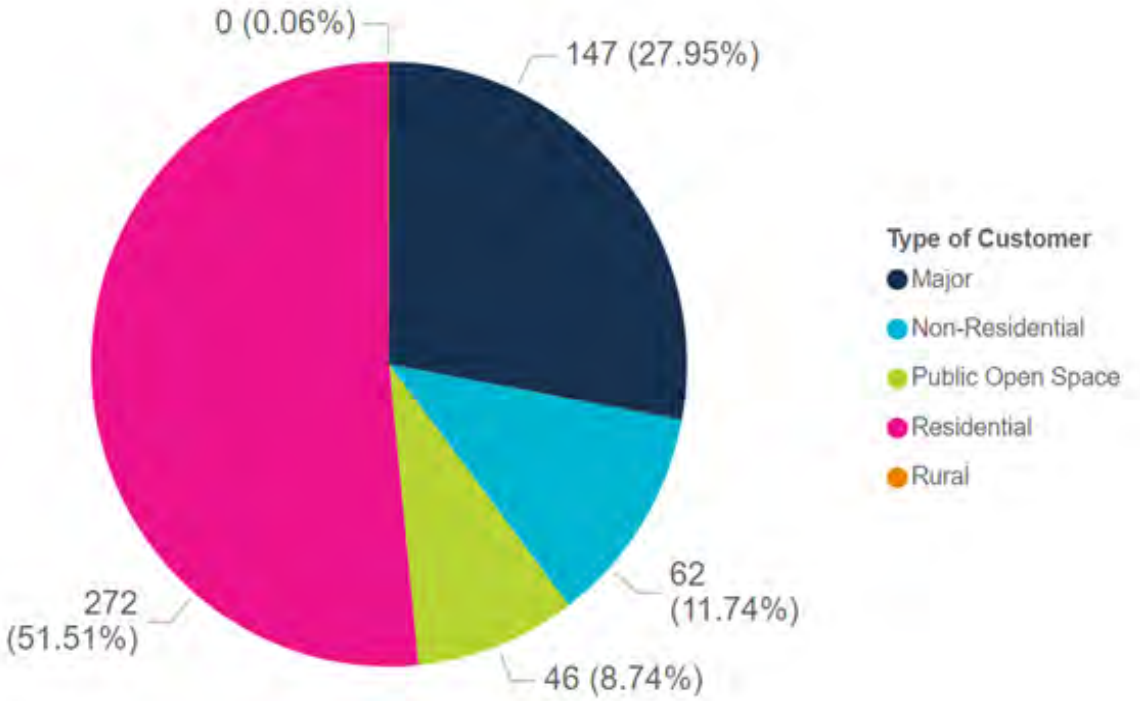


Figure 21 - Port Fairy breakdown of customer water usage (ML) based on customer type

As of 2020/21, we are utilising just over half of the total groundwater licence entitlement volume.

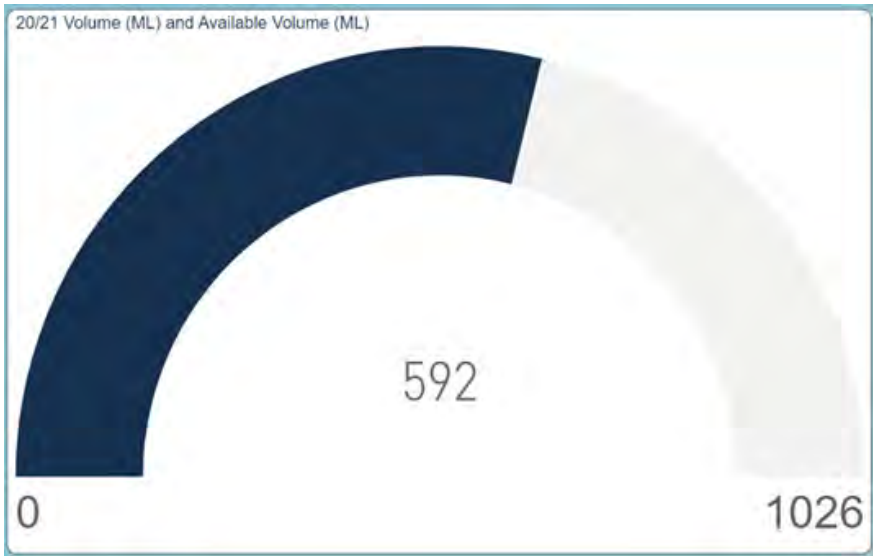


Figure 22 - Port Fairy groundwater extractions versus licence volume

Figure 23 - Port Fairy yield versus demand curves

Port Fairy

Action plan

The customer engagement outlined in Section 4.3 revealed that many customers in Port Fairy were not satisfied with the taste and hardness of the water.

The taste and hardness of the water is due to the source water being high in salts and carbonates. At present, the treatment involves cooling, disinfection and minor dosing to improve water quality. It is safe to drink and complies with all the mandatory health parameters for drinking water, but has a salt level of just over the desirable maximum of 900 mg/l.

Over the past two years, we have undertaken extensive stakeholder engagement and analysis of the impact of the water on the health of the community, the cost to businesses, and the impact on household appliances. A business case is currently being prepared to demonstrate the viability of treating the water further to reduce salt levels. The cost of this type of treatment is very high, requiring funding options to be explored.

If the water is further treated, more water will be required from the aquifer to account for up to 25 per cent of the water treated being discharged as a waste stream. This will increase the demand for raw water to intersect the yield line around 2050.

If further treatment is undertaken to remove salt, the next augmentation option would be to increase the licensed volume from the bores. This is expected to be a relatively straightforward process. The bores are able to supply the increased demand. No increase in licensed volume is required if further treatment does not proceed.

Portland

Overview

Two 1250-metre deep bores constructed in 2008/09 (plus one 1300-metre deep emergency back-up bore at Wyatt Street) provide water from the Dilwyn Aquifer via cooling towers to a 32ML storage located to the south of the town. Water gravitates to the town from this storage.

Current use and trends

Just over a quarter of Portland's water is used by major industries, with the bulk of water use being made up of residential customers.

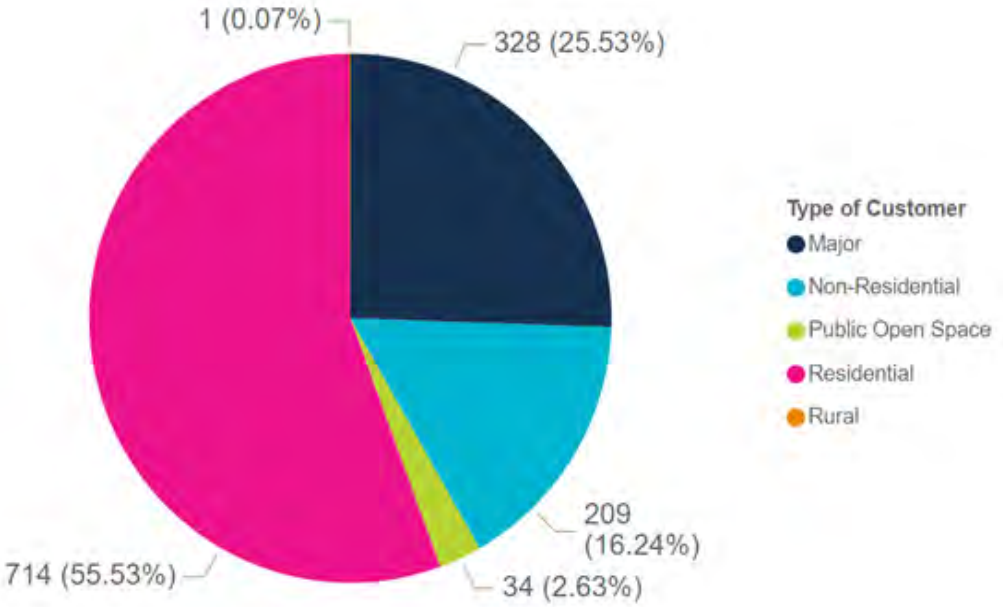


Figure 24 - Portland breakdown of customer water usage (ML) based on customer type

Portland is currently using only a quarter of its overall groundwater licence volume.

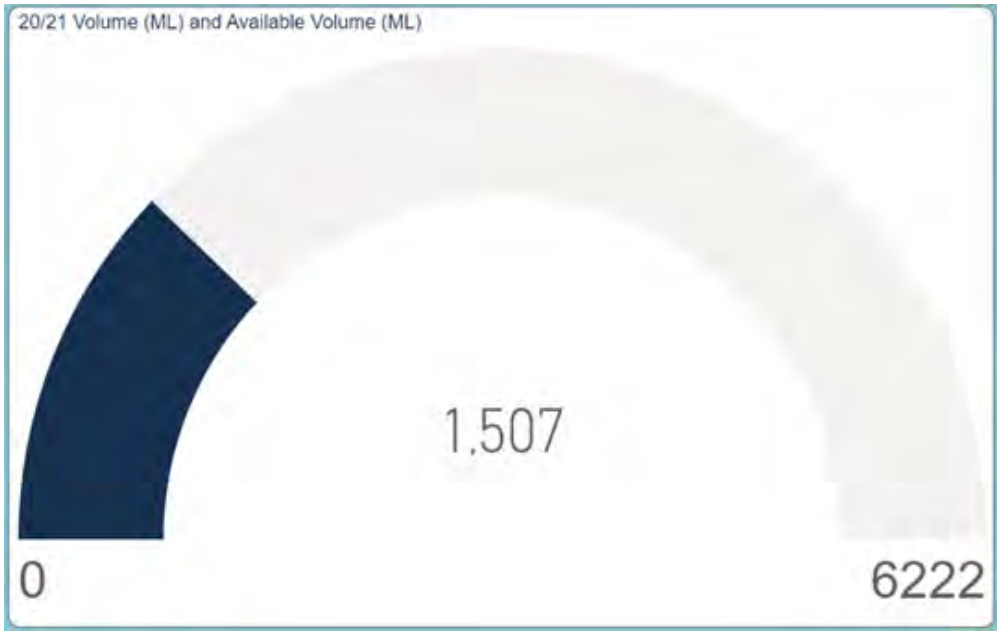


Figure 25 - Portland groundwater extractions versus licence volume

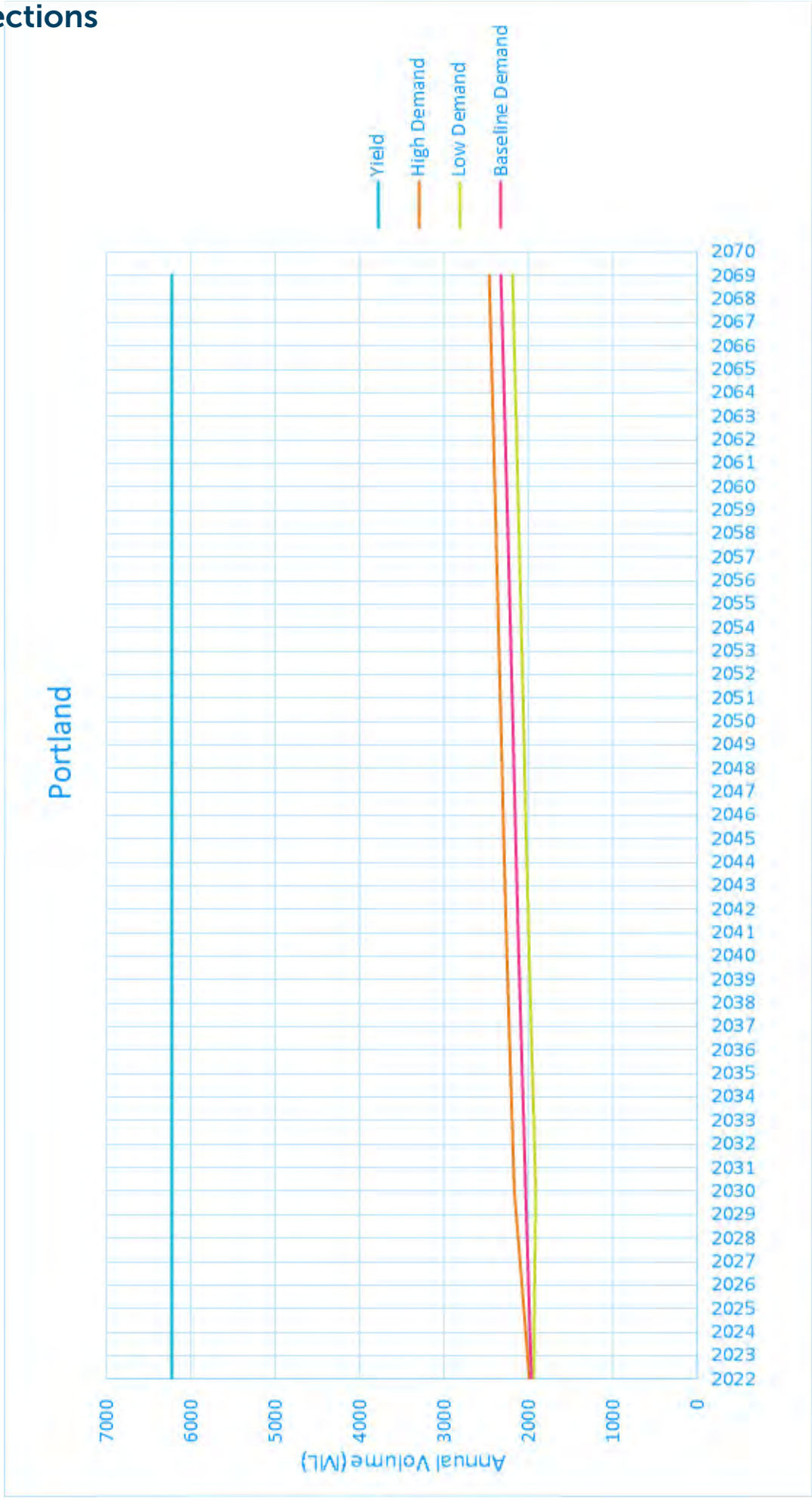


Figure 26 - Portland yield versus demand curves

Portland harbour

Action plan

As with Port Fairy, the customer engagement revealed that many customers in Portland were not satisfied with the taste and hardness of the water.

The taste and hardness of the water is due to the source water being high in salts and carbonates. At present, the treatment involves cooling and disinfection. It is safe to drink and complies with all the mandatory health parameters for drinking water but has a salt level of around 700 mg/l compared to the desirable maximum of 900 mg/l.

Over the past two years, we have undertaken extensive stakeholder engagement and analysis of the impact of the water on the health of the community, the cost to businesses, and the impact on household appliances. A business case is currently being prepared to demonstrate the viability of treating the water further to reduce salt levels. The cost of this type of treatment is very high, requiring funding options to be explored.

If the water is further treated, more water will be required from the aquifer to account for up to 25 per cent of the water treated being discharged as a waste stream. This will increase the demand for raw water, but it is still well below the yield line.

No further augmentation of the system is required regardless of whether further treatment is undertaken or not.

Port Campbell system

Overview

The towns of Port Campbell, Timboon and Peterborough are supplied (as shown in Figure) from a 500-metre deep artesian bore (pumped at peak demand) constructed in 1996, harvesting water from the Dilwyn Aquifer. A back-up bore is scheduled for completion by June 2023 which will provide redundancy if an issue arises with the existing bore. Water is treated at Port Campbell and stored in a 1ML treated water tank at the treatment plant site.

Port Campbell is supplied via a 1.2-kilometre pumped main from the treated water tank to a 1.2ML tank on high ground to the east of the town from where it gravitates to supply the town.

Timboon is supplied via a 16.6-kilometre pumped main from Port Campbell to a 9.1ML covered storage on high ground to the south of Timboon. Water gravitates from the storage to most of Timboon and is pumped to a portion of the town.

Peterborough is supplied from the Timboon pumped main, via a 3.7-kilometre pipeline to a 0.7ML tank, and then by gravity via a 5.5-kilometre pipeline to the town.

Demand for water at Port Campbell and Peterborough varies seasonally due to the high tourist population during summer. Some 40 rural users also draw water direct from the pipelines supplying Peterborough and Timboon.

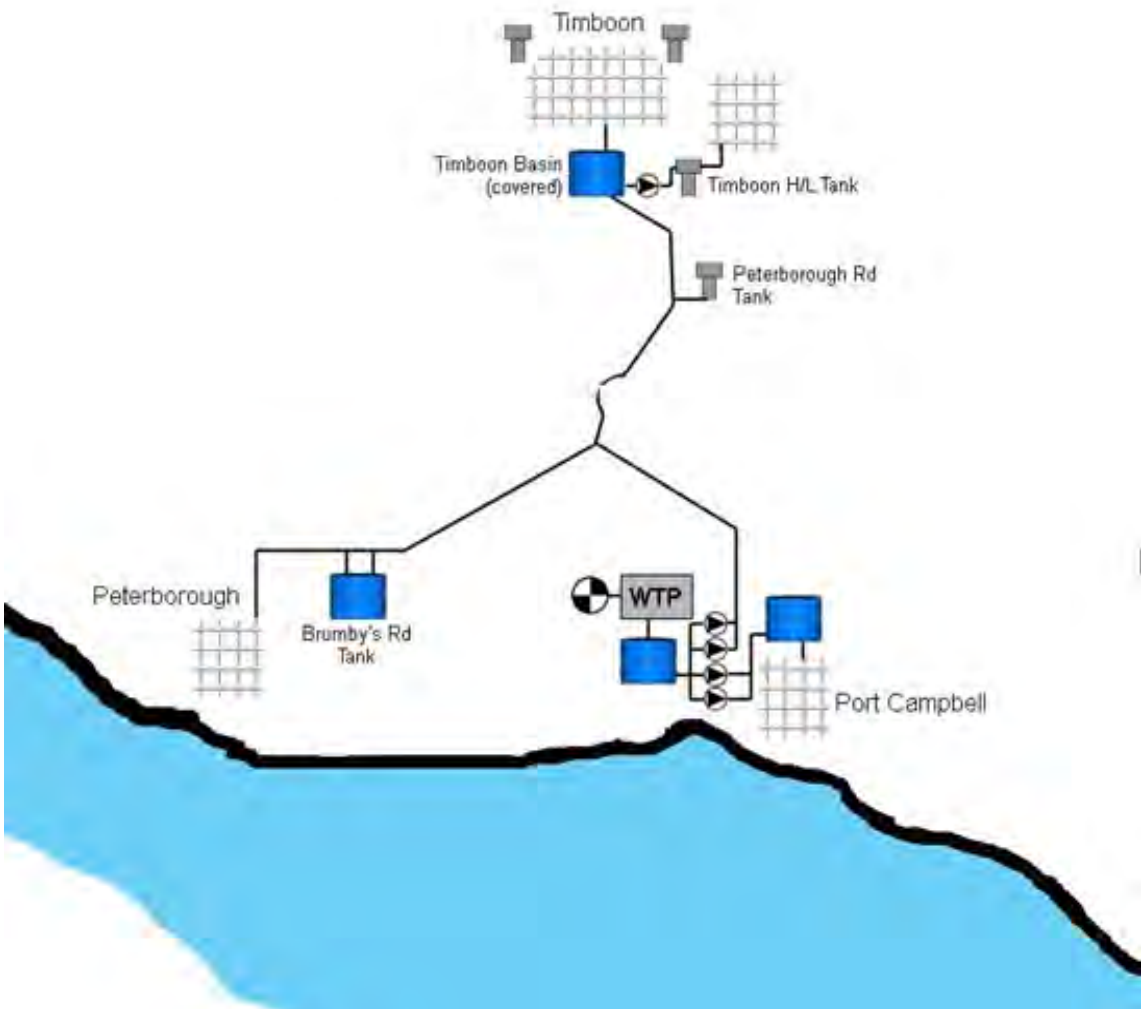


Figure 27 - Port Campbell supply system schematic

Current use and trends

The majority of Port Campbell's water use is made up of residential and rural customers. .

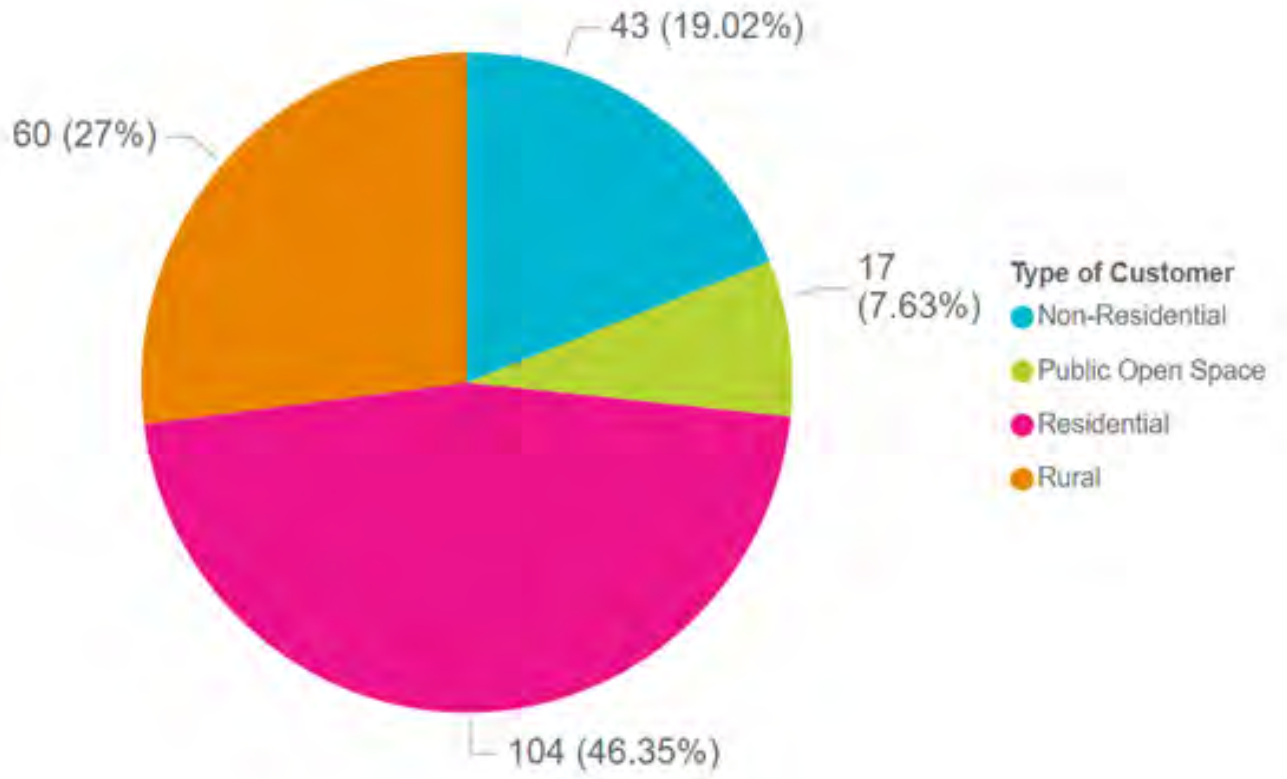


Figure 28 - Port Campbell breakdown of customer water usage (ML) based on customer type

The Port Campbell system is currently using roughly a quarter of its overall licensed groundwater volume.

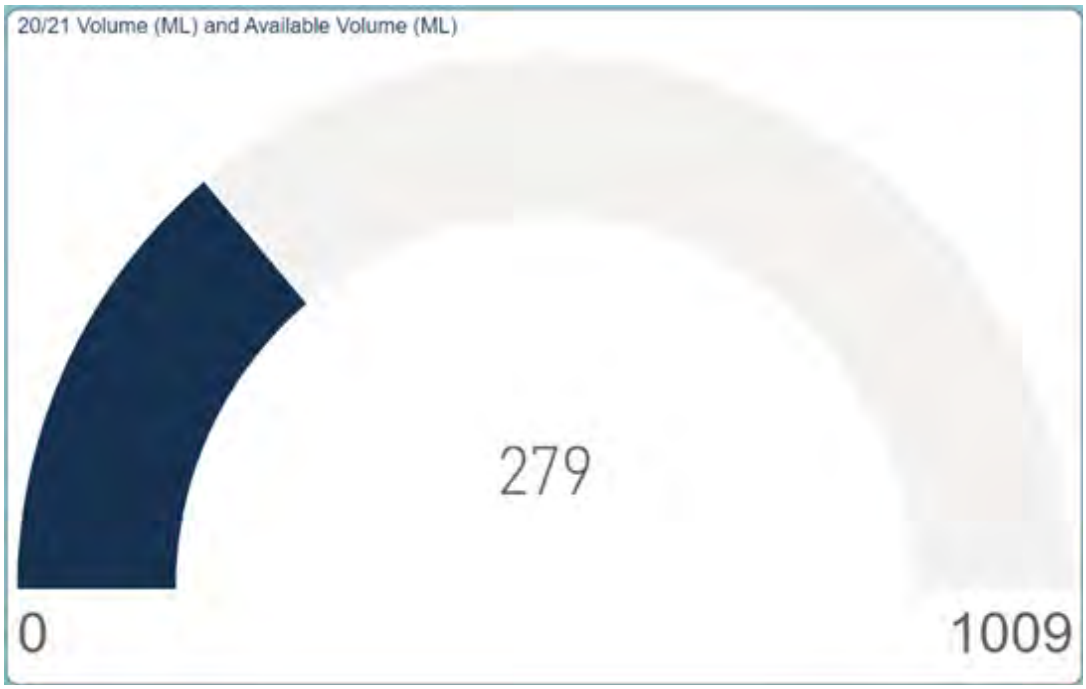


Figure 29 - Port Campbell groundwater extractions versus licence volume

Projections

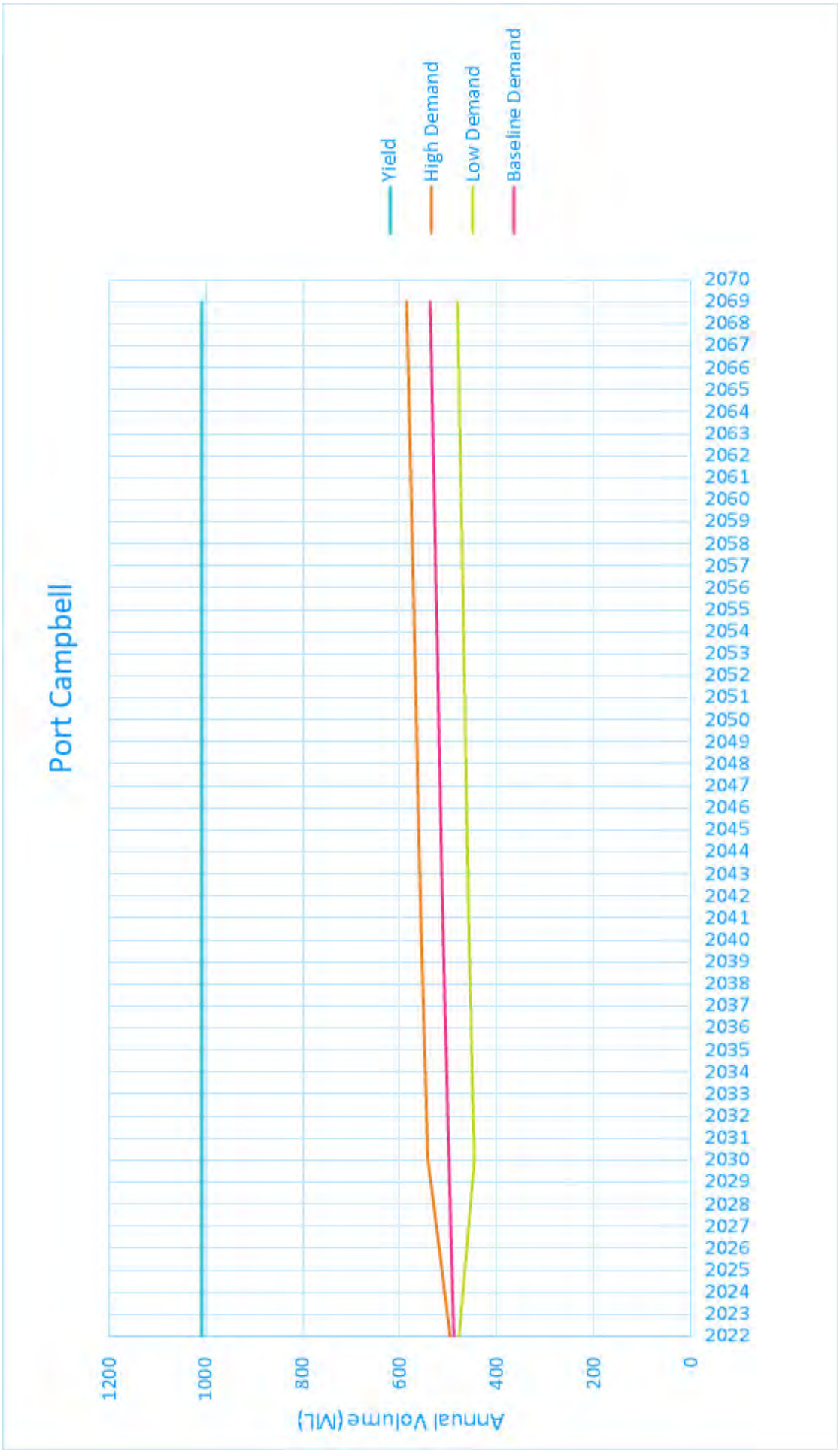


Figure 30 - Port Campbell yield versus demand curves

Action plan

We are currently using a quarter of our overall groundwater extraction licence for the Port Campbell system. This leaves more than adequate room for growth in this system and no action will be required in the next five years.

There is also enough spare capacity in this system to cover any growth in tourism in the 12 Apostles and Great Ocean Road region following recent COVID-19 impacted years.

Port Campbell township with our water treatment plant at bottom left

Tullich system

Overview

The Tullich borefield consists of four production bores, all of which are used to supply peak demands during summer. This groundwater supplies the towns of Casterton, Sandford, Merino and Coleraine as shown in Figure 31.

Water from the Tullich borefield is pumped via a 14.4-kilometre pipeline to the Casterton Water Treatment Plant. The treated water is stored in a 1.5ML tank and 2.9ML covered storage basin from where it supplies Casterton and Sandford by gravity. Water is pumped to Coleraine via a 32-kilometre pipeline to a 1ML tank from where it gravitates to the town. The town of Merino is supplied via a 20.2-kilometre pumped main from Casterton to a 0.2ML tank on high ground adjacent to the town. Water gravitates from the storage to the town.

Approximately 35 customers are provided with a water supply from the long transfer mains.

About half of the native bush that surrounds the Tullich bores was burnt out in 2006. Although the fire occurred in the recharge area of this aquifer, the recharge volumes were not impacted due to the nature of the vegetation in this region (shallow rooted and relatively sparse). The bush has largely regenerated since that time.

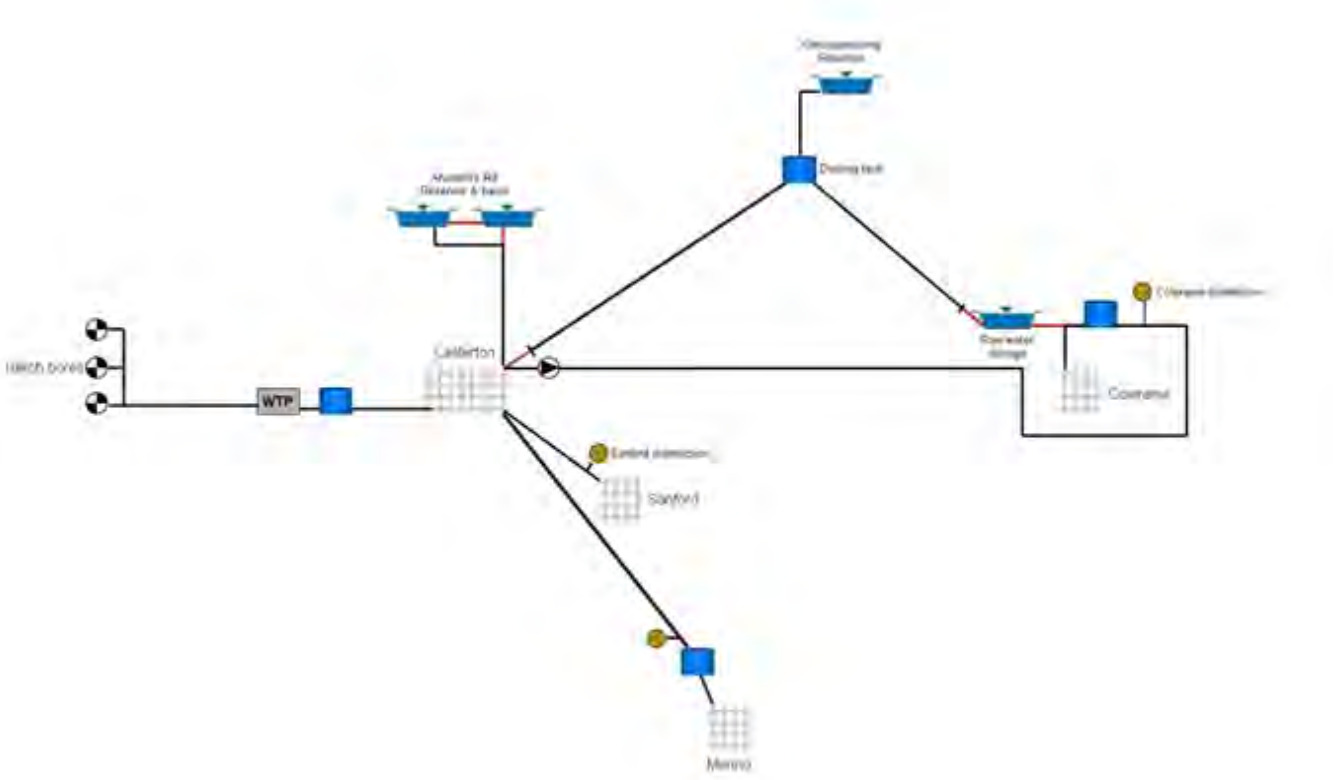


Figure 31 - Tullich system water supply schematic

Current use and trends

The Tullich system is mostly comprised of residential and rural customers.

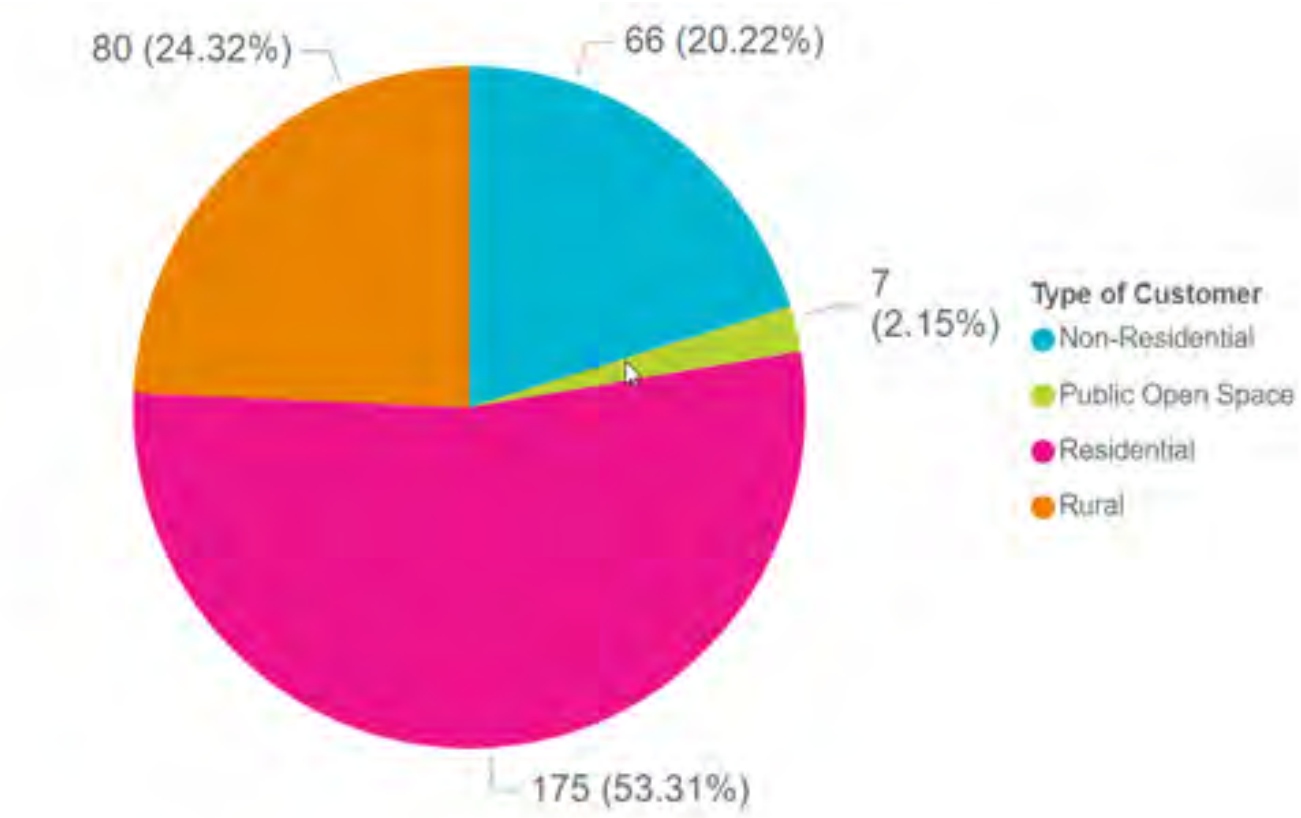


Figure 32 - Tullich system breakdown of customer water usage (ML) based on customer type

The Tullich system is currently utilising under half of its full licensed capacity.

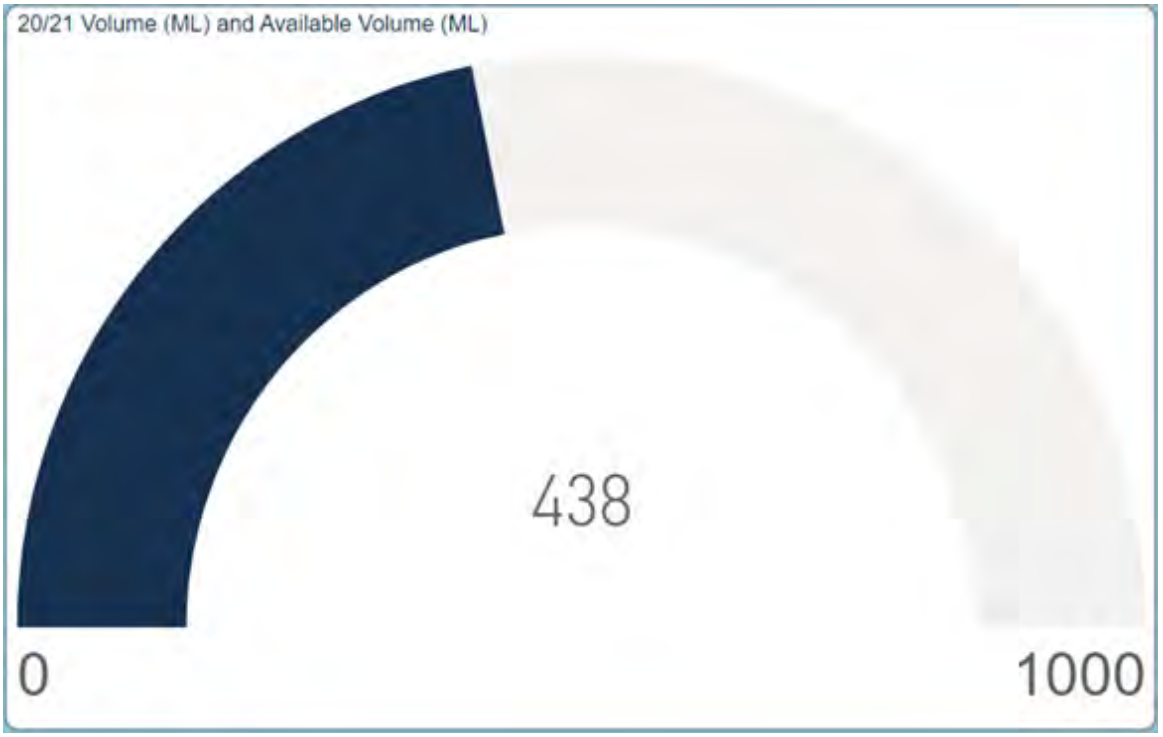


Figure 33 - Tullich system groundwater extractions versus licence volume

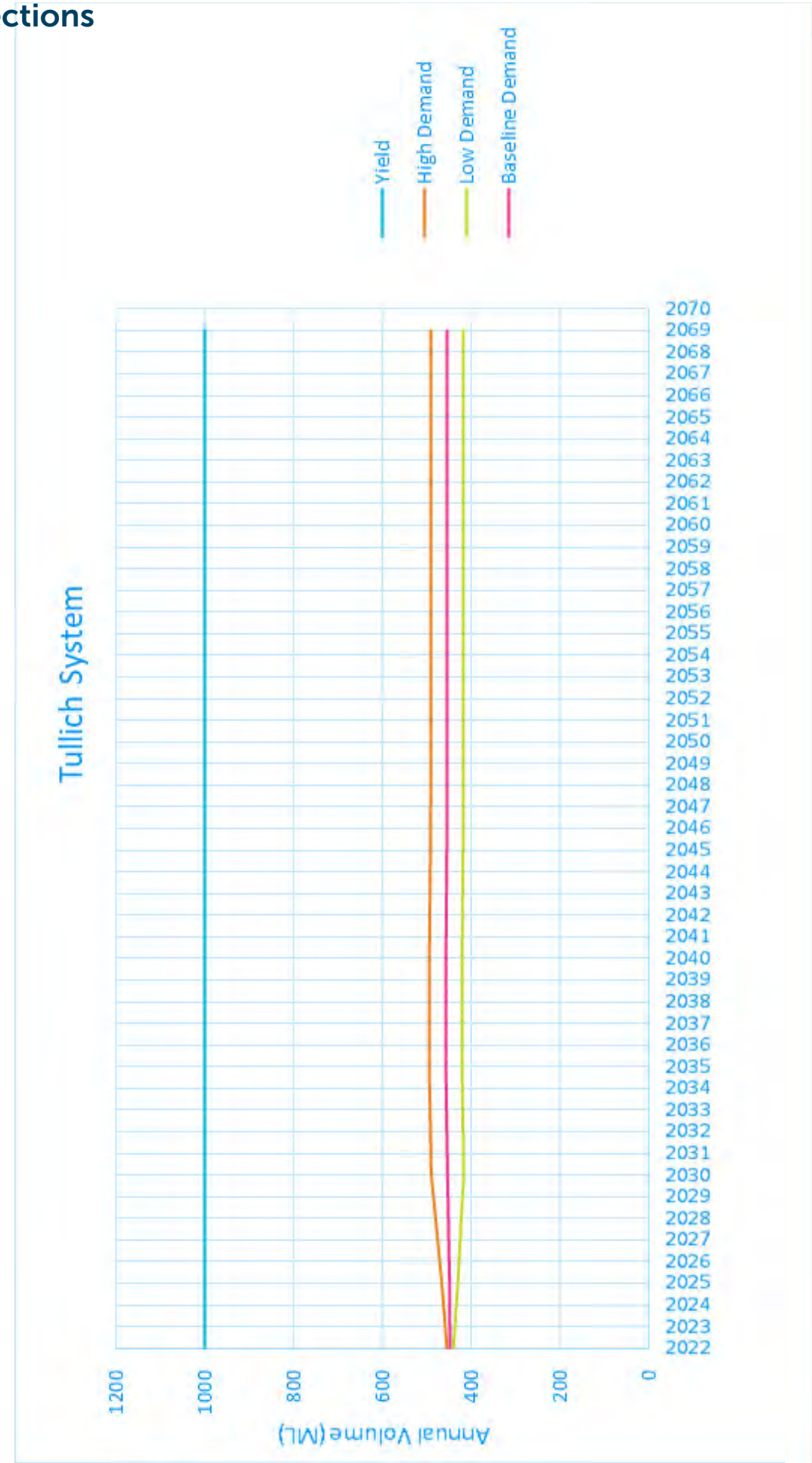


Figure 34 - Tullich system yield versus demand curves

Casterton Water Treatment Plant

Action plan

We are currently utilising just under half of our full groundwater licence for the Tullich system. Population projections for this area suggest that this region of Victoria is decreasing in size and, as such, we expect to see minimal growth. With our groundwater supply being so secure, and good contingency planning already in place at the borefield, no action will be required for the Tullich system.

Small town groundwater

Overview

We service several small towns within our region. Each of these systems is equipped with a groundwater borefield, treatment system, storage, and gravity network.

For this Urban Water Strategy, we have combined the yield and demand analysis. This has been done on the basis that each of these towns is demonstrating a decline in population, which is expected to continue over the next 50 years, while having significant spare capacity in their groundwater licence.

Townships included in this section are:

- Heywood
- Caramut
- Dartmoor
- Macarthur
- Penshurt
- Darlington

Current use and trends

Most of the water usage in these towns is made up of residential water use.

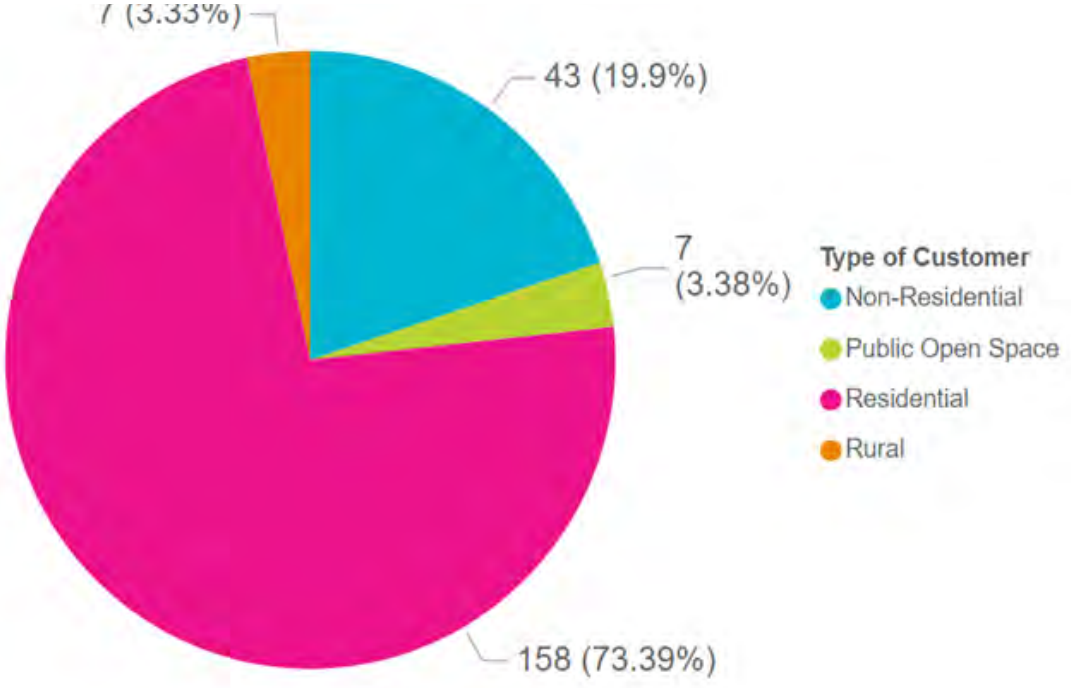


Figure 35 - Small town groundwater breakdown of customer water usage (ML) based on customer type

Penshurst

The following figure shows the 2020/21 volume extracted for each of these townships compared to the capacity of the system. This demonstrates each of our townships have significant spare capacity.

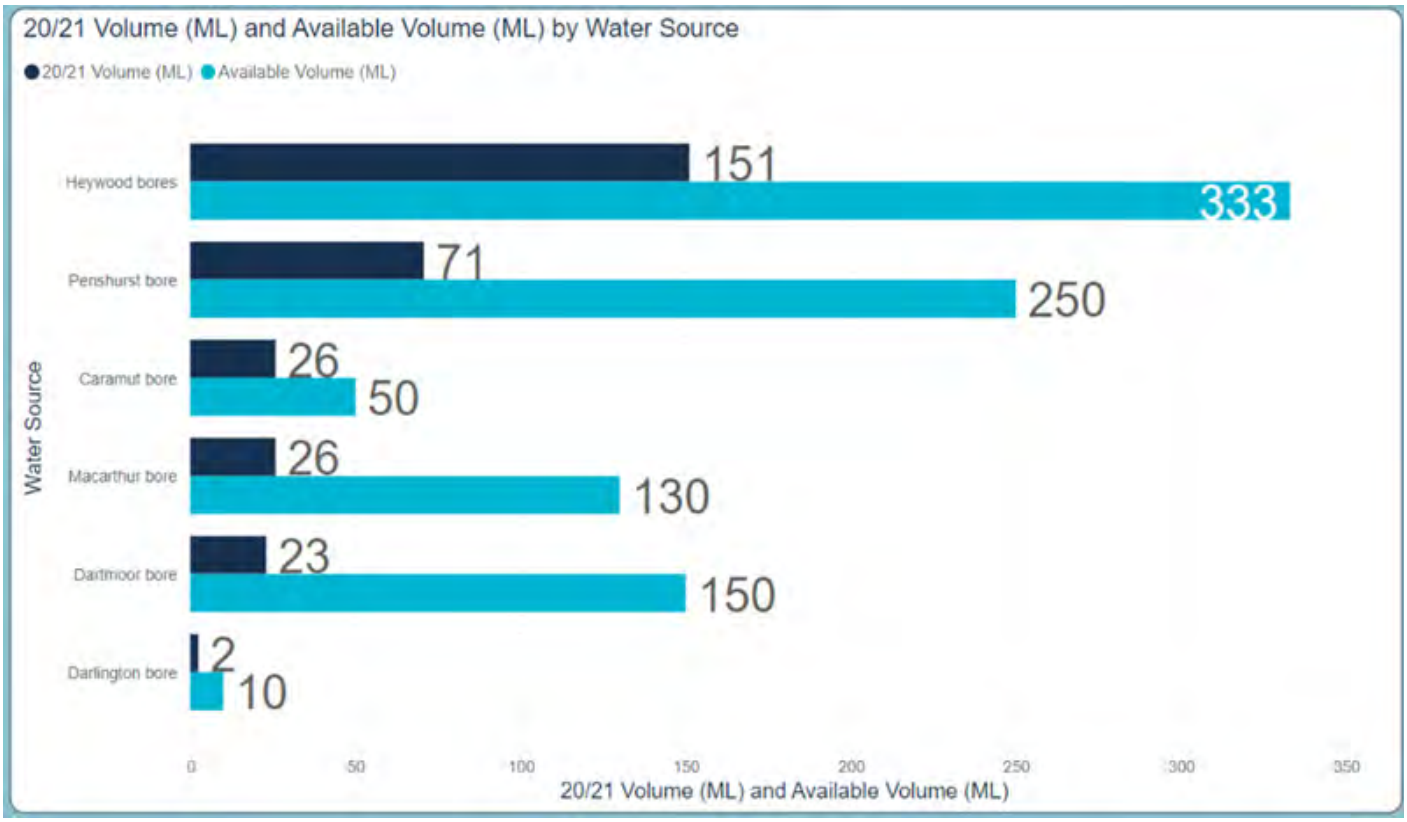


Figure 36 - Small town groundwater extraction volumes versus licence volumes

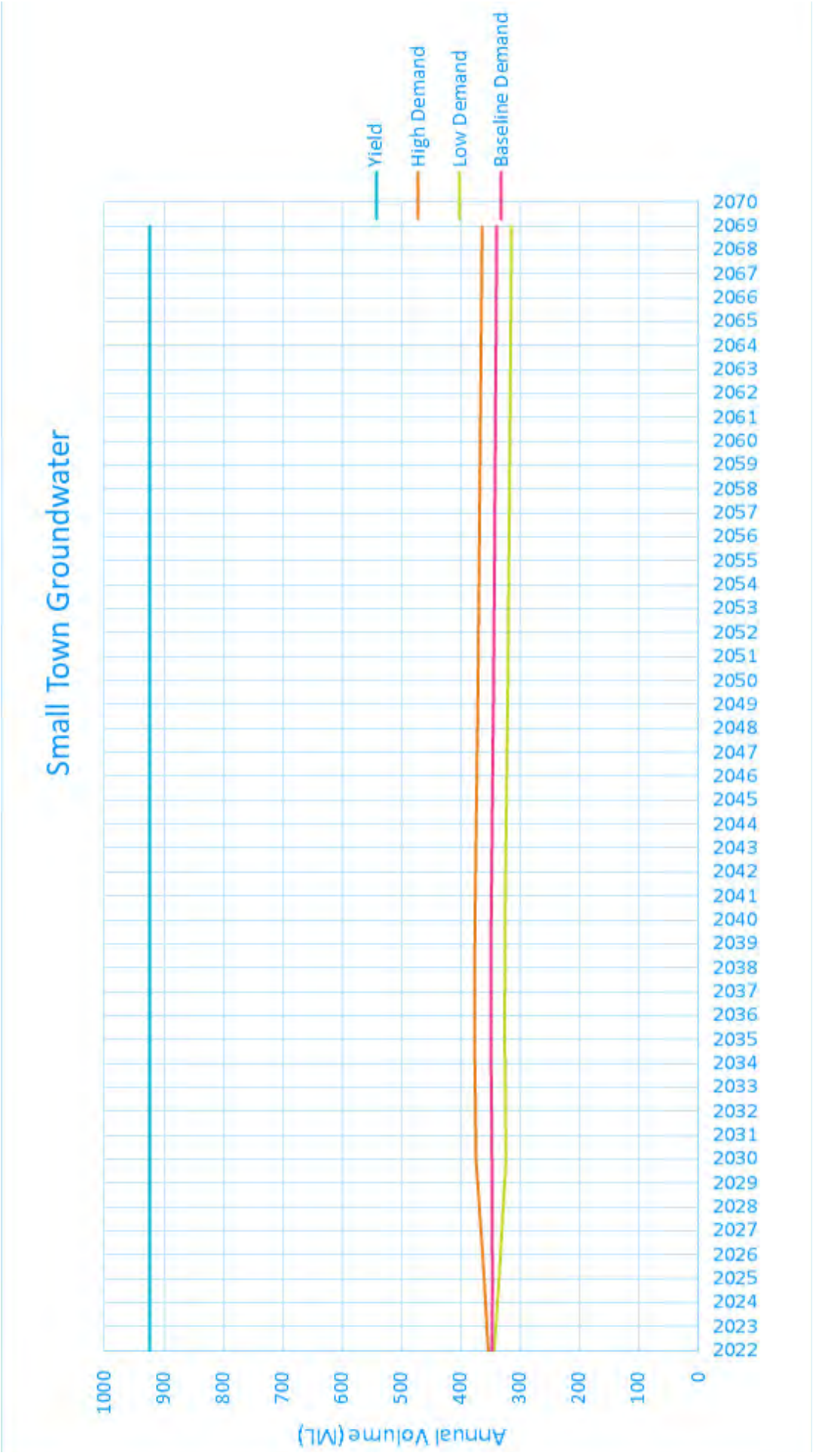


Figure 37 - Small town groundwater yield versus demand curves

Action plan

As with Port Fairy, the customer engagement revealed that many customers in Heywood were not satisfied with the taste and hardness of the water.

The taste and hardness of the water is due to the source water being high in salts and carbonates. At present the treatment involves cooling and disinfection. It is safe to drink and complies with all the mandatory health parameters for drinking water, but has a salt level of around 700 mg/l compared to the desirable maximum of 900 mg/l.

Over the past two years, we have undertaken extensive stakeholder engagement and analysis of the impact of the water on the health of the community, the cost to businesses, and the impact on household appliances. A business case is currently being prepared to demonstrate the viability of treating the water further to reduce salt levels. The cost of this type of treatment is very high, requiring funding options to be explored.

If the water is further treated, more water will be required from the aquifer to account for up to 25 per cent of the water treated being discharged as a waste stream. This will increase the demand for raw water, but it is still well below the licensed volume.

The disposal of this saline waste stream is problematic and costly for an inland town where the treated wastewater from the town is used to irrigate farmland.

No further augmentation of the system is required, regardless of whether further treatment is undertaken or not.

Caramut, Macarthur, Dartmoor, Darlington and Penshurst all source water from a shallow aquifer and hence could be influenced by reduced rainfall in their recharge areas over the coming years. The demand of these towns is well below the licensed volume, meaning that if licensed volumes are reduced by, say 20 per cent, there is no risk to supply security.

The groundwater levels will continue to be monitored to identify if there is a declining trend that can be tied to climate change. Actions to deal with any substantial trends will be considered in subsequent reviews of the Urban Water Strategy.

System-wide water demand reduction actions

Our water systems have shown that we are in a reliable water resource position in South West Victoria under current and medium climate conditions.

Appropriate augmentation actions have been identified for implementation when needed to increase water supply. Despite this, we are striving to be more efficient and sustainable with the water supply we already have. This aligns with the feedback from the community that we should be promoting water savings and providing more water education.

Over the next five years, we will be committing to a series of actions to understand how we can assist our customers to be more water efficient and reduce our system losses.

Non-revenue water and system losses

We own and manage a vast network of water infrastructure. It is impossible to have a network that is 100 per cent leak proof and reliable, however we can put effort into maximising the efficiency of our infrastructure. We are committing to several actions that will assist us in reducing our non-revenue water and water losses across our systems.

Much work has been completed since 2007 to better monitor non-revenue water volumes in various parts of the reticulation pipe network, and a number of significant leaks have been found and repaired. Losses tend to be greater in older systems and where soil types make leak detection difficult. In some cases, better monitoring has revealed a greater loss than previously thought, which has been valuable in prioritising the leak detection and repair effort. Acoustic detection of leaks has been used together with monitoring of night flows to identify a leak before it is reported by the public. Many leaks have been discovered and repaired because of these activities, resulting in significant water savings.

Non-revenue water:

Water that is lost due to leakage after leaving the water treatment plant e.g. leaking pipes, leaking meter connections, water theft.

System losses:

Water that is lost while being transferred from the water source to the water treatment plant e.g. evaporation from storages, leaking transfer pipes.

Figure 38 - Non-revenue water and system losses definitions

We will continue to focus in on non-revenue water with the following goals for this strategy. These volumes are to be tracked within our internal reporting processes as a measure of success.

Figure 39 - Non-revenue water goals

In addition to non-revenue water savings, we will investigate our own system losses in closer detail. We will be exploring gaps in our own metering and data systems to better understand how we can be more efficient in our transmission of water from source to treatment. A five-year action plan has been developed:

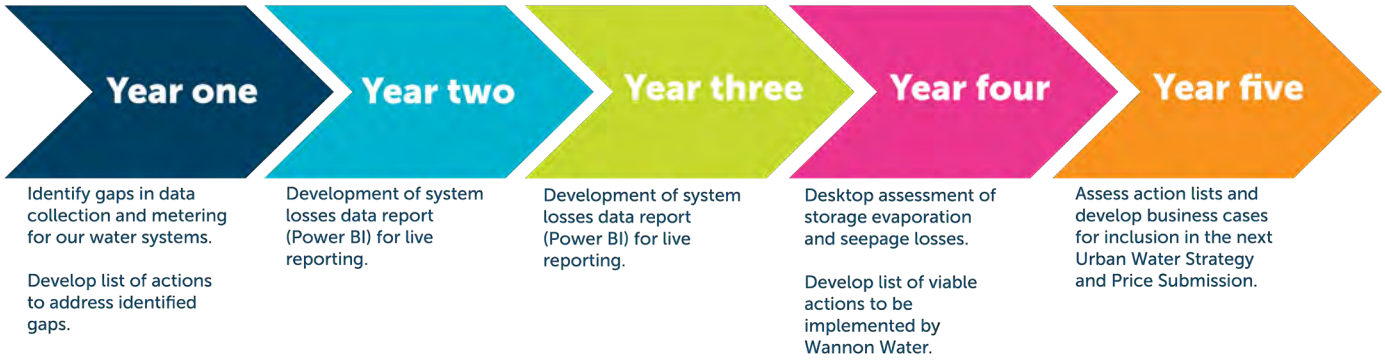


Figure 40 - System losses action plan

Community education and engagement

A big part of promoting sustainable water practices is to empower our customers with the knowledge to make smarter end-use decisions. Therefore, we will be continuing our already extensive communication and education program. Table 12 below details the initiatives we will be participating in over the next five years.

Table 12 - Community engagement action plan

Initiative	Description
Education program	We reach out to schools and community groups to provide information sessions on how to be more water efficient, how our water and sewerage services work, and run activities and competitions such as our 'Water It, Grow It, Cook It' competition.
Water Whys campaign	This is a marketing campaign using multiple media platforms to educate a broad audience on the 'why's' of water supply. This campaign includes information on water saving tips, our permanent water saving rules, where the drinking water comes from etc.
Sewerage service education campaign	Like our Water Why's campaign, this will be a dedicated marketing campaign using our media platforms to educate and promote our sewerage services. It will include information on how sewage is treated, our licensing requirements, how we minimise the impact on the environment etc.
Involvement in Water Night and National Water Week	We will support the initiatives and material released for the water industry and promote community involvement in National Water Week and Water Night.
Smart Approved Water Mark promotion	We will continue to promote the use of Smart Approved Water Mark products for our customers through our media platforms. These are a specific suite of products to improve, reduce or better understand water use under various applications. Links are available on our website.
End-use water efficiency engagement with the community	Further explained in section 13.3, we are investigating how we can improve in the water efficiency space. In year three of this strategy, if lacking data from the broader water industry, we will be incorporating specific water efficiency engagement items to better understand our customers' end use, appetite for water efficiency campaigns and rebates, and costings.

Understanding water efficiency at Wannon Water

We have identified that we are in a secure water resource position. However our engagement results show that our community appreciates our efforts in being more water conscious and promoting water efficiency.

We are taking this engagement feedback on board and will be aiming to better understand what water efficiency looks like and means for Wannon Water. Over the next five years, we will be improving our internal processes and data collection to better inform us of how efficient we already are, and where we can put more effort.

We will be taking inspiration from the broader water industry's existing efforts and creating an action plan of what is feasible in our communities that has been successful elsewhere. Our aim is to be well informed for the next strategy to implement some targeted campaigns. Our five-year plan is below.

Table 13 - Water demand reduction action plan

Action	Year 1	Year 2	Year 3	Year 4	Year 5
Water demand data review	Review of customer demand data across the business	Development of customer demand Power BI report			
Water efficiency business case	Reach out to broader industry to develop contacts on water efficiency trials/ campaigns		Develop shortlist of water efficiency campaigns for Wannon Water using industry data	Develop business cases for shortlist of campaigns Possibility of trial run of an initiative	Internal engagement in preparation for next Urban Water Strategy and Price Submission
Ongoing reporting	Bulk water reporting and Annual Water Outlook	Bulk water reporting and Annual Water Outlook	Bulk water reporting and Annual Water Outlook	Bulk water reporting and Annual Water Outlook	Bulk water reporting and Annual Water Outlook

Our ocean outfall sewerage systems

Three of our sewage treatment plants discharge treated water to the ocean.

Warrnambool

The Warrnambool Sewerage System is the largest of our sewer systems, servicing a total population of around 34,615 (VIF 2019), comprising residential customers, commercial customers, and a number of large individual trade waste customers. The Warrnambool Sewage Treatment Plant (STP) treats all wastewater collected from Warrnambool and the towns of Allansford and Koroit. Wastewater is also received from industries and septic tank contract cleaners at purpose-built facilities in Warrnambool.

We have an extensive gravity pipe network totalling around 300-kilometres in length (of various pipe materials). However, due to the topography of Warrnambool, 37 sewer pump stations are required to transfer sewage to the STP. There are seven major pump stations and a further 30 smaller sewer pump stations (SPS), not including the Allansford and Koroit SPS (two pump stations each).

The Warrnambool STP, commissioned in 1996, is located approximately two kilometres south-west of the Warrnambool CBD, next to the Southern Ocean. It uses an Intermittently Decanted Extended Aeration (IDEA) process to treat the wastewater. Following treatment, the effluent gravitates out to sea via a 1200mm diameter, polyethylene-lined, steel-encased pipe.

This pipe discharges sub-tidally at the edge of the shoreline just west of Thunder Point. The receiving environment is of a very turbulent nature, with natural formations aiding in the mixing and dispersion away from the shoreline. The current mixing zone is identified as a maximum 300-metre radius from the end of the outfall pipe. The quality of water discharged is of a high standard in compliance with the EPA discharge licence.

Sludge is removed from the bottom of the tanks and de-watered using a belt press or centrifuge, which removes excess water. The dewatered sludge is transported to a sludge processing site in Camperdown where it is further dried and stabilised before being re-used as a soil conditioner.

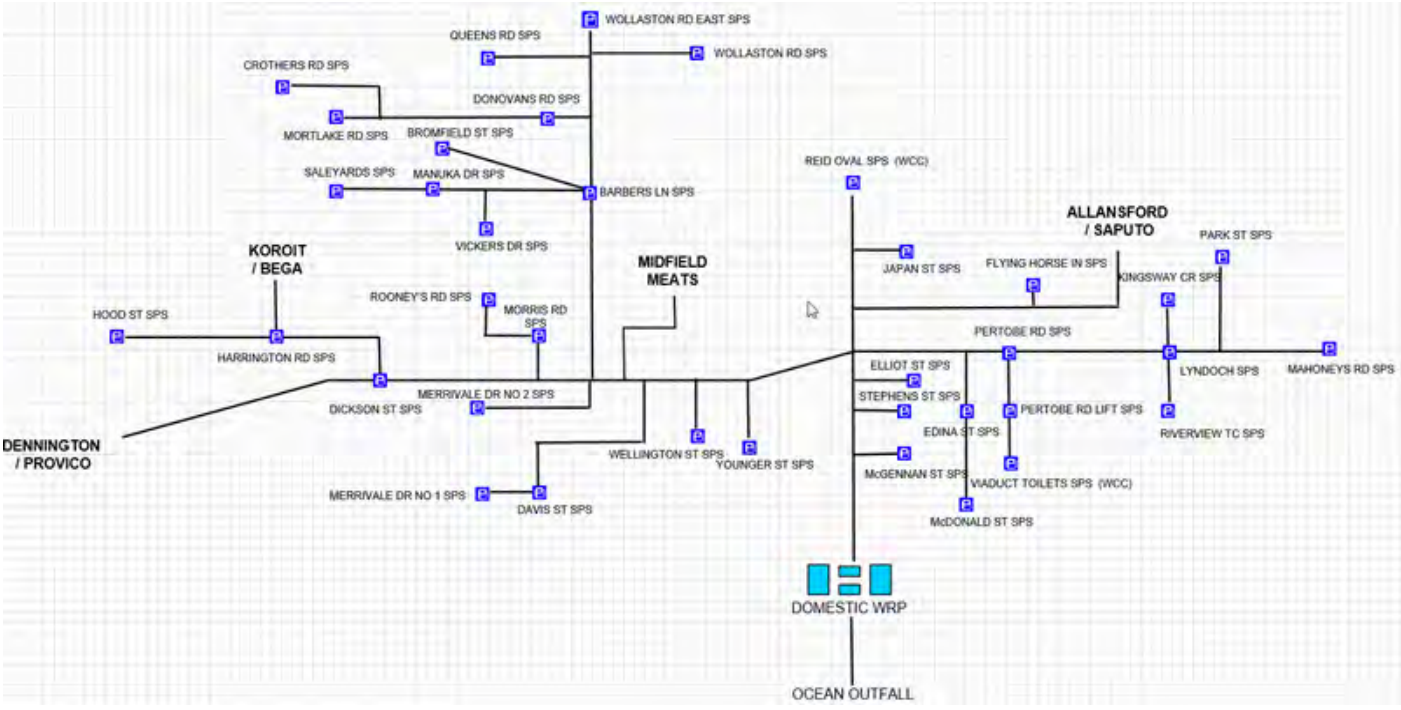


Figure 41 - Warrnambool Sewerage System schematic

Warrnambool Sewage Treatment Plant

Table 14 - Warrnambool sewerage infrastructure summary

Number of customers	17,400 (including Koroit and Allansford
Pipe network	300 kilometres of pipe of different materials and sizes
Sewer pump stations (SPS)	37 - Barbers Lane SPS (major), Japan Street SPS (major), Morris Road SPS (major), Dickson Street SPS (major), Harrington Road SPS (major), Lyndoch SPS (major), Pertobe Road SPS (major), 30 other minor SPS.
Treatment facilities	Warrnambool STP - IDEA plant
Re-use/discharge	Minor re-use on site as part of cleaning processes of STP
Year sewered	1937
Major waste suppliers	Saputo (supplied from Allansford) - annual volume 1700 ML Midfield Meat - annual volume 550 ML Warrnambool Saleyards - annual volume 60 ML Provico - annual volume 200 ML wastewater, 100 ML condensate Bega - annual volume 80 ML

Actions

The Warrnambool STP has reached its capacity, prompting a substantial upgrade which has received EPA works approval and will be constructed over the coming years. It involves the construction of a new influent pump station, a new inlet screening facility, two new IDEA tanks and an additional effluent screening before discharge. The project will also include disinfection of effluent discharged from the new and existing IDEA tanks.

The upgrade will cater for the anticipated growth in residential and industrial loads over the coming 15-20 years.

A condition of the works approval is to further explore the options of reducing the environmental impact of the ocean discharge. The options will include extension of the ocean outfall, higher level of treatment and reducing the volume of effluent discharged to the ocean through re-use. The investigation is expected to be completed by 2025 following extensive analysis into the options and engagement with the community and key stakeholders.

Portland

Raw sewage is collected at three major pump stations around Portland and is pumped via a pressure pipeline to the STP. To begin the treatment process, sewage undertakes a step screening process that removes any large items and rubbish, which is collected and washed before being disposed. Sand and grit is removed from the sewage via the grit removal channel.

The treatment plant uses an IDEA process which uses four one-hour cycles to treat the sewage. The four cycles include two stages of aeration, settling and decanting the treated water from the surface of two tanks. Treated water then travels through a UV disinfection system which assists in eliminating harmful bacteria.

Sludge is removed from the bottom of the two treatment tanks and pumped to drying beds where excess water is removed. The dried sludge is then stabilised and re-used as soil conditioner

Following treatment, the effluent is discharged to ocean under gravity via a 450mm diameter pipeline. The receiving environment is at the base of steep cliffs and is of a very turbulent nature, with natural formations aiding in the mixing and dispersion away from the shoreline. The quality of water discharged is of a high standard in compliance with the EPA discharge licence.

The treatment plant has sufficient spare capacity to meet expected growth over the coming 10 years and further detailed analysis will be done in the next five years to determine augmentation requirements over the 50-year timeframe.

Actions

Over the next five years we will be investigating the sludge management process at Portland as well as investigating how we can be more efficient at managing peak flows and optimise treatment plant efficiency when operating at capacity.

Portland Sewage Treatment Plant

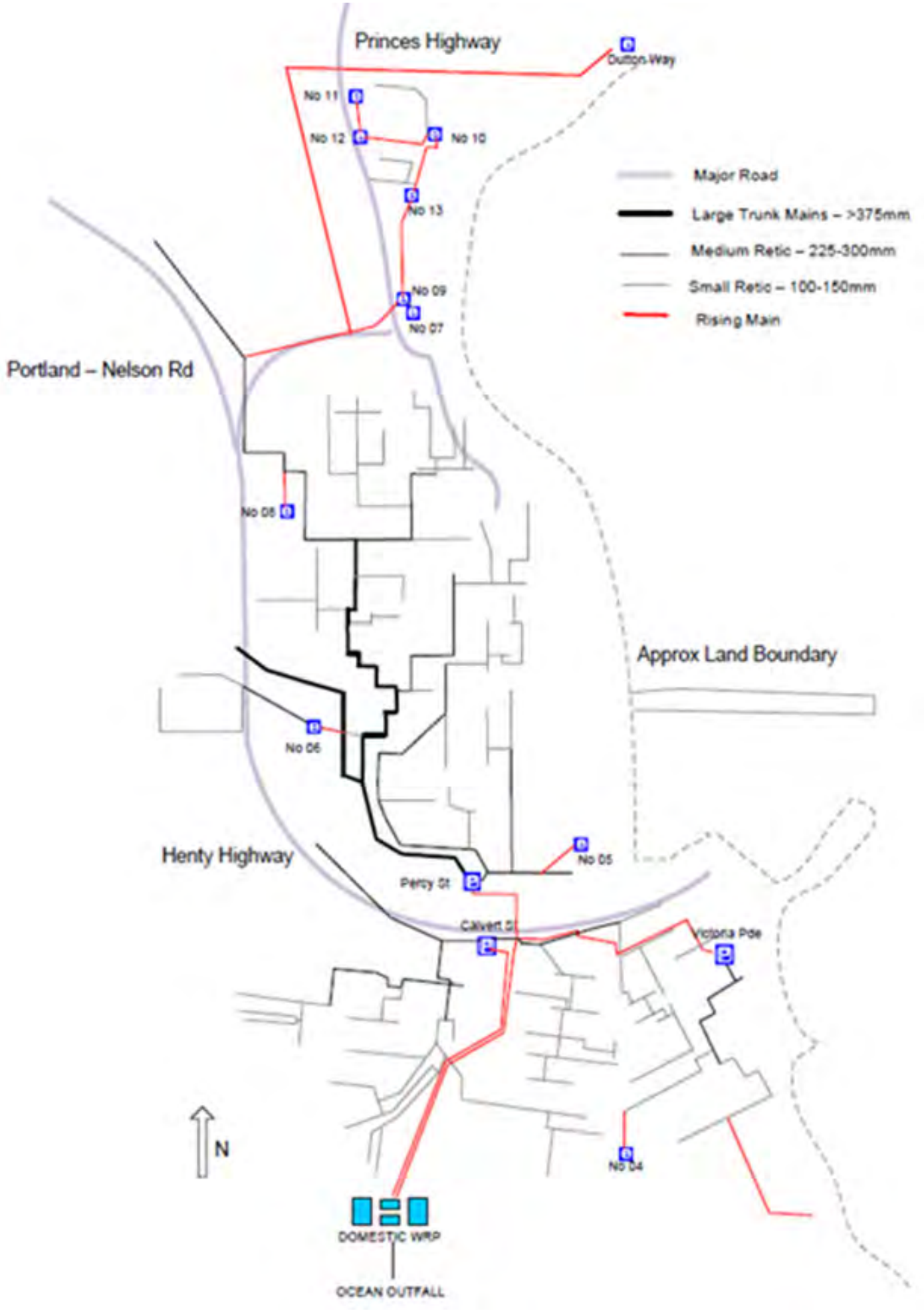


Figure 42 - Portland Sewerage System schematic

Port Fairy Sewage Treatment Plant

Port Fairy

The raw sewage is collected via 18 pump stations around Port Fairy and is pumped via a single pump station to the STP. The raw sewage undertakes a screening process which collects and washes large items and rubbish before it is further treated.

The treatment plant uses an IDEA process, which uses four one-hour cycles to treat the sewage. The four cycles include two stages of aeration, settling and decanting the treated water from the surface of the tank. Treated water then travels through a UV disinfection process, which assists in eliminating harmful bacteria. Clear water is then released to the ocean.

The wastewater from Sunpharma is transferred to a dedicated treatment plant also located at the treatment site. It has the same process, but is not disinfected due to there being no human waste in their discharge.

Sludge is removed from the bottom of the tank and de-watered using a belt press, which squeezes out excess water. The dried sludge is then stabilised and re-used as a soil conditioner.

Following treatment, the effluent is pumped via a 300mm diameter pipeline discharging south of Griffith Island. The receiving environment is of a very turbulent nature, with natural formations aiding in the mixing and dispersion away from the shoreline. The quality of water discharged is of a high standard in compliance with the EPA discharge licence.

The treatment plant has sufficient spare capacity to meet expected growth over the coming 10 years and further detailed analysis will be done in the next five years to determine augmentation requirements over the 50-year timeframe.

Actions

Over the next five years, we will:

- Undertake a review of the treatment processes at the Port Fairy plant to ensure we are optimising the treatment of both the industrial and residential waste streams. Our intentions are to explore how we can further improve the level of treatment at this site or make our processes more efficient.
- Investigate the re-use opportunities for treated wastewater currently discharged to ocean.
- Develop a business case to understand the cost-benefit trade-offs of treating sewage to a higher quality than our EPA licensing.

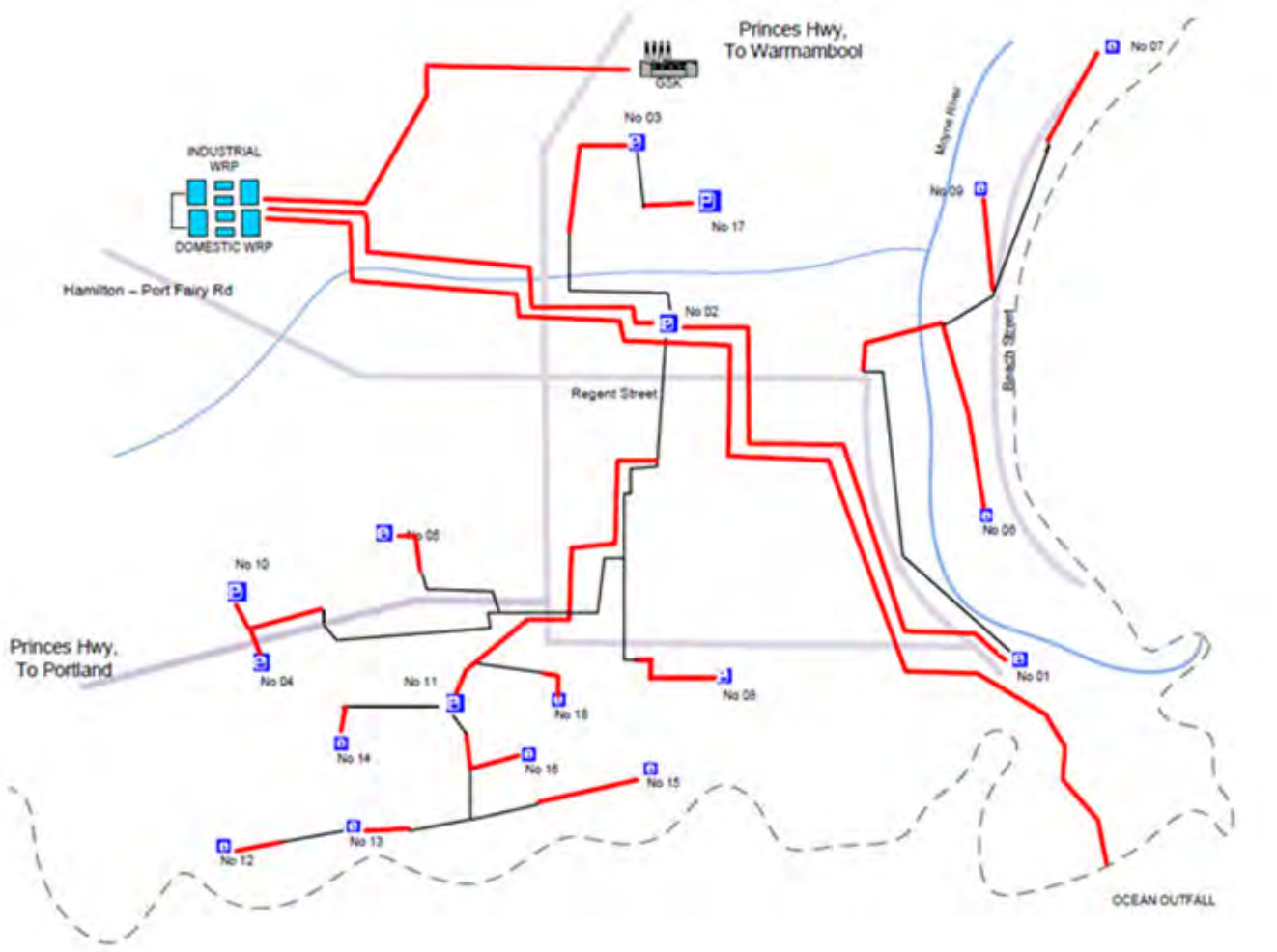


Figure 44 - Port Fairy Sewerage System schematic

Our inland lagoon sewerage systems

We have 13 towns that are serviced by lagoon-based sewage treatment systems.

This is where we collect an area's sewage and wastewater and transfer it to large storages where it is retained for a distinct amount of time so it can aerate. Biological processes reduce the organics and harmful products over a set detention time.

We monitor the levels of these nutrients and adhere to strict EPA limits before the treated wastewater can be re-used, irrigated or discharged as appropriate to the wastewater site. Table 15 (next page) summarises each township and the end use of each of the lagoon-based systems.

For most of these townships, minimal growth and, in some cases, population decline is expected. Therefore, there is a high degree of confidence that the existing treatment capacity at these sites will be adequate in the future.

We are still investing in these systems to ensure we have a sufficient irrigation area and winter storage capacity to cater for wet years. Table 16 (next page) details the actions we will be focusing on in the next five years for these systems.

Camperdown Sewage Treatment Plant

Table 15 - Lagoon-based sewage treatment and end use	
Township	**End use**
Simpson	EPA licence to discharge
Mortlake	Re-use, irrigation
Timboon	Re-use, irrigation
Dunkeld	Re-use, irrigation
Peterborough	Re-use, irrigation
Coleraine	Re-use, irrigation
Heywood	EPA licence to discharge and irrigation
Port Campbell	Re-use, irrigation
Casterton	Re-use, irrigation
Terang	Re-use, irrigation
Cobden	EPA licence to discharge and irrigation
Hamilton	EPA licence to discharge and irrigation
Camperdown	Re-use, irrigation

Table 16 - Lagoon-based sewage treatment action plan	
Action	**Description**
Lagoon improvement works	Ongoing dam safety program to maintain our dam walls at an optimal standard. This program often includes the replacement of rip rap and other material..
90th percentile wet year compliance investigation	We are currently undertaking an investigation using external consultants to determine which of these systems are compliant with EPA regulations for 30A discharges. A list of recommendations and actions will then be reviewed for further implementation.
Improved data systems and monitoring for inflow and infiltration	As these systems age, they are prone to Inflow and Infiltration due to cracks and defects in sewers. Over the next five years we will be implementing data reporting using Power Bi to track inflow and infiltration on an annual basis.

Port Campbell Sewage Treatment Plant

Appendix 1 - Urban Water Strategy Engagement Report

Engagement objectives

The objective of our engagement was to understand customers' and other stakeholders' expectations and views on a range of topics to inform the development of the 2022 Urban Water Strategy, our 50-year water and sewerage strategic plan. We have taken an iterative approach to engagement since 2018, and our objectives have been not only to engage, but also to educate on the following topics which align with the Department of Environment, Land, Water, and Planning (DELWP) guidelines for the development of Urban Water Strategies:

- Values and uses of water
- Appropriate levels of service and willingness to pay
- Drought preparedness and response
- Long-term water security (supply and demand etc)

Engagement approach

Wannon Water defines engagement as "a genuine process of working with people to build capacity, strengthen relationships and inform decisions". Our engagement work is guided by our community engagement framework. Aligned to the International Association of Public Participation (IAP2) principles and approach, this framework requires each engagement to follow a specific process (see below).

In this process we agree on the purpose of our engagement; seek to understand those with whom we want to engage; design an appropriate engagement including appropriate engagement tools and approaches; deliver engagement, review information; and provide feedback on the outcomes and then learn from the process. Like all our engagements, engagement for the Urban Water Strategy has followed this process.

Engagement for the 2022 Urban Water Strategy started in 2018 as part of our annual Wannon Water Engagement Cycle (WWEC), and each year has built on the feedback from customers and community from the previous year(s). Incorporating this engagement into our annual engagement cycles helps us to develop a richer understanding of our customers' and communities' priorities over time while minimising engagement fatigue.

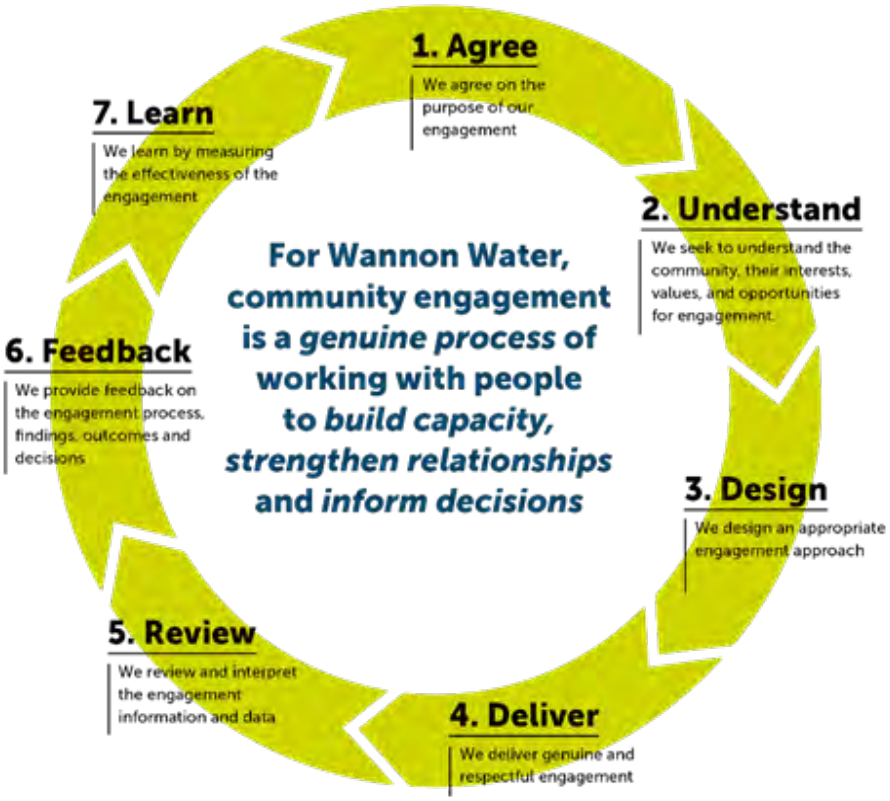
Engagement undertaken to inform our Price Submission (2018-2023 and 2023-2028), which sets our activities, investments and maximum customer prices for each five-year regulatory period, has also contributed to this Urban Water Strategy Engagement Report.

Wannon Water Engagement Cycle (WWEC)

The WWEC is an annual process that ensures customers, stakeholders and community members can provide valuable input and advice to help inform our decision-making, quality improvement and annual Corporate Plan.

The WWEC builds on what we learnt from the 2018-2023 Price Submission engagement and ensures that engagement is an ongoing process within the organisation.

It supports sound governance and recognises the capacity for Wannon Water to produce better outcomes for our region. It also delivers on on our customer promise that we will "be responsive and willing to adapt as their needs change".



Stakeholder groups

Feedback is sought annually from south-west stakeholders to ensure the diversity of our region is represented in the WWEC.

From 2018 – 2021, we specifically engaged the following stakeholders for the Urban Water Strategy engagement:

- Regional Advisory Forum (Wannon Water's peak advisory body)
- Traditional Owners
- Aboriginal Water Officers
- Water users
    - Residential property owners / renters
    - Rural property owners
    - Businesses
    - Non-paying customers
- Property developers
- Major customers (industry)
- Vulnerable customer representatives
- Small communities including Penshurst
- Port Fairy, Heywood and Portland communities
- Local government
- Neighbouring or connected water corporations
- Catchment Management Authorities.

Engagement methods

Our engagement has been planned each year (2018-2021) to gather customer and stakeholder input to inform the Urban Water Strategy development.

A detailed engagement plan for 2021 has been prepared. The table below outlines the primary methods for how customers and stakeholder groups were engaged.

Engagement methods				
Tools/activity*	**2018**	**2019**	**2020**	**2021**
Online surveys (Engage & Explore) N=131			N=35	N=96
Online comments (Engage & Explore) N=16		N=13		N=3
Online focus groups N=112			N=58	N=54
Face-to-face focus groups N=280	N=129	N=151		
Customer Value Surveys N=4790	N=1348	N=1090	N=1238	N=1078
Stakeholder Perception Reviews N=121	N=56			N=65
Water Services Association of Australia (WSAA) surveys N=198		N=98		N=100
Monthly Pulse surveys N=414				N=414
Small Town Roadshow N=65				N=65
Great Tasting Water Project N=844			N=644	
Penshurst information session		Unavailable*		N=26
Major customer engagement	Internal	Internal		N=17
Property developer engagement	N=4	Internal		N=6
Integrated Water Management (IWM) forums				
Ongoing engagement with Traditional Owners and Aboriginal water officers	Refer to page 79 for engagement details			

The total participation is not available for some activities as this data was not collected at the time

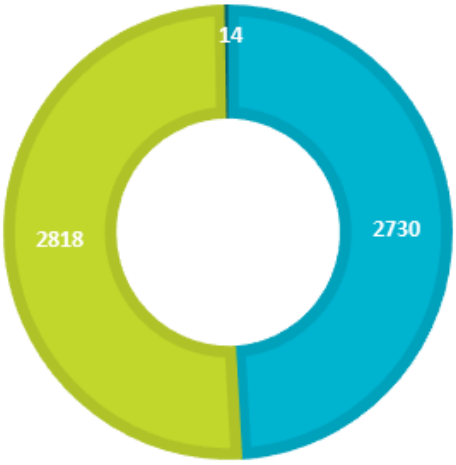
Demographic profile

We have applied a continuous improvement process to our engagement approach over the years to ensure we are capturing appropriate levels of participation across different stakeholder groups and geographical locations. For the purposes of this report, there are four sources of data that include demographic information on respondents:

- Annual engagement programs 2020 and 2021 – in-house engagement rounds
- Monthly Pulse Surveys (Sept, Oct, Nov, Dec 2021) - independent research
- Water Services Association of Australia (WSAA) 2019 and 2021 – independent research
- Customer Value Surveys 2018, 2019, 2020 and 2021 – independent research

The below gives a breakdown of our demographic data collected from 2018-2021. There are some gaps in our data where these demographics have not been collected, or have been collected inconsistently and this is noted as required on the relevant data summaries.

Gender, N=5,562



Male

Female

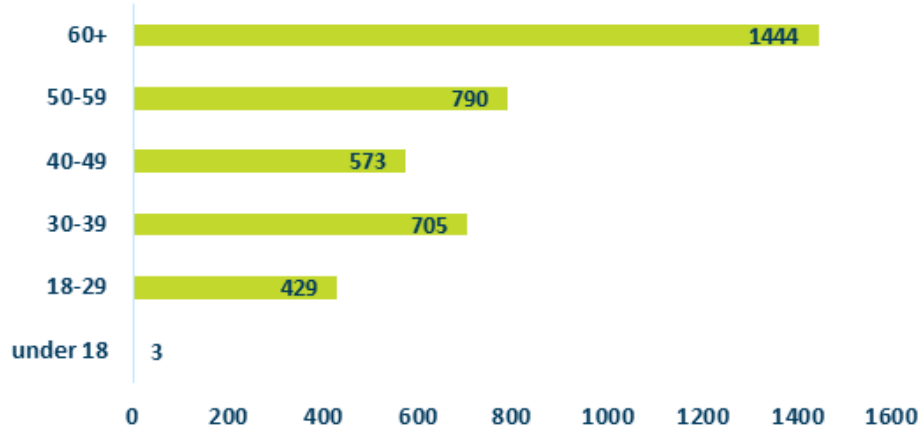
Non-binary

Prefer not to disclose

Data sources:

- *Annual engagement programs (2020 and 2021)*
- *Monthly Pulse Surveys (Sept, Oct, Nov, Dec 2021)*
- *Water Services Association of Australia (2019 and 2021)*
- *Customer Value Surveys (2018, 2019, 2020 and 2021)*

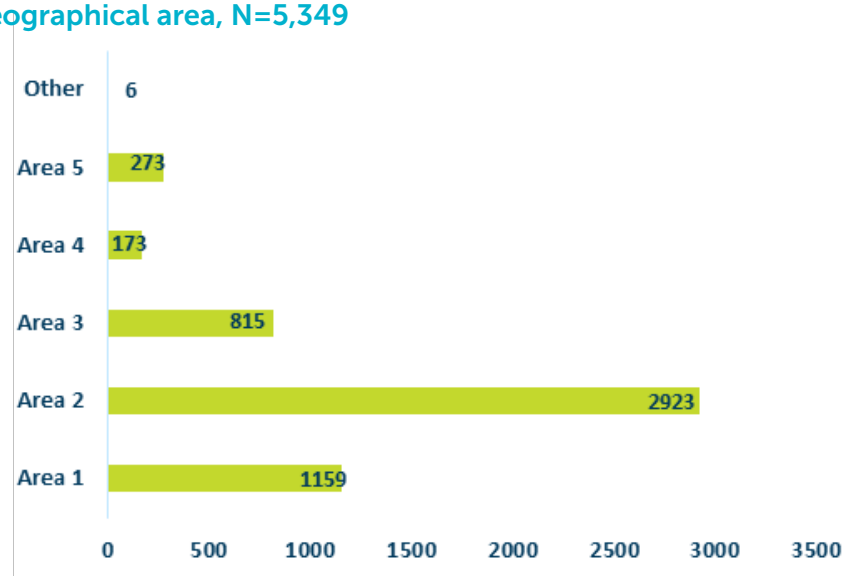
Age, N=3,944



Data sources:

- *Annual engagement programs (2021)*
- *Monthly Pulse Surveys (Sept, Oct, Nov, Dec 2021)*
- *Customer Value Surveys (2018, 2019, 2020 and 2021)*

Geographical area, N=5,349

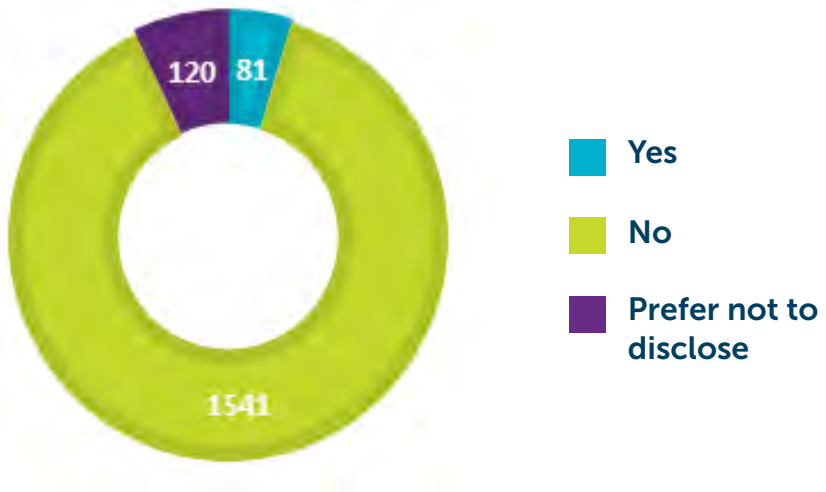


Data sources:

- *Annual engagement programs (2020 and 2021)*
- *Monthly Pulse Surveys (Sept, Oct, Nov, Dec 2021)*
- *Customer Value Surveys (2018, 2019, 2020 and 2021)*

Area 1: Portland, Heywood, Port Fairy.
Area 2: Allansford, Noorat/Glenormiston, Camperdown, Cobden, Koroit, Lismore/Derrinallum, Mortlake, Purnim, Simpson, Terang, Warrnambool.
Area 3: Balmoral, Caramut, Cavendish, Dunkeld, Glenthompson, Hamilton, Penshurst, Tarrington.
Area 4: Peterborough, Port Campbell, Timboon.
Area 5: Dartmoor, Casterton, Coleraine, Macarthur, Merino, Sandford.

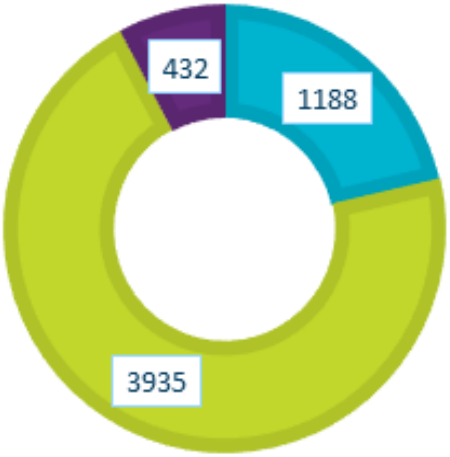
Aboriginal or Torres Strait Islander descent, N=5,342



Data sources:

- *Annual engagement programs (2020 and 2021)*
- *Monthly Pulse Surveys (Sept, Oct, Nov, Dec 2021)*
- *Customer Value Surveys (2018, 2019, 2020 and 2021)*

Concession card holder, N=5,555



Yes

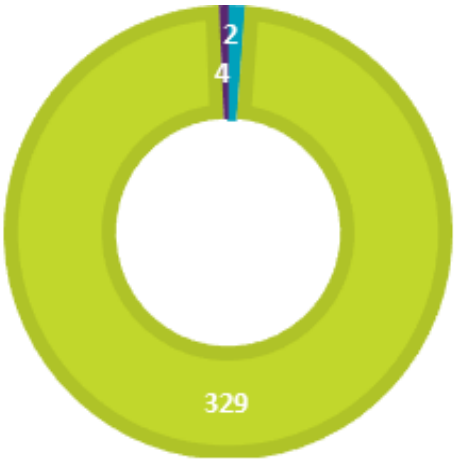
No

Prefer not to disclose

Data sources:

- *Annual engagement programs (2021)*
- *Monthly Pulse Surveys (Sept, Oct, Nov, Dec 2021)*
- *Customer Value Surveys (2018, 2019, 2020 and 2021)*

English as a second language, N=335



Yes

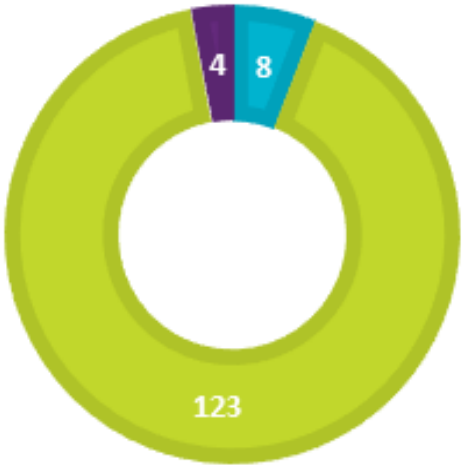
No

Prefer not to disclose

Data sources:

- *Annual engagement program (2021)*
- *Water Services Association of Australia (2019 and 2021)*

Living with a disability, N=135



Yes

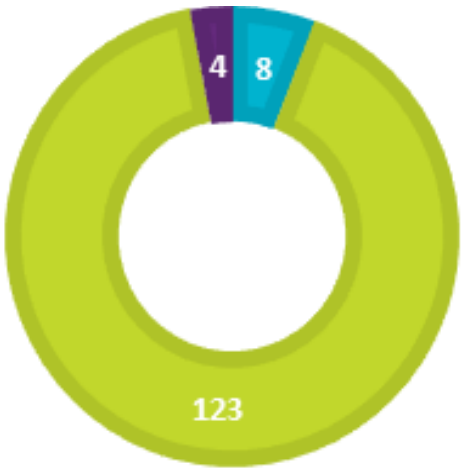
No

Prefer not to disclose

Data sources:

- *Annual engagement program (2021)*

Birth country Australia, N=134



Data sources:

- *Annual engagement program (2021)*

Engagement at a glance

Top five themes for the Urban Water Strategy

Topic	Customer feedback
Water quality	Concern with water quality including taste, smell and hardness continues to be the leading reason for level of dissatisfaction and lower perceptions of value across some service regions.
Climate change and carbon neutrality	Actions to address climate change in relation to water security, and Wannon Water becoming carbon neutral are increasingly topics being discussed and prioritised by our customers and community
Water conservation	Customers and the community have continually shown that they value water saving, conservation initiatives and education.
Water sources	Customers value the investigation of recycled water as a water supply option into the future for irrigation or industrial applications.
Water restrictions	Customers were generally satisfied with the current level of water restrictions (currently permanent water saving rules only).

Engagement findings

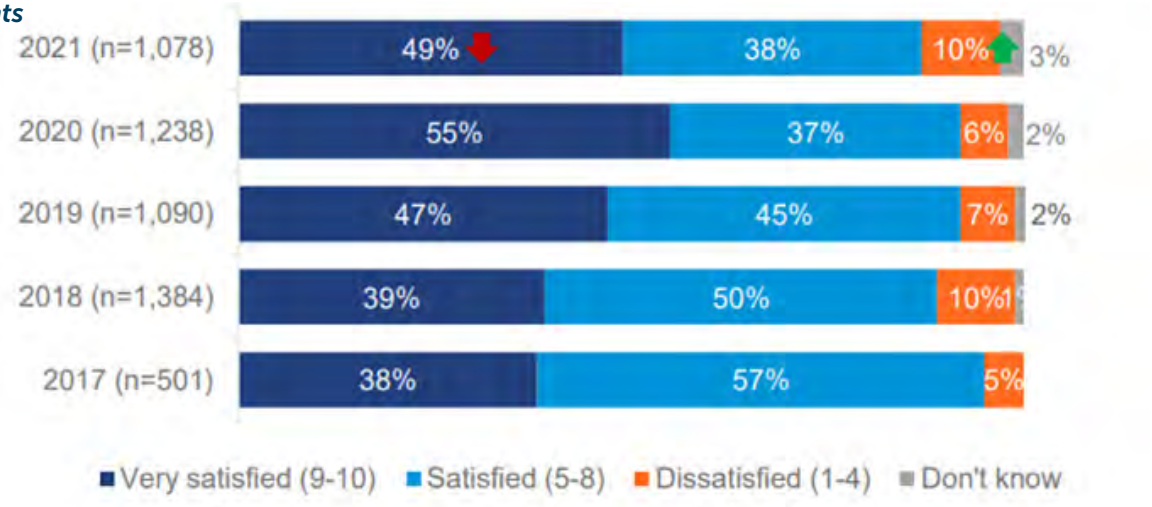
Topic 1 – Appropriate levels of service and willingness to pay

Customer Value Survey results

Since 2018, we have conducted an annual market research which has reached a sample size of 4,790 participants in our region. The surveys have checked in with customers how we are performing in relation to our key performance indicators, including levels of service and customer satisfaction. Overall satisfaction with Wannon Water increased from 2018 to 2020 (89% - 92%), but decreased in 2021 (87%).

Overall satisfaction with Wannon Water's services (Customer Value Survey 2021, page 16)

Base: all respondents



Water quality

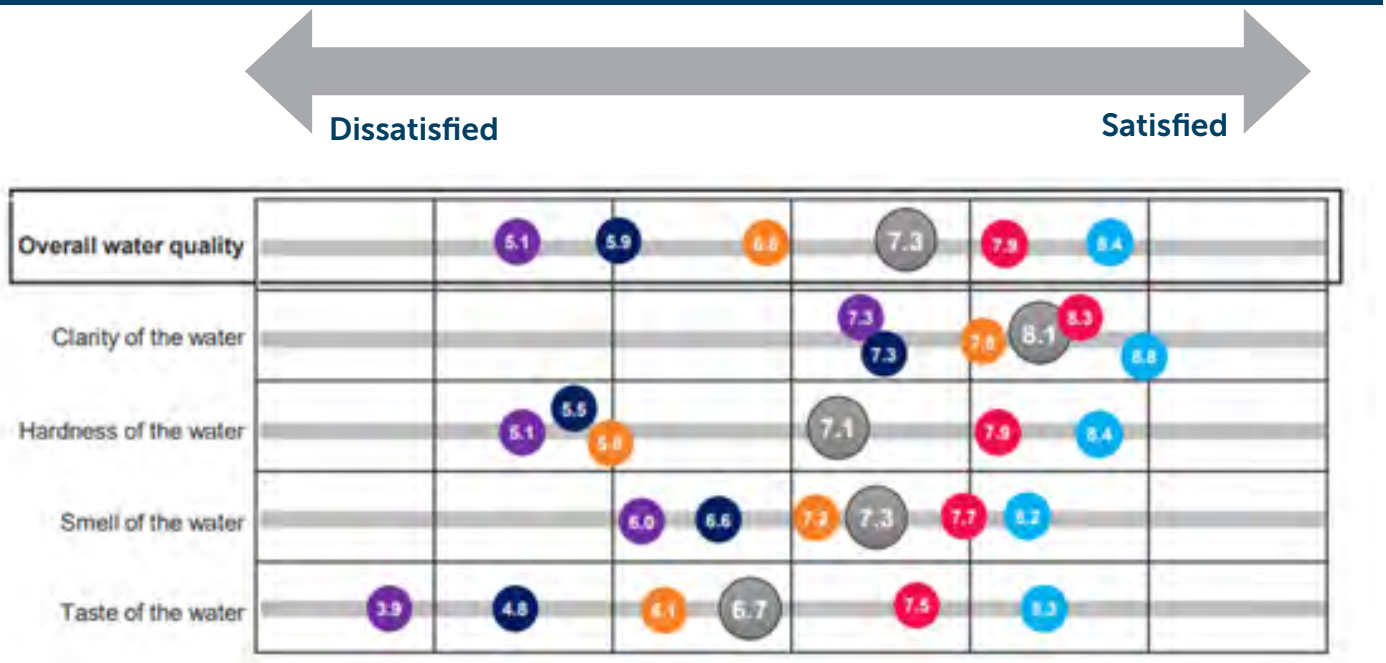
In 2021, 76% of customers said they drink the water they receive from Wannon Water, and almost all customers who drink the water were satisfied with the water quality (91%). Satisfaction with water quality among those who drink our water has remained stable over time.

In 2021, water quality emerged as one of the key drivers for satisfaction in comparison to previous years (in addition to value for money and customer service).

Over the years, results have consistently shown that there is a significant disparity in quality of water across our five service areas, with lower levels of tap water consumption in Area 1 (Portland, Heywood and Port Fairy) and Area 5 (Dartmoor, Casterton, Coleraine, Macarthur, Merino and Sandford), where more towns are supplied with groundwater higher in mineral salts, compared to the rest of the region This feedback has resulted in targeted engagement in these service areas, including the Great Tasting Water Project in 2020 as discussed below.

There have been concerns around taste and water quality in some parts of the region which has been key in the decline of overall satisfaction levels in 2021 compared to previous years. A perceived bad taste has remained the highest reason for dissatisfaction in water quality since 2018, followed by undrinkable water and chemical elements in water/hard water/chlorine/fluoride.

Satisfaction with aspects of water quality - average score (Customer Value Survey 2021 page 43)



All respondents (n=1,238)

Area 3 - Balmoral, Caramut, Cavendish, Dunkeld, Glenthompson, Hamilton, Penhurst, Tarrington (n=197)

Area 4 - Portland, Heywood, Port Fairy (n=270)

Area 4 - Peterborough, Port Campbell, Timboon (n=37)

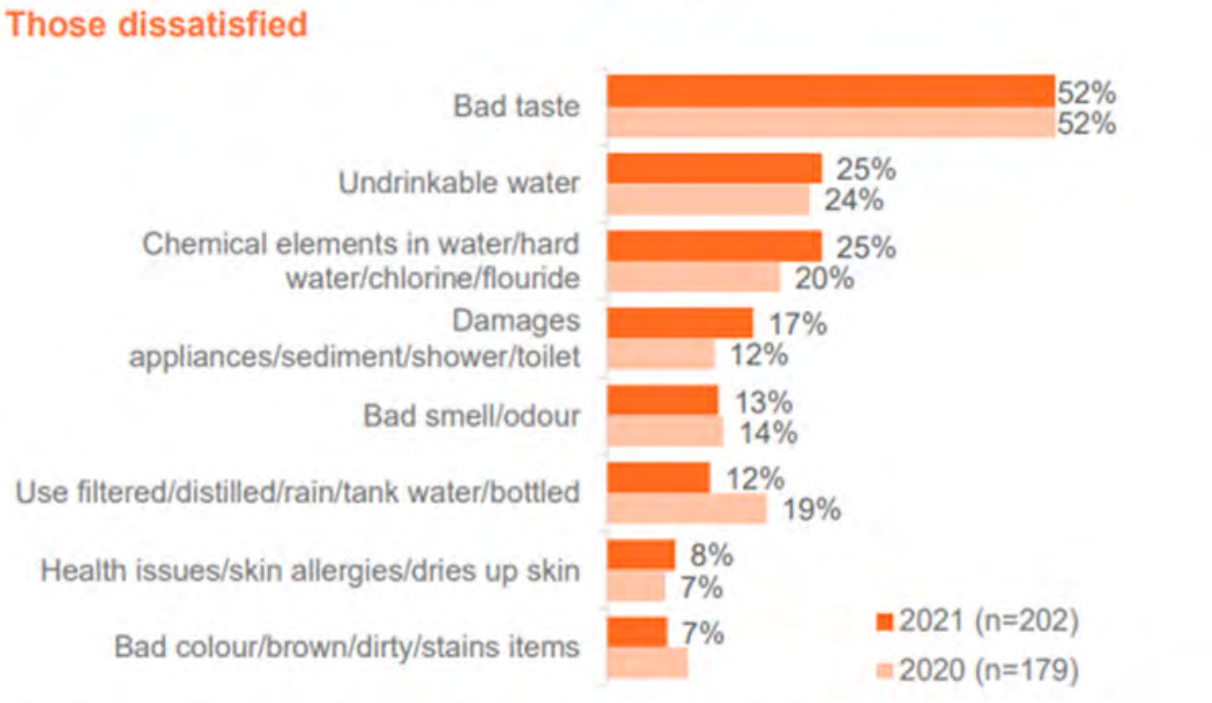
Area 2 - Allansford, Noorat/Glenormiston, Camperdown, Cobden, Koroit, Lismore/Derrinallum, Mortlake, Purnim, Simpson, Terang, Warrnambool (n=664)

Area 5 - Dartmoor, Casterton, Coleraine, Macarthur, Merino, Sandford (n=70)

As has been the case in previous years, customers in Areas 1 and 4 continued to be among those least satisfied with all aspects of water quality, while those in Areas 2 and 3 remained the most satisfied. Taste of the water is particularly an issue for those in Areas 1 and 4, and levels of satisfaction on this have also declined since last year (4.7 to 3.9 in Area 1 and 5.7 to 4.8 in Area 4.

Reasons for disatisfaction with Wannon Water's water quality (Customer Value Survey 2021, page 51)

Base: those who rate their satisfaction with Wannon Water's water quality as 0-4



Q.11. Why are you dissatisfied with Wannon Water's water quality over the last 12 months?

Service interruptions

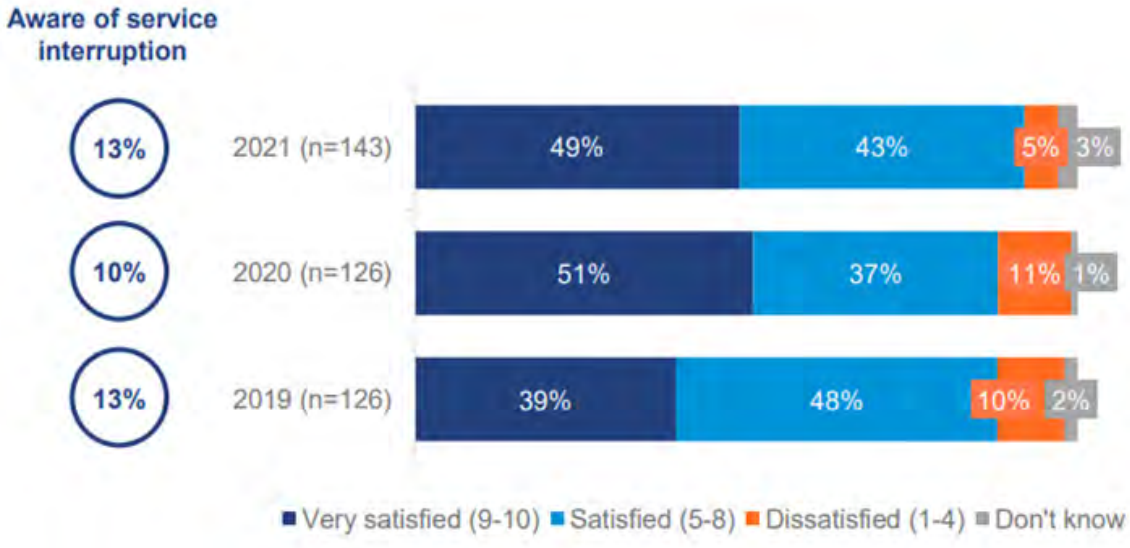
Over the past few years, levels of satisfaction (satisfied and very satisfied) with the management of service interruptions has improved (87% in 2019 to 92% in 2021).

Similar to previous years, in 2021 customers living in Areas 3 (Balmoral, Caramut, Cavendish, Dunkeld, Glenthompson, Hamilton, Penshurst, Tarrington) and 4 (Peterborough, Port Campbell, Timboon) were significantly more likely to be aware of a supply interruption (19% and 31% respectively). Residential customers were significantly less likely to be aware of a supply interruption (11% vs. business 17%).

Dissatisfaction with management of interruption services was mainly due to lack of prior notification.

They never let me know when they cut the water off - 2018 Customer Value Survey respondent

Satisfaction with management of service interruptions (Customer Value Survey 2021, page 53)



Water supply reliability and water pressure

Overall satisfaction with water supply reliability has remained steady over past three years. The proportion of 'very satisfied' customers is down slightly in 2021 compared to 2020.

Dissatisfaction with water supply reliability mainly stems from bad taste, bad quality water and chemical elements in water/hard water.

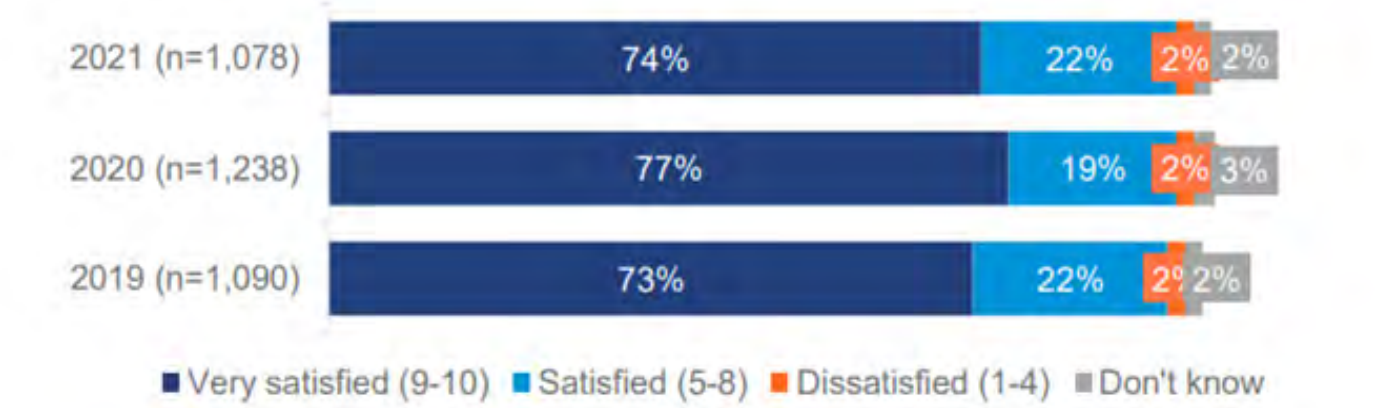
Satisfaction levels with water pressure has also remained stable, with 92% of customers either satisfied or very satisfied with water pressure in 2018 compared to 91% in 2021.

However there has been some feedback about water pressure issues which is why it remains one of the reasons for dissatisfaction with water supply reliability.

Pressure fluctuation is the biggest issue - 2020 Customer Value Survey respondent

Low pressures in Wollaston region - 2019 Customer Value Survey respondent

Overall satisfaction with water supply reliability (Customer Value Survey 2021, page 50)



Sewerage services

Overall, customers satisfied with their sewerage services remained at 93% over the period. Since 2018, the key reason for dissatisfaction with sewerage services is the cost/fees being too high/expensive.

It costs too much. The cost of sewerage alone could pay for a new septic tank every 6 years - 2021 Customer Value Survey respondent

There was a strong uplift this year in the number of customers concerned about water contamination and pollution to waterways (17%). These are the strongest levels to date (5% in 2020 versus 6% in 2019 and 5% in 2018). The issue is of most concern among those aged 18-29 (50%).

Overall, the customer value surveys showed that generally customers perceived our services as excellent or good value for money. To boost perceived value, customers said that we should focus on improving water quality.

Level of satisfaction with sewerage services (Customer Value Survey 2021, page 48)

Wannon Water Engagement Program results

We have promised to provide our customers with safe and reliable water supplies (e.g., minimal interruptions, providing safe drinking water to homes and businesses). As part of our engagement in 2021, we asked customers via an online survey if they agree we are delivering on this promise.

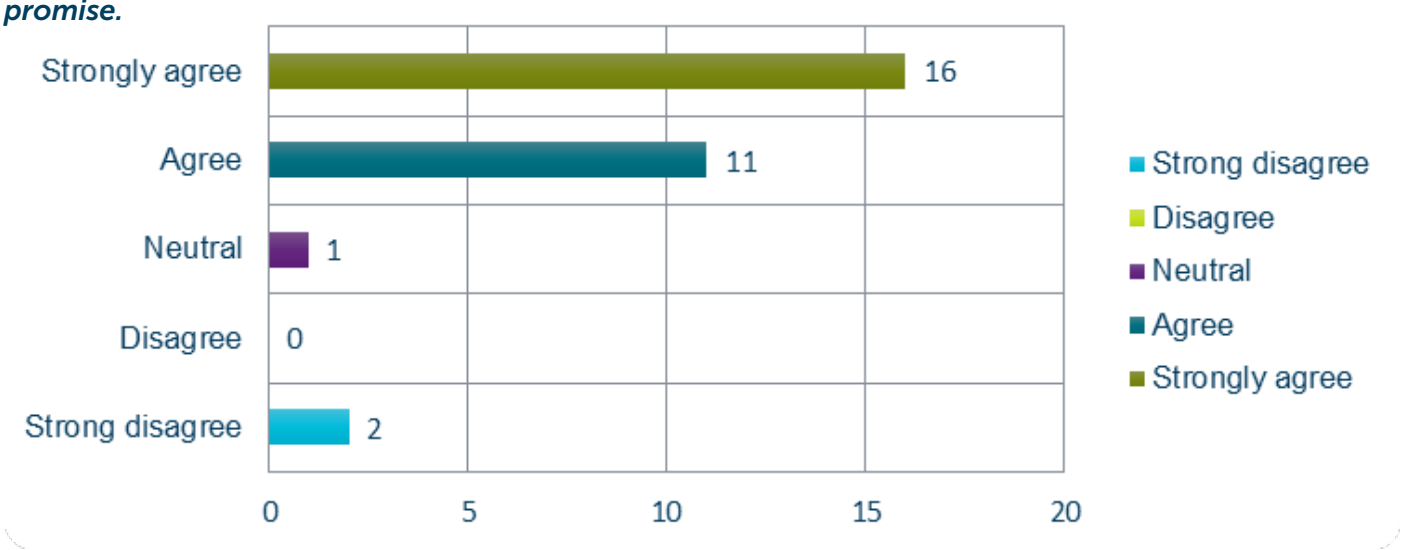
Ninety per cent of respondents (n=30) indicated they agreed or strongly agreed. Some suggestions for improvement included water quality, water pressure and water taste.

Only 51% of respondents agreed that we provided sewerage services that protect public health and the environment and 42% agreed that we are protecting and enhancing the environment in line with community expectations. This low level of agreement reflects what we heard in the 2021 Customer Value Survey about customer concerns about water contamination and pollution of waterways. These issues may have become forefront for some people as a result of a 2017 plastic contamination incident at Shelly Beach and the Warrnambool Sewage Treatment Plant upgrade plans.

In 2018, we received strong feedback about the poor taste and odour of the water supply (in groundwater regions). Scaling as a result of the water quality (in groundwater supply towns) was also considered a cost to residents, small to medium businesses and industry. We heard similar feedback in 2019, with customers saying that taste is a driver in perception of value (both groundwater and/or chlorine taste).

Customer promise (2021 annual engagement cycle)

We have promised to provide safe and reliable water supplies for our customers. As part of our engagement in 2021, we asked customers via an online survey if they agree we are delivering on this promise.



Great Tasting Water Project results

The trend about poor water quality across specific geographical areas was reflected strongly through our annual engagement cycles in 2018 and 2019.

This resulted in a targeted program in 2020, known as 'Great Tasting Water', to engage households and businesses in service Area 1 (Portland, Heywood and Port Fairy). The engagement findings from this project showed that 75% (n=583 participants) of survey participants in Heywood, Portland and Port Fairy do not drink the tap water, which resulted in half of participants purchasing bottled water to drink at home.

The water quality impacted residents in many other ways, including negative health outcomes, frustration with scale residue on appliances, negative impact on washing clothes, corrosion of appliances and impact on tourism and reputation.

... the health impact is significant too as our kids will actively avoid drinking tap water (at school, kinder, day care, home, cafes, other community venues) because of the taste - Household survey participant.

Visitors are reluctant to come to visit Portland due to the water taste and are quite derogatory about this - Household survey participant.

I don't think it's good for the environment having to purchase water in plastic bottles. - Household survey participant.

We are using this feedback to build a business case with high level options analysis of alternative technologies/ water sources and consideration of funding models. We are preparing an updated engagement plan, taking into account opportunities with the Authorising Environment and the need for further community engagement.

Strategic customers - engagement results

We have ongoing engagement with our major customers. In 2021, we engaged directly with strategic customers in key industries in the region. A theme that emerged from these interviews, was that water pressure was a concern for some businesses. Two businesses have installed booster pumps to receive adequate water pressure for their operations.

The interviews also highlighted that water quality was seen as a priority over water security with a focus on safety for consumption, nitrogen levels, conductivity, odour and the impact of blue green algae outbreaks. It was noted that open communication between the customer and Wannon Water was valued, especially if there are network disruptions which will impact operations.

Topic 2 - Drought preparedness and response

In 2021, customers and community were asked in the online surveys and focus groups what water uses they would prioritise if water was scarce during dry times. Household use, environment (to support natural eco-systems) and farm use (e.g., irrigation, stock) were the top three options selected in the online survey. The same results were collected from respondents in the online focus groups (refer graph below).

After providing context about our Permanent Water Saving Rules, we asked customers if they were satisfied with their current level of water use according to the rules.

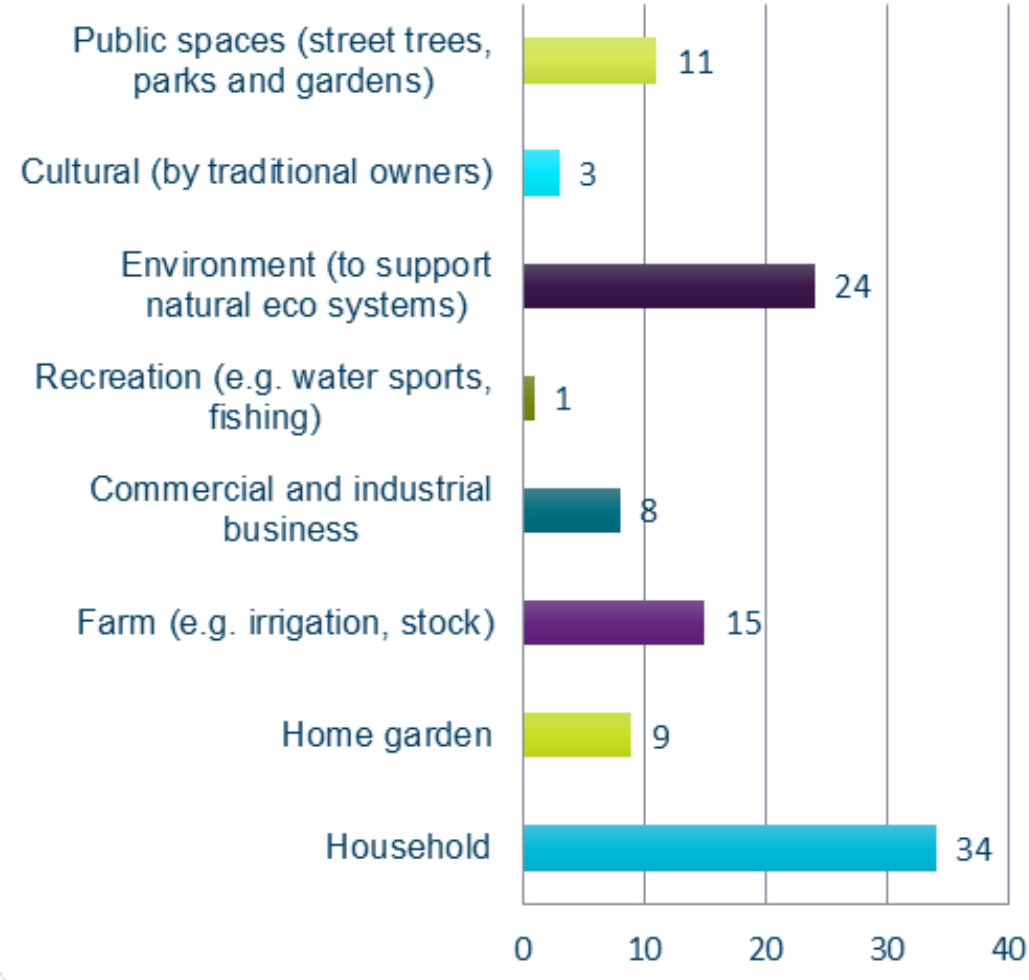
Seventy-three per cent of online survey respondents (n=95) were happy with their current levels of services, while 27% of respondents would prefer to have more water restrictions all year round in order to reduce water demand (refer graph top of next page)

Many of our respondents already implemented water saving initiatives in their homes (refer graph bottom of next page).

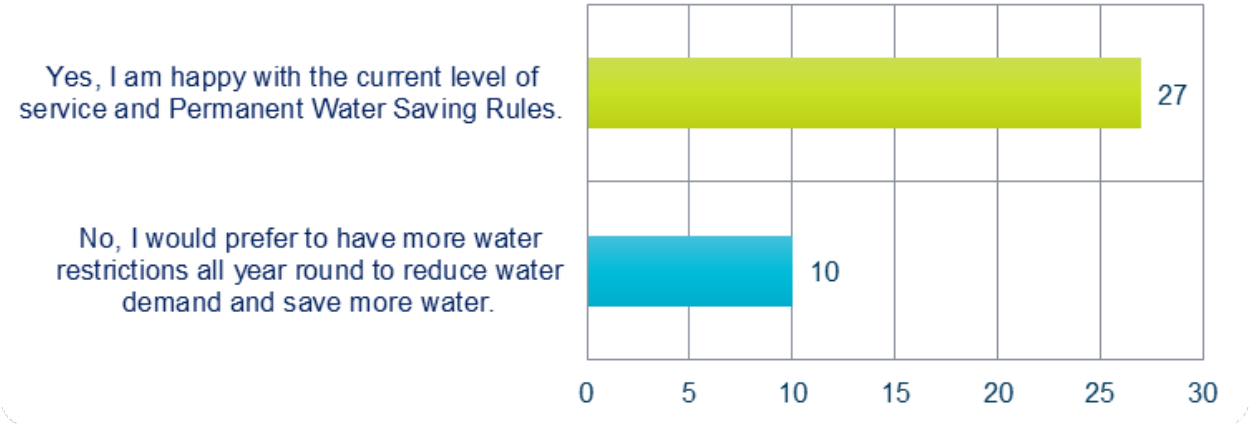
The most common water saving options selected were turning the water off while brushing your teeth (89%), choosing to use water efficient appliances (86%) and installing water saving showerheads (70%). No respondents selected that water saving was not important to them in their home.

The Water Services Association of Australia (WSAA) data from 2019 reveals that 63% of the responded (n=98) believed that water was scarce while 30% didn't not think it was, and 7% did not know.

Prioritisation of water use during dry times (annual engagement cycle 2021, online survey)



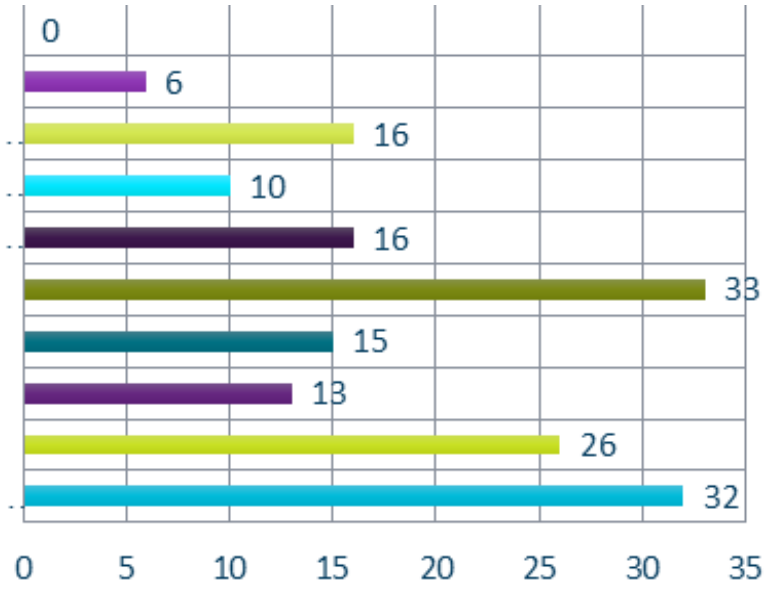
Levels of satisfaction with current water use according to the Permanent Water Saving Rules (annual engagement cycle 2021, online survey)



There is a strong interest from the majority of our customers to learn more about our water sources and conservation. The 2019, 2020 and 2021 engagement cycles revealed that customers value water conservation and education and would like us to proactively promote water conservation initiatives regardless of whether water restrictions are on the horizon or not.

Good water savings habits instilled at an early age make it easy to continue throughout life. Education program is very important for this - 2021 Focus Group participant

Water saving initiatives in the home (annual engagement cycle 2021, online survey)



- Turn water off while you brush your teeth - 33
- Choosing to use water-efficient appliances (water star rating) - 32
- Install water-saving showerheads = 26
- Have a rainwater tank for garden, drinking or household use - 16
- Using sprinklers and watering systems after 5pm and before 10am - 16
- Take timed showers - 15
- Install low-flow taps - 13
- Recycle water where you can e.g. have a bucket in the shower to water your garden - 10
- Use grey water systems for outside showering - 6
- Not important to me - don't do anything - 0

Topic 3 - Long term water security (supply and demand)

Since 2018, a recurring theme with customers and the community, often unsolicited, has been around water security, water efficiency and our ability to provide secure water resources into the future.

We have promised to protect and enhance the environment in line with community expectations, ensure the long-term resilience of our services, and provide sewerage services that protect public health and the environment. From 2018- 2021, we have designed our engagement cycles to engage customers and community about our long-term water planning.

In 2021, the Customer Value Survey indicated that 53% of respondents were satisfied or very satisfied with how we are protecting and enhancing the environment in line with community expectations, while the online survey indicated 43%.

Climate change and water security

In 2020 and 2021, some customers have increasingly placed emphasis on the connection between climate change and water security. After being provided the context about our carbon emissions reduction program, 89% of the online survey respondents via our Engage and Explore online engagement portal, and 100% of the focus groups respondents in 2021, were supportive of our targets.

Some focus group participants suggested that we could be doing more to reduce carbon emissions and our focus should now be on becoming carbon positive.

I want to see those targets to be strengthened, brought forward and made more ambitious – like moving towards carbon positive - 2021 Focus Group participant

Wannon Water are having a good crack at it and moving in the right direction - 2021 Focus Group participant

In comparison to the feedback we received in 2018 and 2019, the results in 2020 and 2021 showed a significantly higher interest in the need to address climate change. In 2019, results showed that customers placed a stronger emphasis on water security compared to efforts to reduce carbon emissions and believed a steady path towards carbon neutrality was best (rather than going hard and fast).

Water conservation

Since 2018, customers have told us that we should be proactively promoting water conservation and efficiency measures and taking a lead in protecting and enhancing the environment.

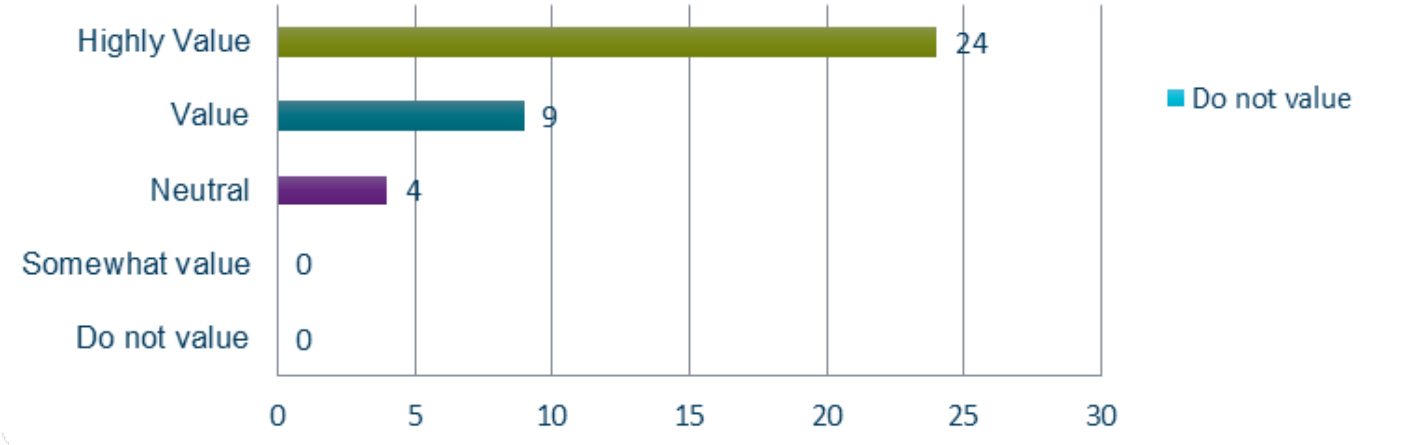
The WSAA data in 2019 revealed that 70% (n=98) of survey respondents thought that the long-term solution to our water shortages is to reduce water consumption.

Education to promote water use reduction was mentioned commonly throughout each year. In 2020, we identified there were opportunities to provide greater education for our customers about urban water systems and water conservation.

In 2021, we asked participants via an online survey if they value education to promote water use reduction and 89% said they either valued or highly valued it, while 11% were neutral (n=37). In addition, 73% of respondents valued or highly valued rebates for water-efficient appliances (refer graph below).

We asked customers via an online survey and online focus groups in 2021 if they agree we should focus on promoting water saving before accessing new water sources. Of the online survey respondents, 89% agreed we should promote water savings before water augmentation options, and 100% of the focus group participants who responded also agreed.

Value of education to promote water use reduction (annual engagement cycle 2021, online survey)



Water augmentation

In 2019, our engagement revealed noticeable customer interest in water security and our ability to secure access to water sources in the Otways in competition with growing populations near Geelong. Customers shared this with us throughout many engagement touchpoints, possibly driven by the impact of drought in other parts of Australia. This was less evident in 2020 and 2021, but feedback showed there was still interest in securing our water supplies into the future.

The WSAA data in 2019 also found 50% of survey respondents (n=98) thought the long-term solution to our water shortages is to increase supply.

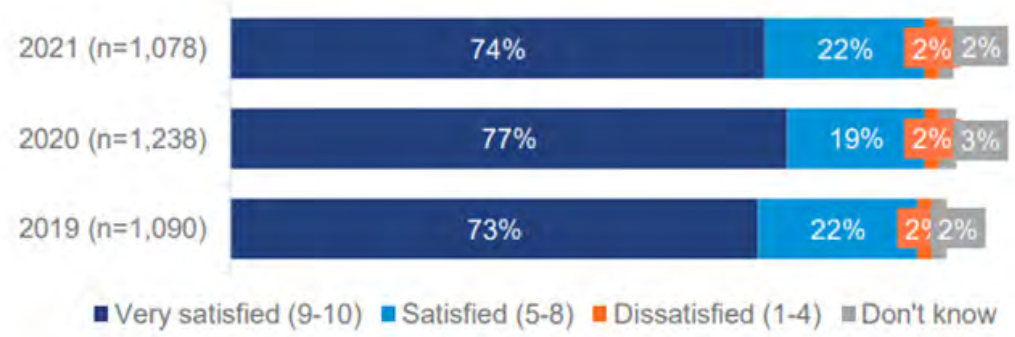
In 2021, a strong theme emerged regarding recycled water and roof water harvesting. The online survey showed that 81% of respondents (n=37) either valued or highly valued the use of recycled water and 92% either valued or highly valued our innovative roof-water harvesting scheme. In comparison, there was less support for investigating desalination with only 32% of respondents either valuing or highly valuing this option.

Overall, the 2021 Customer Value Survey revealed that most customers were satisfied with their water supply reliability. This level of satisfaction has remained steady in the past three years.

Over the next five years, our water sources are secure, so no extra augmentation options will be necessary to keep supply and demand in balance.

While the data showed that some customers were interested in water augmentation options, generally customers thought our water supply in the region was secure and reliable.

Satisfaction with water supply reliability (Customer Value Survey 2021, page 50)



Strategic customers

In 2021, interviews with our strategic customers found 90% are planning for production increases in the next five years. However, they predicted that these would not significantly increase water demand. Some suggested that future operational improvements in that period may reduce water usage. Most of our strategic customers noted that water efficiency and conservation was important to them and some already had water efficiency programs in place.

All strategic customers in 2021 were supportive of our carbon neutrality targets, with some open to a more aggressive approach. Most businesses were open to partnering with us in this space and acknowledge there is little incentive for water efficiency practices. There is also an appetite to partner in water education programs.

Developers

In 2021, our interviews with local property developers revealed there was interest in a more coordinated and strategic approach to future planning between Councils, Wannon Water and private business (other services providers).

Developers told us that they would like to see more strategic planning to cater for population growth.

Topic 4 - Values and uses of water

Traditional Owners

We have an ongoing and collaborative approach to engaging with Traditional Owners in the region. A large part of this collaboration occurs within the Integrated Water Management Forum and representation in the Wata Waetnanda group.

In 2019, 2020 and 2021 the Integrated Water Management Forum improved relationships with Traditional Owners, allowing for more support around projects.

In 2021, following DELWP advice, we also met with the Aboriginal Water Officers from Eastern Maar and Gunditj Mirring Corporations. These organisations showed interest in how we can add a cultural lens to water management and better align government and community needs and expectations. There was also support for a more holistic approach to water management and the need to bring sustainability to the forefront.

Water conservation and education

As discussed in Topic 3, a prominent theme emerged through our annual WWECs that customers value water conservation initiatives and education. The 2019, 2020

and 2021 data all showed that customers thought we should be proactively promoting water conservation and efficiency measures and providing educational opportunities.

While much of this data focussed on water conservation and education at a household level, in the 2021 WWEC some focus group participants also emphasised the need to encourage 'big players' (business and industry) to save water. The participants thought that encouraging business and industry to save water would have the most positive impact on the environment and water conservation. There was interest in how we partner with these bigger businesses to enhance water efficiency programs.

The 2019 data revealed that customers feel we should be proactively promoting water conservation and efficiency measures, regardless of whether water restrictions are on the horizon for our region or not. This feedback shows that customers value our water supply, and think we should be taking action to protect it before it becomes scarce.

Water supply

The data revealed that in terms of water augmentation projects, customers valued recycled water, the roof water harvesting scheme and having the opportunity to have their own rainwater tank supply.

Potential of initiatives that would encourage best practice e.g. harvest your own rainwater you get a 5% discount on your bill
-2021 Focus Group Participant

While the community placed value on the roof water harvesting scheme, our local property developers showed less support. While developers understood the concept and supported the intention of the scheme, the approvals process and 'red tape' involved resulted in reduced support.

Water for recreational use

If water was scarce in dry times, the 2021 data showed that customer would prioritise household, farm (irrigation, livestock) and environment (to support natural eco-systems) uses of water. However, 29% of respondents also selected the use of water for public spaces, which reveals that customers place some value on using water to maintain our street trees, parks and gardens.

When water is scarce, I prefer water for [recreation] spaces for community moral. E.g., farmers come in from out of town and see some nice green spaces and it feels safe and refreshing and it's not all doom and gloom. An 'oasis' that people can go to and feel better
- Focus Group Participant 2021

This builds on similar data from 2020 which showed positive support for water for recreational multi-purpose areas, such as ovals and botanic gardens rather than nature strips. Though customers also acknowledged there were some environmental and economic trade-offs to consider when addressing this issue.

Conclusion

Since 2018, we have taken an iterative approach to our engagement to understand customers other stakeholders' expectations and views on a range of topics to incorporate into the development of the 2022-2027 Urban Water Strategy.

We have applied a continuous improvement process to our engagement approach over the years to ensure we are capturing appropriate levels of participation across different stakeholder groups and geographical locations.

Our engagement approach has included a variety of tools and methods, to capture broad ranging views on the topics as discussed above:

- Values and uses of water
- Appropriate levels of service and willingness to pay
- Drought preparedness and response
- Long-term water security (supply and demand etc).

Overall, customers perceived our services as excellent or good value for money. While most customers drink the tap water and are satisfied with the quality, there is significant disparity in quality of water across our five service areas which is a key driver for dissatisfaction with our services. To boost perceived value, customers said that we should focus on improving water quality (in specific areas).

The vast majority of customers remain satisfied and very satisfied with our management of service interruptions, water supply reliability and water pressure. Most also remain satisfied with sewerage services, however there was a strong uplift in 2021 in the number of customers who are concerned about water contamination and pollution to waterways.

Customers strongly value water conservation and education, and more than 75% believed we should be focusing on promoting water savings in order to protect and enhance the environment now and into the future. There was also interest in how water supply would be increased in a drying climate, with customers placing value on the roof-water harvesting program and recycled water options.

Customers are increasingly discussing the link between climate change and water security, with the 2020 and 2021 engagement showing a significantly higher interest in the need to address climate change generally and for water corporations to pursue carbon emission reductions

Appendix 2 - Drought Preparedness Plan

March 2022

Part A
General

A1. Introduction

A1.1 Wannon Region Water Corporation

Wannon Region Water Corporation (Wannon Water) is a statutory corporation constituted on 1 July 2005 under the Water Act 1989. Wannon Water operates in an area of over 24,500 km^2, providing water and sewerage services to approximately 100,400 people across 34 customer districts.

Wannon Water has developed this Drought Preparedness Plan which incorporates all water supply systems across its region. The Drought Preparedness Plan represents the following systems:

- Otway Water Supply System including Warrnambool and towns and other users connected to the North Otway pipeline;
- Grampians Water Supply System including the Hamilton system and Balmoral;
- Glenthompson Water Supply System; and
- Groundwater Water Supply Systems including the Port Campbell system, the Tullich system, Caramut, Darlington, Dartmoor, Heywood, Macarthur, Penshurst, Port Fairy and Portland.

These systems are illustrated in Figure A1.

Figure A1 Wannon Water's Water Supply Systems

A1.2 Drought Response Plan

This Drought Preparedness Plan includes the Drought Response Plan referred to in Wannon Water's Water Restriction By-Law (By-Law No. 6). The Drought Response Plan is written separately for the Otways, Grampians , Glenthompson and Groundwater Systems in Parts B to E below.

A1.3 Structure of the Drought Preparedness Plan Document

The content of this Drought Preparedness Plan is summarised as follows:

PART A - General

Provides background information on Wannon Water and the water supply systems within its region, the structure of the Drought Preparedness Plan and details from previous revisions of Drought Response Plans undertaken over recent years.

Part A also provides details relating to the overall legal framework in which Wannon Water manages the water supply systems including; legal entitlements to water, permanent water saving plans, water restriction by-laws and details of reporting responsibilities.

Part A outlines gaps identified in the Drought Preparedness Plan that should be addressed progressively over the coming years.

PART B –Otway Water Supply System Drought Response Plan

Provides details of drought response activities specifically relating to the Otway Water Supply System including:

- Descriptions and details of the system, system demands, system yield and level of service objectives;
- A summary of the previously documented impacts of drought on the system and its water customers;
- Details on specific water supply options that have been assessed and could be implemented during periods of water shortage; and
- A sequential plan of action to assist Wannon Water to operate the system during periods of water shortage.

PART C –Grampians Water Supply System Drought Response Plan

Provides details of drought response activities, as summarised in Part B above, specifically relating to the water supply systems located within the Grampians System.

PART D –Glenthompson Water Supply System Drought Response Plan

Provides details of drought response activities, as summarised in Part B above, specifically relating to the Glenthompson Water Supply System.

PART E – Groundwater Supply Systems Drought Response Plan

Provides details of drought response activities, as summarised in Part B above, specifically relating to the water supply systems supplied by Groundwater.

A1.4 Revisions to Drought Preparedness Plan

This 2022 update of the Drought Preparedness Plan is based on the 2017 Drought Response Plan. Specific variations have been made to;

- General updating of system descriptions to reflect current information;
- Mention upcoming work with local government to identify priority green spaces.

Note that there has not been drought in south west Victoria since 2010, so “drought experience” has not been updated.

A1. Drought Preparedness Plan Objectives

The purpose of this Drought Preparedness Plan is to ensure a timely and effective short-term response to water shortages, with the aim of minimising the impacts (social, economic, and environmental) of such shortages.

There are two components involved in securing a water supply which provides the ability to mitigate the impacts during times of drought:

- The provision of an adequate supply system to satisfy current and future demands over a range of climatic conditions ensuring that shortfalls in supply are within 'acceptable' levels; and
- The specification of actions required when shortfalls in water supply occur as a result of drought.

The first component represents long term planning actions that determine the level of infrastructure development required to satisfy specified standards of supply.

The second component relates to management actions that are required to minimise the impacts of shortfalls in supply, which is the purpose of this Drought Preparedness Plan.

The Drought Preparedness Plan complements the long term planning process where the short term response needs to be aligned with the longer term security of supply (i.e. knowledge of the likely frequency and severity of water restrictions).

The aim of this Drought Preparedness Plan is to ensure that key strategic, planning and operational objectives are met. The strategic, planning and operational objectives are summarised in Table A1.

Table A1 Strategic, Planning and Operational Objectives

Strategic Objectives
Provide timely warning of any water shortages which might occur during future drought events and to be prepared to deal with such shortages when they occur.
Develop and implement an appropriate action plan to respond to water shortages.
Planning Objectives
Identify all the necessary steps that need to be taken through a drought including identifying clear triggers to instigate actions.
Provide a basis for regular reviews of the plan as the system develops and more information becomes available.
Give direction for reviewing the plan during and following a drought where its performance can be evaluated.
Provide clear indicators to ensure that a reliable assessment of drought status is available.
Operational Objectives
Ensure that Wannon Water is aware of what stage of drought they are in and how severe the drought is likely to be.
Ensure that Wannon Water maintains information on current levels and patterns of demand and continually assesses customer expectations in relation to desirable levels of service.
Wannon Water commits to providing its urban and rural customers (excluding customers supplied by agreement) with a reliable water supply free of water restrictions on average for 95 in every 100 years.
During times of drought or water shortage, Wannon Water aims to ensure that its urban and rural customers (excluding customers supplied by agreement) are not restricted in their use of water beyond Stage 3 water restrictions.
During times of drought or water shortage, customers supplied by agreement will be restricted in accordance with the terms of their agreement.

A2. Legal and Institutional Context

A2.1 Introduction

Wannon Water sources water from a combination of surface water and groundwater resources under the provisions of the Water Act 1989. The quantity of water that may be harvested is specified in bulk entitlements for surface water resources and in groundwater licences for groundwater resources. These entitlements are described in the following sections.

Wannon Water's Statement of Obligations imposes obligations in relation to the performance of its functions and exercise of its powers as described in the Water Industry Act 1994. In relation to drought response, Section 18 requires Wannon Water to develop and implement an effective Drought Response Plan for each water supply system and make it available to the public. In addition, Wannon Water is required to review, and if necessary amend, its drought preparedness plans as follows:

(a) at intervals of no more than five years; and

(b) within twelve months of either:

(i) the lifting of any period of restriction imposed under the Drought Preparedness Plan; or

(ii) any major change occurring to works or arrangements for conserving water for, or supplying water to, any water supply system.

A2.2 Bulk Water Entitlements (Surface Water)

Surface water diversions across the supply systems are defined in the Bulk Entitlement Conversion Orders (BEs). The BEs for the various systems define annual diversion limits as well as other operational requirements. The BEs currently held by Wannon Water are listed below and summarised in Table A2.

The relevant BEs include:

- Bulk Entitlement (Otway System) Conversion Order (1998);
- Bulk Entitlement (Hamilton) Conversion Order (1997);
- Bulk Entitlement (Wimmera and Glenelg Rivers – Wannon Water) Order 2010;
- Bulk Entitlement (Dunkeld) Conversion Order (1997);
- Bulk Entitlement (Glenthompson) Conversion Order (1997);
- Bulk Entitlement (Coleraine, Casterton & Sandford) Conversion Order (1997); and
- Bulk Entitlement (Willaura system – Wannon Water) Conversion Order 2012.

Table A2 Summary of Bulk Entitlement Conversion Orders

Supply System	Bulk Entitlement Order	Maximum Annual Diversion (ML)	Other Conditions
Otway	Bulk Entitlement (Otway System) Conversion Order (1998)	12,580 ML	◗ Subject to flow sharing rules.
Grampians (streams)	Bulk Entitlement (Hamilton) Conversion Order (1997)	3 ,435 ML	◗ Plus drought reserve of up to 520 ML/a. ◗ Passing flow requirements in tributary streams. ◗ Extraction rate not to exceed 12.8 ML/d.
Grampians (Rocklands)	Bulk Entitlement (Wimmera and Glenelg Rivers – Wannon Water) Order 2010[1]	2,120 ML	◗ Annual water availability declared by seasonal allocation. ◗ Includes ability to carryover unused allocation from year to year. ◗ Includes water available for Balmoral.
Grampians (Dunkeld)	Bulk Entitlement (Dunkeld) Conversion Order (1997)[2]	170 ML	◗ Emergency supply for Dunkeld.
Glenthompson	Bulk Entitlement (Glenthompson) Conversion Order (1997)	94 ML	◗ Extraction rate not to exceed 0.9 ML/d.
	Bulk Entitlement (Willaura system – Wannon Water) Conversion Order 2012	58 ML	◗ Extraction rate not to exceed 0.55 ML/d.
Konongwootong	Bulk Entitlement (Coleraine, Casterton & Sandford) Conversion Order (1997)[3]	855 ML	◗ Extraction rate not to exceed 4.5 ML/d.

1. Primary supply source for Balmoral and secondary supply source for Hamilton.
2. Dunkeld was connected to the Hamilton system in 1999. Resource now kept as an emergency supply.
3. Casterton and Sandford were switched to 100% groundwater in 2004. Coleraine switched to 100% groundwater in 2009. The surface water resource (Konongwootong) will be kept as an emergency supply. Merino connected to system in December 2005.

Prior to 2010, Balmoral accessed water from Rocklands Reservoir under the Bulk Entitlement (Wimmera and Glenelg Rivers – Glenelg Water) Conversion Order 2004. This entitlement has now been consolidated into the Bulk Entitlement (Wimmera and Glenelg Rivers – Wannon Water) Order 2010. This increased entitlement volume allows water to be accessed for both Balmoral and the Hamilton systems.

A2.3 Groundwater Entitlements

Existing groundwater licences for water supply bores are summarised in Table A3 below.

Table A3 Summary of Groundwater Licence Volumes

System	Location	Licence Number	Number of Bores	Licensed Annual Volume (ML)
Otway	Carlisle River	BEE029488	2	1,800
	Curdievale	BEE026252	1	2,150
	Mortlake	BEE030858	2	335
	Warrnambool	BEE024155	3	750
	Koroit	BEE029066	2	524
Grampians	Bullawin, Headworks, Geerak, McCutcheons	BEE026192	4	1,102
Groundwater	Portland	BEE026771	3	6,222
	Heywood	BEE028970	2	333
	Dartmoor	BEE032545	1	170
	Port Fairy	BEE029010	2	1,026
	Port Campbell[1]	BEE026252	2	1,009
	Casterton	BEE022551	4	1,000
	Penshurst	BEE026146	2	250
	Macarthur	BEE021944	1	130
	Caramut	BEE021943	2	50
	Darlington	BEE021827	2	10

1. A second bore at Port Campbell is being constructed in 2022.

A2.4 Permanent Water Saving Plan

In May 2006, Wannon Water introduced its Permanent Water Saving Plan designed to generate ongoing long-term water savings. The Permanent Water Saving Plan was subsequently revised and approved by the Minister for Water in August 2007. The rules in the Permanent Water Saving Plan are designed to support the commitment that Victorian communities have made to using water more efficiently.

The Permanent Water Saving Plan sets out a set of common sense rules that apply to our customers everyday use of water. The Plan aims to encourage the efficient use of water to avoid wasting this precious resource.

A copy of the Permanent Water Saving Plan is provided in Appendix A.

A2.5 Water Restriction By-Laws

Mandatory water restrictions provide an effective mechanism to reduce urban demand during times of water shortage. Water restrictions are designed to predominately impact on non-essential water uses (for example, garden watering and filling of pools), and minimise the impact on the use of water for commercial purposes, public health and essential residential use.

In accordance with section 287ZC of the Water Act, Wannon Water has made a by-law, titled Water Restriction By-law No. 6, pursuant to sections 171 and 160 of the Water Act 1989. Water Restriction By-law No.6 is made using a Model Water Restriction By-law issued by the Minister for Water on 3 March 2022.

The restriction schedule has been given legal effect under By-Law No. 6. A copy of the By-Law is provided in Appendix B.

Wannon Water's adopted restriction schedule defines four successive stages of water restrictions. The anticipated water savings under each stage of restriction effects storage response and assists to maintain the required level of water security. The estimated savings for each stage and the associated trigger levels for the implementation of water restrictions are described further in each of the relevant Drought Preparedness Plans provided in the subsequent parts of this document.

A2.6 Responsibilities and Reporting

The communication of the status of each supply system leading into, during and following drought conditions forms an integral part of drought preparedness planning.

There are various communication levels and protocols mandated by Wannon Water according to three separate modes of operation, these being; General Monitoring, Heightened Awareness and Drought Response. Table A4 summarises the reporting obligations. The operational modes detailed in this table are described further in each of the Drought Response Action Plans in the following sections.

Table A4 Summary of Reporting Obligations

Mode	Communication Actions	Purpose
1	General Monitoring	

Mode	Communication Actions	Purpose
	System Status Report	Weekly report providing base information on current supply-demand balance and trends. Prepared for the Executive Management Team for briefing and endorsement of recommendations.
	Annual Water Outlook	Report prepared in November each year and published by 1 December covering current and forecast future supply status for each system. Prepared for the Executive Management Team and the Department of Sustainability and Environment.
2	Heightened Awareness	
	System Status Report	Weekly report providing base information on current supply-demand balance and trends. Prepared for the Executive Management Team for briefing and endorsement of recommendations.
	External Communications	Media advertising to increase awareness amongst customers and the community about reduced water availability and to promote water conservation behaviours/activities.
	Monthly Department of Environment, Land, Water and Planning Report	Report prepared for Department of Environment, Land, Water and Planning to advise current system status and actions being undertaken to monitor potential threats from reduced water availability.
3	Drought Response	
	System Status Report	Weekly report providing base information on current supply-demand balance and trends. Extended to project water supply status over coming 12 – 18 months. Prepared for the Executive Management Team for briefing and endorsement of recommendations.
	External Communications	Media advertising to increase awareness amongst customers and the community about reduced water availability and to promote water conservation behaviours/activities.

A2.7 Monitoring Programs

Wannon Water has comprehensive long term monitoring programs in place to collect data in each of the supply systems for operational, reporting and planning purposes. A summary of the monitoring programs is shown in Table A5 below.

Table A5 Summary of Wannon Water Monitoring Programs

Program	Details
Bulk Water Demand	Flow measurement from all major demand areas and customers. Documented in Quarterly and Annual Water Demand Reports.
Reservoir Monitoring	Storage level and quality readings at all Wannon Water storages. Data is held by Manager Operations Reporting and Projects.
Streamflow Monitoring	Monitors flow in key headworks streams. Data is held by Manager Operations Reporting and Projects.
Groundwater Bore Monitoring	Monitoring of groundwater levels in bores throughout the regions. Data is held by Manager Operations Reporting and Projects.
Climate Data	Climate data for Wannon Water sites is sourced from the Bureau of Meteorology.
Bulk Entitlement Metering Plan	The Bulk Entitlement Metering Plan has been developed for Wannon Water to measure and record compliance with the obligations of each surface water Bulk Entitlement. The Plan contains detailed information on the location and accuracy of meters and other data management information.
Annual Water Outlook	This is a document that collates information on the status of each system. The Annual Water Outlook provides key information for the preparation of weekly and monthly system status reports.

A3. Gaps in Information

A3.1 General

There are several knowledge gaps identified which have prevented the finalisation some aspects of this Drought Preparedness Plan. Wannon Water intends to progressively work on towards addressing these gaps in the coming years. The key gaps requiring further actions are detailed below:

Konongwootong System	• The Konongwootong System provides a raw water supply to rural users under a supply by agreement arrangement. This supply is also an emergency back-up supply for the Tullich groundwater system. Further work is required to understand the potential supply issues during drought periods including consideration for the development of a Drought Preparedness Plan for this system.
	•
Rural Customers	• Develop a restriction policy for rural customers during times of drought or water shortage.
All systems	• Develop protocols for the easing or removal of restrictions.
	• Work with local government to identify priority green spaces – see below.

A3.2 Priority Green Spaces

Wannon Water will work with local government to identify priority green spaces – playing fields and the like, and to explore opportunities to keep these spaces watered when other facilities are subject to water restrictions. To coordinate with other council planning processes, this work is planned for 2023 to 2028. Note that Supply Demand Balance at the time of publication indicate that drought triggers are not likely to occur in this timeframe.

Part B

Otway System Drought Response Plan

B1. Otway Water Supply System

B1.1 Details of the Otway Supply System

B1.1.1 System Description

The Otway Water Supply System obtains its primary supply from two pumped offtakes on the Gellibrand River and by gravity diversions from weirs on three Arkins Creek tributaries. Water is diverted westwards via two pipelines to supply the townships of:

- Simpson;
- Camperdown;
- Cobden;
- Derrinallum;
- Lismore;
- Terang;
- Noorat;
- Glenormiston;
- Mortlake;
- Purnim;
- Allansford;
- Warrnambool;
- Koroit; and
- A number of smaller townships and numerous rural properties.

A schematic of the Otway system is provided in Figure B1.

The Otway Water Supply System is supplemented from two groundwater bores at Carlisle River. Supply to Warrnambool, Koroit and Allansford is augmented by roofwater harvesting in the Russells Creek Growth Corridor and Horne Road industrial estate and by a shallow groundwater bore field adjacent to the Warrnambool Water Treatment Plant at Albert Park contributing approximately 10% of the supplied water. The Otway supply to Mortlake is shandied with 17% groundwater from a bore in Prentices Lane Mortlake (Absaloms Bore).

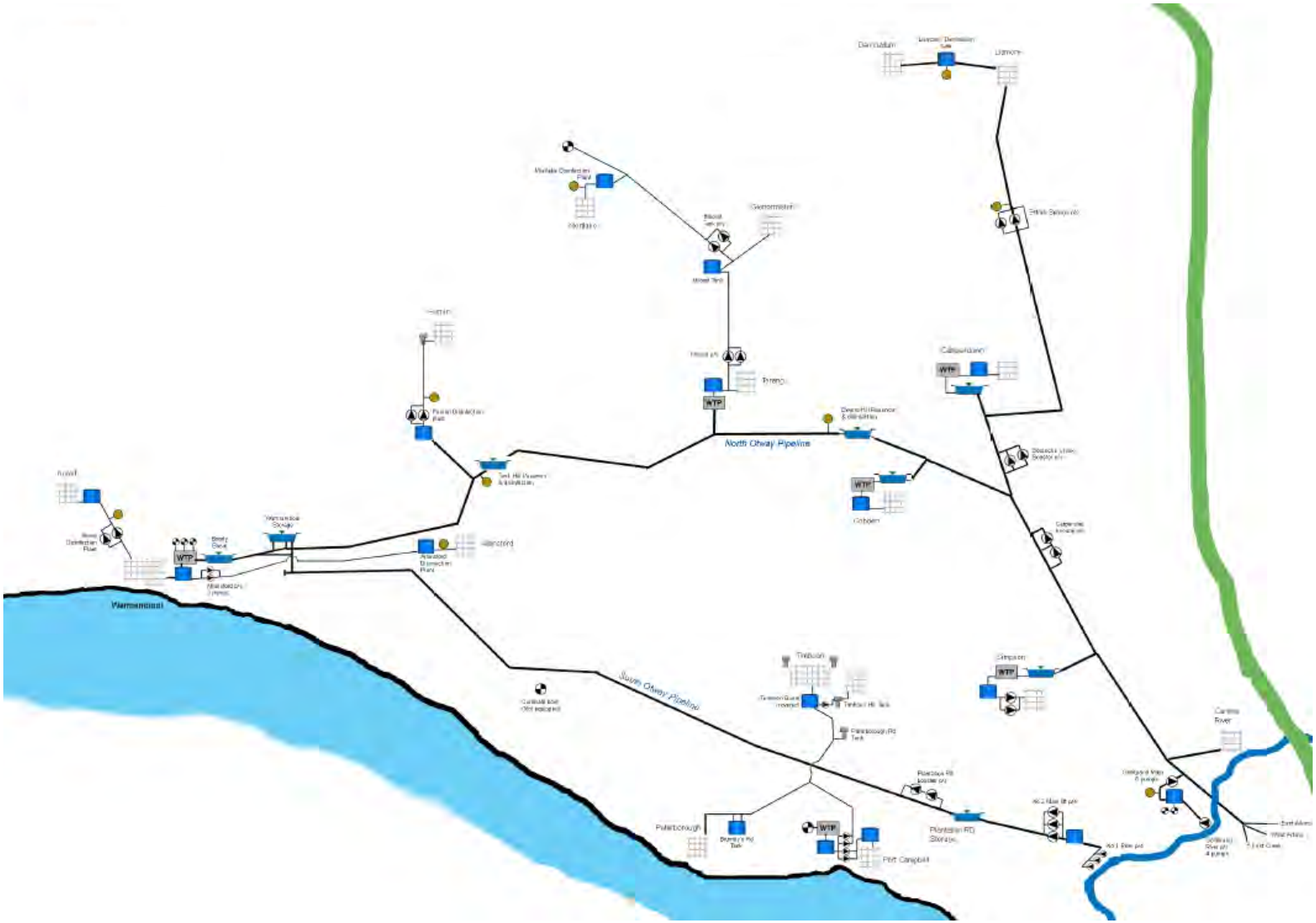
In addition to urban supplies there are close to 1,000 rural connections to the North Otway pipeline. Approximately 460 services supply farms and the small rural communities of Carlisle, Carpendeit, Cudgee and Garvoc direct from the North Otway pipeline. The Camperdown (Otway) Rural District is an area mostly to the north and west of Camperdown providing around 400 connections to domestic, stock and dairy-related customers. This reticulated system is supplied by pipeline from the Camperdown water treatment plant..

There are no permanent connections to the South Otway pipeline. Diversions from the Gellibrand River at Carlisle and extractions from the Carlisle Bores are used to supplement flows from Arkins Creek into the North Otway pipeline. The maximum capacity of the North Otway pipeline is 22.5 ML/day and the maximum capacity of the South Otway pipeline is 21.5 ML/day.

The bore field at Carlisle River is licensed for a maximum daily extraction of 6 ML/day. This enables diversions from the Gellibrand River to be partly or completely replaced by bore water during a river contamination event or diversion limitation as part of the flow sharing rules. The groundwater licence entitles Wannon Water to a maximum annual extraction of 1,800 ML.

The groundwater licence for the Albert Park borefield allows extraction of up to 750ML per annum. Current extraction is about 400ML per year, to provide 10% of the water supplied to Warrnambool. The Mortlake bore has a groundwater licence of 295ML pa, and planned extraction of about 25ML per year, to provide 17% of the water supplied to Mortlake. These blending ratios have been set for water quality reasons. Both these sources have significant spare licenced volume.

Figure B1 Otway System Schematic



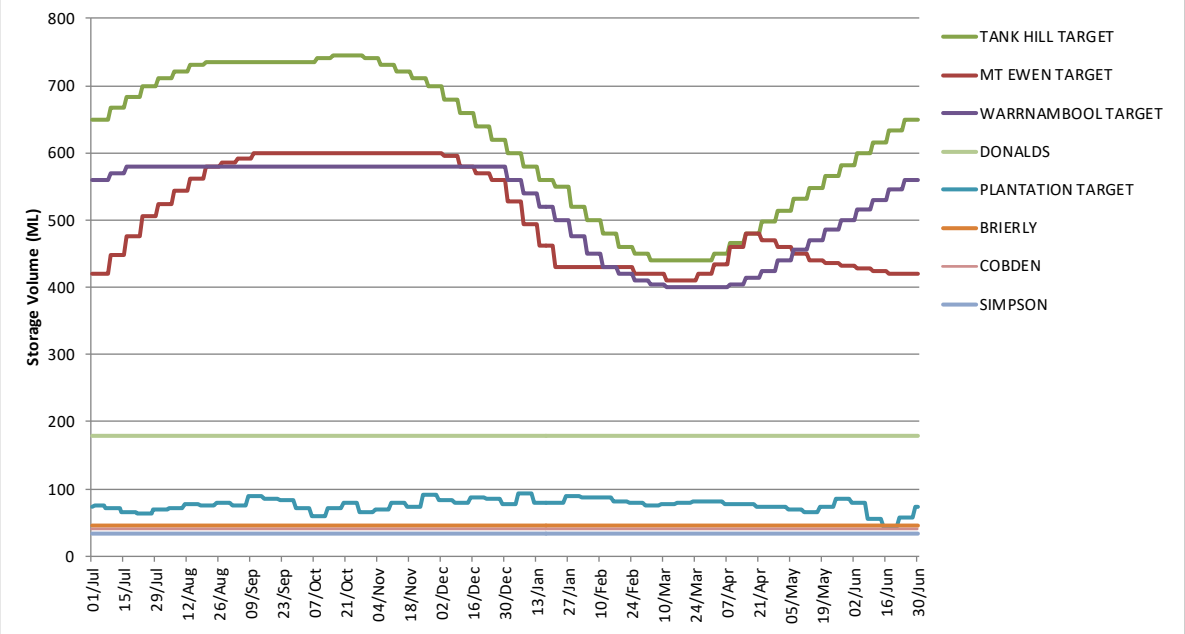
Water storages located throughout the system are used to balance supply during peak periods. The system storages are summarised in Table B1. The active on-line storage is equivalent to less than 20% of the average annual demand. Consequently, during the peak summer demand period when storages are drawn down, less than one month of unrestricted demand may be available in storage.

Table B1 System Storages

Storage Name	Volume (ML)
Simpson Storage	34
Donalds Hill Storage	207
Cobden Basin	51
Ewens Hill Reservoir	625[1]
Tank Hill Reservoir	774
Warrnambool Basin	611
Plantation Road Storage	100
Brierly Basin	52
Total Storage	***2,454***

1. To be increased to 900 ML capacity in 2031.The system is operated to minimise the cost of pumping, which is defined by a set of operational curves for each of the storages described in Table B1. These operational curves provide control over the rate and magnitude of drawdown and filling, whilst providing a reserve volume in each storage for contingency purposes. The storage operating curves are provided in Figure B2 below.

Figure B2 Storage Operating Curves - Otway System



A set of storage based triggers define the severity of a water shortage event in the Otway System and are used to trigger a range of drought response actions. Further details on these actions and triggers are provided in Section B1.4.

B1.1.2 System Demands and Consumption

The total demand represents the unrestricted water usage from the headworks, inclusive of system distribution losses. The current (2020) average annual demand for the system is adopted for long term planning purposes, including the development of Wannon Water's water restriction policies.

The estimated total average annual demand (in 2016) for the Otway Water Supply System is about 10,000 ML/year. The components of demand are detailed in the table below.

Table B2 Components of the Current (2020/21) Average Annual Demand - Otway

Component	Total Demand (ML)	Base Demand (ML)	Restrictable Demand (ML)
Residential	3,026	2421	605
Non Residential	971	777	194
Rural	1,330		-
Major	2,941		-
Public Open Space	70		-
Total Consumption	7,667	6,868	799
Nonrevenue Water	800		-
Bulk Usage (WTP Outflow+Pipeline customers)	8,467	7,668	799
WTP Losses	380		-
System losses (upstream of WTPs)	700		-
Total Raw Water Usage	9,547	8,748	799

Note 1 – Restrictable demand was estimated at 20% of resi and nonresi use based on data collected in Hamilton over the Millenium drought.

Climate corrected water consumption in 2019/2020 for each of the towns supplied by the Otway Water Supply System is provided in Table B3. This year was chosen as the basis for establishing the average annual demand.

Table B3	**Consumption by Customer District - Otways 2021 (climate corrected)**							
Customer District	**Major**	**Nonresi**	**Resi**	**Rural**	**Public Open Space**	**Customer totals**	**Bulk Meter**	**NRW**
Allansford	0	56	51	27	2	137	150	14
Camperdown	0	138	231	0	8	377	421	44.7
Camperdown Rural	0	0	0	411	0	411	518	107
Cobden	511	44	104	97	1	757	829	73
Koroit	224	23	111	3	0	361	413	52
Lismore Rural (pre-Ettrick)	0	0	0		0	0	63	63
Lismore & Derrinallum	0	22	39	41	1	104	153	49
Mortlake	0	45	87	13	1	145	175	29
Noorat & Glenormiston	0	14	25	44	1	84	103	19
Purnim	0	0	0	23	0	23	28	6
Simpson	0	15	10	14	2	41	45	4
Terang	0	36	136	8	4	184	205	21
Warrnambool	506	580	2214	23	22	3345	3723	379
Camperdown Water Works	0	0	0	27	0	27	27	0
Carlisle Water Works	0	0	0	12	0	12	12	0
Carpendeit Water Works	0	0	0	147	0	147	147	0
Cobden Water Works	0	0	0	117	0	117	117	0
Terang Water Works	0	0	0	61	0	61	61	0
Warrnambool Pipeline	1201	0	0	41	1	1244	1244	0
South Otway Pipeline	0	0	0		0	0	0	0
Otways total	**2443**	**974**	**3007**	**1109**	**43**	**7576**	**8436**	**860**

Figures exclude WTP and system losses. Volumes in ML.

B1.1.3 System Yield and Security of Supply

The yield of a water supply system is defined as the average annual level of total (raw water) demand that can be supplied from the water supply system, subject to resource availability, operational rules, demand patterns and adopted reliability criteria.

For the Otway Water Supply System, the Average Annual Demand that can be supplied whilst meeting Wannon Water's level of service objectives is 12,537 ML/a or 131% of current average annual demand (GHD, 2022). At this level of demand, restrictions are required at a frequency of 1 in 20 years (95% of years) and the severity of restrictions is not greater than Stage 3 restrictions.

The estimated reliability of the current demand (9,547 ML/a) under historical streamflow and medium impact 2040 climate change conditions is 100%.

Table B4 illustrates the sources of supply and how the distribution varies as climatic conditions change.

Table B3 Otways Diversions from the Environment by Source (in ML)

	2017/18	2018/19	2019/20	2020/21
Arkins Creek	**2291**	**2280**	**2884**	**3077**
NOPS river water	**2177**	**1808**	**1217**	**1356**
SOPS river water	**4594**	**3943**	**3929**	**4017**
NOPS bore water	**12**	**16**	**2**	**5**
Albert Park bores	**395**	**417**	**450**	**450**
Absaloms bores (Mortlake)	**14**	**23**	**21**	**21**
Brierly Roofwater	**38**	**36**	**41**	**62**
Otways Raw Water				

B1.2 Drought Experience

Over the last 40 years the Otway Water Supply System has experienced restrictions during the following droughts: 1967/1968, 1971/1972, 1972/1973, 1973/1974, 1980/1981 and 1982/1983. The maximum restrictions applied were level two of an eight-stage policy, over a maximum duration of one month. Since the 1970s, augmentation of the supply system has included the South Otway pipeline (1976) and Warrnambool Basin (1985). During the 1982/1983 drought, restrictions were not required for the Otway system specifically, but were implemented to reflect the serious water shortages throughout most of Victoria at the time.

Water restrictions were not required during the summer of 1999/2000, although diversions from the Gellibrand River at Carlisle were reduced under the flow sharing arrangements specified in the Otway Water Supply System Bulk Entitlement Order. Flow share restrictions, reducing allowable diversions from the Gellibrand River into the North Otway system, were imposed between 5 February and 26 March 2000. This resulted in an allowable diversion 200 ML less than the maximum possible had flow share restrictions not been in place.

The reduction in allowable diversions combined with increased water usage and increased evaporation losses from storages resulted in some concern that water restrictions may have had to be imposed on customers in all districts supplied from the North Otway pipeline upstream of Tank Hill Reservoir.

Storages were however able to be maintained above minimum desirable levels. Another two weeks of flow share restrictions would probably have resulted in water restrictions being implemented in towns supplied solely from the North Otway pipeline.

Gellibrand River flow sharing rules were applied to reduce irrigator's access to water from 3 February 2001 to 16 April 2001, and Wannon Water was restricted to an allowance of 17.5 ML/d from 9 March 2001 to 15 March 2001. Southern Rural Water placed Gellibrand irrigators on level one restrictions in 2005/2006. However restrictions have not been placed on Wannon Water extractions since 2001. The Carlisle River bores were brought online in 2001, and have been used in 2001/2002, 2002/2003 and 2005/2006 to supplement supply.

Flow sharing arrangements under the bulk entitlement were implemented in 2006, although there was negligible impact on Wannon Water's ability to maintain the system storages at the desired operating levels.

In 2007, the capacity of the Warrnambool basin was increased by 291 ML providing additional off stream storage capacity. The Warrnambool Roofwater harvesting project was completed in 2011. This infrastructure has the capacity to supply up to 460 ML of additional water to Warrnambool per year.

In summary, Wannon Water has not implemented water restrictions in the Otway system since 1982/1983. Whilst annual rainfall totals in the Gellibrand River catchment have been typically low over the last decade, flows in the Gellibrand River and tributaries have been sufficient (combined with use of the Carlisle River bores) to avoid the need for water restrictions.

B1.3 Drought Response Options

B1.3.1 Introduction

Drought response options within the Otway system can be classified into two broad categories; demand management and supply augmentation. This section of the Drought Response Plan identifies and evaluates the options that are currently available to Wannon Water to mitigate the impacts of water shortages.

B1.3.2 Demand Reduction During Droughts

Summary of Options

There are a number of demand reduction options that can be employed during times of water shortage. A summary of these demand reduction options is shown in Table B5 below.

Table B4 Summary of Demand Reduction Options

Option	Details	Comments
Community Education Programs	Water efficiency awareness (showerhead rebates, information brochures), linked to ongoing State Government programs. Estimated savings are around 2-5% of total demand.	Being progressively implemented by Wannon Water.
Voluntary Demand Reduction Measures	Self regulated water conservation measures aimed at increasing effectiveness of measures within the Permanent Water Saving Plan.	Water savings from this option are expected to exceed the savings already achieved from the Permanent Water Saving Plan.
Mandatory Water Restrictions	Option available under By-Law No. 6.	See Appendix B for requirements and prohibitions on water usage.
Compliance Officer/s	Additional resources may be required during extended periods of moderate to severe restrictions to monitor the performance of targeted water savings measures.	

Wannon Water's long-term demand reduction strategies attempt to reduce both base demand and restrictable demand by encouraging more efficient water use in all circumstances.

Short term drought response strategies largely target discretionary water use. Recent experience across Wannon Water's systems has shown that short term savings can be achieved across residential, non-residential and commercial sectors.

The current unrestricted average annual demand of the Otway Water Supply System is estimated to be 9,547 ML/a (including system losses). Historical records show that demand can be quite variable from year to year. Generally, demand tends to increase during hot and dry periods when outdoor usage increases. Hence, water shortages resulting from reduced inflows during drought conditions tend to be exacerbated by increased demand levels.

Voluntary Demand Reduction Measures

Voluntary demand measures are an initial measure in the event of a drought. The importance of public awareness, understanding and involvement in meeting demand reduction objectives cannot be underestimated.

Wannon Water is committed to communicating effectively with its Otway Water Supply System customers to encourage take up of voluntary water saving measures and in turn deliver the best possible outcomes in demand reduction.

Supporting these voluntary water saving measures with initiatives including showerhead exchanges, trigger nozzles and other merchandise, Wannon Water aims to encourage its customer base to play an

active role in managing their water supply and play their part in times of water shortages to ensure efficient use of their precious resource.

A broad base of local media (press and electronic) can be utilised to raise community awareness of system supply levels and encourage voluntary water saving measures.

Wannon Water will raise the profile of system levels and support the take-up of voluntary measures through extensive 'tips' and media coverage on its website, regular informative media releases, advertising, distributing publications with customer accounts and distributing information at community events throughout the service region. Wannon Water will also liaise with its Customer Engagement Committee where appropriate and consider holding community information sessions to raise awareness.

Publication of information including changes in water usage, rainfall levels, streamflows or bore performance details can assist in raising the profile of shortages and demand needs. Recent experience has shown that in combination, all of the above communication tools have been effective in heightened public awareness and consciousness of water efficiency measures, particularly over summer months.

As well as engaging the community in voluntary demand reduction measures Wannon Water can liaise with major consumption customers to work out strategies to reduce consumption. Major customers include the local shire, community groups, industrial and rural water users.

Mandatory Water Restrictions

As mentioned in Part A of this document, Wannon Water applies a four-stage water restriction policy in accordance with the Victorian Uniform Drought Water Restriction Guidelines (VicWater, 2005). The policy defines trigger levels corresponding to the total volume of water held in system storages (refer Table B1). The current restriction triggers for the system are provided in the Drought Response Plan Action Plan.

The anticipated water savings for each level of restriction is shown in Table B6. These savings have been tested by comparing residential KL per connection over the period 2005/2006 to 2010/2011 for Hamilton against other towns not subject to water restrictions. The residential consumption rates shown in Table B6 provide guidance on the level of consumption which should be targeted to achieve the stated water savings.

Table B5 Anticipated Water Savings from Water Restrictions for the Otway System

Restriction Level	Estimated Water Saving			Target Residential Consumption Rate	
	% of Restrictable Demand[1]	Volume (ML)	% of Total Raw Water Use[2]	KL/ connection/ yr	L/ person/ day
PWSM				160	190
Stage 1	13% - 16%	90-110	1%	156	185
Stage 2	40% - 50%	300-350	3%	146	173
Stage 3	60% - 75%	420-520	5%	140	166

Restriction Level	Estimated Water Saving			Target Residential Consumption Rate	
	% of Restrictable Demand[1]	Volume (ML)	% of Total Raw Water Use[2]	KL/ connection/ yr	L/ person/ day
Stage 4	95% -100%	700	7%	130	154

1. Ranges adopted from VicWater, 2005.
2. Total raw water extracted from the environment.

B1.3.3 Supply Augmentation Options During Drought

Options to augment the supply system during extended low rainfall periods are limited to some extent due to lead times required to implement these alternatives. It is therefore essential to consider the larger scale options as part of longer term water supply planning. However, there are several options available to augment supply during drought. The feasibility of each option depends to a large extent on the size of the population being serviced, the physical characteristics of the supply system and, ultimately, on the severity of the drought. A summary of the short term supply augmentation options for the Otway Water Supply System is shown in Table B7.

Table B6 Supply Augmentation Options During Drought

Option	Details	Available Supply
Emergency Groundwater Bores[1]	Curdievale Bore – 3 year old bore pump tested to 9 ML/day available for use during an emergency. Delivery to W'bool Storage to reduce impact of higher salinity and temperature.	2,150 ML/year
	Koroit – two existing bores in railway reserve not equipped and power disconnected. Would need to reinstall disinfection system, connect power and replace pumps. Higher salinity water may be of concern to customers especially Bega.	524 ML/yr
	Lismore and Camperdown	To be determined[3]
	Albert Park Bores	250 ML/yr[2]
	Mortlake	270 ML/yr[2]
Reservoir Dead Storage	Measures may need to be taken to access water below pipe offtakes. Water quality in reservoirs generally deteriorates when water falls below offtake levels.	50 ML Tank Hill 200 ML Ewens Hill 40 ML Donalds Hill 80 ML Warrnambool
Water Cartage	Not a viable option for large towns such as Warrnambool, but could be used to supply many of the smaller satellite towns across the system.	
Qualification of Rights	Apply to the Minister to increase surface and/or groundwater extractions beyond the conditions of our entitlements.	

1. Emergency groundwater bores are not brought online until Action 4 under the Drought Response Mode (refer Table B10).
2. These volumes are in addition to current usage of 500 ML/yr at Albert Park and 25 ML/yr at Mortlake.
3. Further assessment required to determine available supply.

B1.4 Drought Response Actions

System monitoring is undertaken to assess the status of the supply system according to one of the following three operational modes:

Mode 1 – General Monitoring 

Mode 2 – Heightened Awareness 

Mode 3 – Drought Response 

B1.4.1 Mode 1 – General Monitoring (Pre-Drought Phase Activities)

The zone for the General Monitoring mode is defined by the system storage capacity as the upper bound and a trigger which is set just below the system operating curve, as the lower bound.

There are a number of important factors in pre drought monitoring and planning which will influence the decision to declare the system as being in the General Monitoring mode. These include:

- Storage contents, river flows and bore performance data to monitor availability of supply;
- Climatic trends and seasonal outlooks as indicators of the possible onset of drought;
- Consumption trends to indicate changes in Customer's usage of water; and
- Forecasting storage behaviour over a 6-12 month period.

The Annual Water Outlook tool is used to monitor supply and demand side aspects of the system. During the General Monitoring mode, the system status is updated on a weekly basis and a report prepared weekly. A summary of the key system performance indicators for the Otway Water Supply System which should be included in the Annual Water Outlook and System Status Report is provided in Table B8.

Table B7 Requirements for Annual Water Outlook and System Status Monitoring and Reporting

Item	Requirements
Rainfall, seasonal climate outlook	Information accessed from Bureau of Meteorology website.
State-wide status	Bureau of Meteorology and Department of Environment, Land, Water and Planning websites provide status reports on rainfall, streamflow, storage levels, groundwater and urban water restrictions across Victoria on a monthly basis.
System storage contents	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.
Gellibrand River gauging stations downstream of both the pump offtakes.	Monitoring of passing flow level and flow details are provided by telemetered data loggers. Two models have been developed to facilitate prediction of demand trends and storage contents.
Water levels in shallow ground water supply systems are monitored at least monthly and are able to be compared against pump depths.	The frequency of monitoring should be increased to weekly or daily if a decline in water level raises concern on the security of the system.
System Demands (bulk meter consumption)	All towns monitored at least weekly and recorded in an operational database.

The trigger mechanism for actions is the total system storage volume for the Otway system storages, using the Drought Response Triggers shown in Appendix C1.

Forward look projections of storage response forms an integral part of the short term planning during a drought. Projections assist to anticipate the “likely” response based on current climatic conditions. At a minimum, Wannon Water makes projections over the next 3-12 months based on its experience in previous droughts. However, seasonal forecasting over three month, six month and 12 month periods, incorporating information from low-frequency climate signals such as the El Nino Southern Oscillation Index and sea surface temperatures, may also be useful in this assessment.

The Annual Water Outlook tool has been set up to enable system monitoring including forecasts to be completed.

The drought response triggers are an informative guideline, and are not used as rigid bands or triggers that guarantee the implementation of the specified action, such as the implementation of water restrictions.

B1.4.1 Mode 2 – Heightened Awareness

The zone for the Heightened Awareness mode is designed to provide early warning of a pending water shortage. The Heightened Awareness mode is triggered following consideration of:

- Storage contents, river flows and bore performance data to monitor availability of supply;
- Climatic trends and seasonal outlooks;
- Consumption trends to indicate changes in Customer's usage of water; and
- Forecasting storage behaviour over a 3-6 month period.

The key actions are summarised in Table B9 (in order of increasing impact from water shortages).

Table B8 Otway Water Supply System Action Plan for Mode 2 – Heightened Awareness

Action	Trigger	Response
Action 1	High likelihood that total storage contents cannot be maintained above the System Operating Curves	1. Reconvene the Drought Response Monitoring Committee
Action 2	Moderate to high likelihood that total storage contents cannot be maintained above the Level 1 Drought Response Trigger	2. Provide weekly updates of the System Status Report 3. Implement demand reduction options such as Community Education Programs, Voluntary Demand Reduction Measures via increased media advertising,
Action 3	High likelihood that storage contents cannot be maintained above the Level 1 Drought Response Trigger	4. Alert public to the imminent water shortages and possible need for restrictions in the future. 5. Promote “voluntary restrictions” via media advertising campaigns to inform consumers about water conservation programs. 6. Declare operational mode as Mode 3 - Drought Response.

B1.4.2 Mode 3 - Drought Response

Mode 3 defines an active drought response period where supply and/or demand side measures are required to maintain supply security. Restriction rule curves are used to trigger an increase in the severity of the water shortage. Actions during each level of restriction are summarised in Table B10.

Table B9 Otway Water Supply System Action Plan for Mode 3 – Drought Response

Action	Trigger	Response
Action 4	Total storage contents unable to be maintained above Level 1 Drought Response Trigger.	7. Consider implementation of Stage 1 Restrictions. 8. Introduce advertising campaign using all appropriate forms of media. 9. Monitor storage volume response and perform regular forward look storage volume projections. 10. Make standby arrangements to bring Curdievale bore into service. 11. Advise major users of Otway system that Curdievale groundwater supply may have to be introduced.
Action 5	Total storage contents unable to be maintained above Level 2 Drought Response Trigger	12. Consider implementation of Stage 2 Restrictions. 13. Continue media advertising. 14. Daily monitoring of storages. 15. Bring Curdievale bore pumping infrastructure into service. 16. Monitor storage volume response and perform regular forward look storage volume projections.
Action 6	Total storage contents unable to be maintained above Level 3 Drought Response Trigger	17. Consider implementation of Stage 3 Restrictions. 18. Continue media advertising. 19. Daily monitoring of storages. 20. Monitor storage volume response and perform regular forward look storage volume projections. 21. Identify and plan for implementation of emergency options.
Action 7	Total storage contents unable to be maintained above Level 4 Drought Response Trigger (Emergency Level)	22. Consider implementation of Stage 4 Restrictions. 23. Continue media advertising. 24. Daily monitoring of storages. 25. Monitor storage volume response and perform regular forward look storage volume projections. 26. Implement other emergency supply options. 27. Tankering water to areas of critical shortage.

B1.5 Post Drought Assessments

Actions to be considered after a drought has occurred are summarised in Table B11. These include evaluating the appropriateness of the actions within each of the operational models and the associated triggers, the effectiveness of demand reduction and emergency supply augmentation options and the effectiveness of each level of restriction.

Table B10 Evaluate Operational Modes Trigger Levels and Associated Actions

Operational Mode	Action Sequence	Description	Assessment Procedure
General Monitoring	NA	Monitoring and evaluation	Were the indicators being used to monitor system performance appropriate?
Heightened Awareness	Actions 1-6	Planning	Was there adequate time to undertake the activities detailed in Actions 1-3.
		Voluntary Demand Reduction	Was the community responsive? Was there a significant reduction in demand? Was the trigger level appropriate?
Drought Response	Actions 7-27	Water Restrictions	Was the expected reduction in demand achieved for each stage? Were the trigger levels appropriate? Were policing methods effective, if so, how?
		Groundwater pumping	Was groundwater effective at this stage or should it be started earlier? Was timing of groundwater input appropriate? Were pumps and equipment available? Was water quality acceptable to customers, particularly for industrial customers? Were any problems identified with the specific flow sharing arrangements with the Gellibrand River with Southern Rural Water?
		Implement other emergency supply options	To what level was demand reduced? What was the cost and practicality of carting water if undertaken? Were individual emergency options implemented too late? Did other options arise; if so, what other options were available?

Table B12 summarises the assessment procedure for evaluating the impact of water restrictions on customers, authority staff and supply systems. The intention is to learn from the methodologies that have been applied in order to minimise any future incidents of this nature.

Table B11 Evaluate the Impact of Restrictions

Stakeholders	Assessment Procedure
Domestic Users	Were the restrictions too severe?
	Was the right mix of media used to disseminate information?
	Was there enough warning of impending drought? If not, how could this be improved?
Diverters	Were flow sharing arrangements appropriate?
	What was the irrigator's reaction to restrictions?
Environmental	Were flow triggers appropriate?
	Should environmental flows be reassessed?
	What were the effects upon the aquifer and other users of pumping?
	What methods have been put into place to rectify any environmental effects?
	Effects upon identified groundwater dependent ecosystems?
Wannon Water Staff	Were many instances reported of restriction violations?
	Was it possible to effectively enforce the restriction policy?
	Were sufficient staff available to monitor system performance?
Supply Systems	Did restrictions achieve expected levels of water savings?
	Have supply systems been replenished? If so, how long did it take to achieve this level?
	What procedures were put in place to achieve this?

Table B13 summarises the assessment procedure for establishing the effectiveness of pumping groundwater to replenish the supply systems during drought.

Table B12 Evaluate Effectiveness of Groundwater Pumping

Action	Assessment Procedure
Evaluate effectiveness of ground water pumping	Did water quality problems occur?
	Should groundwater supplies have been introduced prior to where programmed in the Drought Response Plan?
	Did the volume of water extracted stay within the groundwater licence limits (daily volumes and annual volumes)?
	Review predictive models / bore performance / water quality and recalibrate predictive models / water balances / assessment tools?

Part C

Grampians System Drought Response Plan

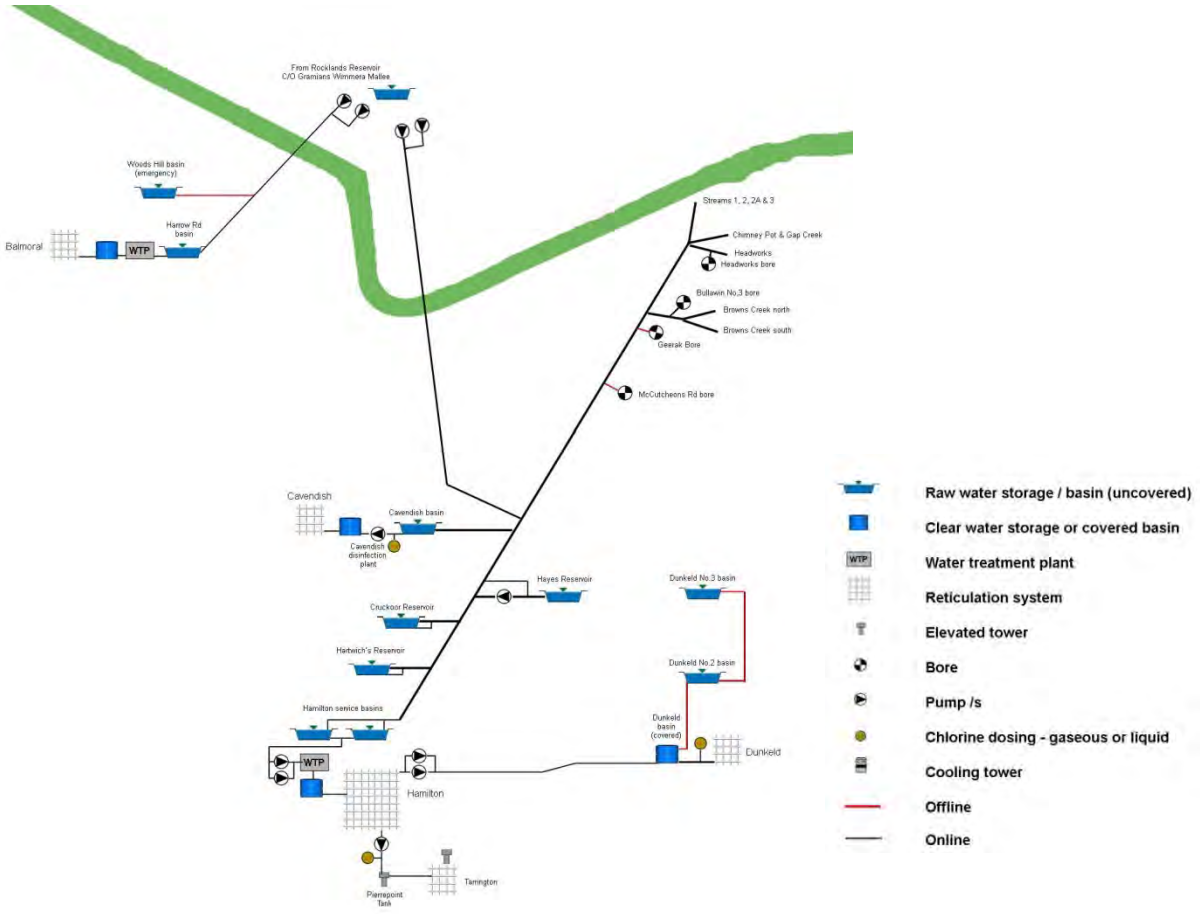
C1. Grampians Water Supply System

C1.1 Details of the Grampians Water Supply System

C1.1.1 System Description

The Grampians Water Supply System provides water to the five urban zones of Balmoral, Cavendish, Hamilton, Tarrington and Dunkeld, and also to a number of rural customers located along the main supply pipelines. A schematic of the Grampians Water Supply System is provided in Figure C1.

Figure C1 Grampians Water Supply System



Water from Rocklands Reservoir is supplied to Balmoral via a 10km pipeline constructed in 1964 and to the southern part of the system via a 52km pipeline constructed in 2009/2010.

The main supply for Hamilton is obtained from the western slopes of the Victoria Range in the southern part of the Grampians National Park. Water is diverted from eight small streams and the Headworks bore. The first diversion, on Headworks Creek, has been in place since 1904 and the most recent diversions, on No's 2 and 3 streams, since 1960. The Bulk Entitlement specifies passing flow requirements in five of these streams. The water flows by gravity through 47.4km of pipeline to storages north of Hamilton. The maximum capacity of the supply system is approximately 12.8ML/d.

A 52km pipeline was completed in 2010 providing a connection between Rocklands Reservoir and the Hamilton System. Wannon Water has a 2,120 ML bulk entitlement from the Wimmera-Glenelg system and receives an annual allocation, which is subject to the flow sharing arrangements in the bulk entitlement. Water available under this bulk entitlement is also used to supply the township of Balmoral via a separate pipeline. Wannon Water can carryover its unused entitlement from year to year, with carryover occurring on 1 October, subject to a 15% reduction for evaporation. The accumulation of water above 2,120 ML will help provide for years when the allocation is less than 100%. In dry years the allocation can be low. For example, in 2015/2016 the allocation was only 5%.

For security of supply purposes, the storage volume available in the Grampians Water Supply System is considered to be equal to the 2,120 ML bulk entitlement, plus the capacity of the local storages that are upstream of the Hamilton Water Treatment Plant. Water brought to Hamilton is stored in five main storages located along the pipeline to the north of Hamilton. The total capacity of the local storages is approximately 2,652 ML. These storages are summarised in Table C1.

Table C1 System Storages

Storage Name	Volume (ML)
Hayes Reservoir	1,200
Cruckoor Reservoir	990
Hartwichs Reservoir	330
No. 1 and 2 storages	132
Total Storage	**2,652**

Hartwichs Reservoir was constructed in 1950 and is located approximately 2 km north of Hamilton. It was constructed with a capacity of 381ML but the FSL has since been revised downwards to 330ML. Cruckoor Reservoir was constructed in 1969, with a capacity of 990 ML, and is located approximately 4.5 km north of Hamilton. The most recent storage constructed is Hayes Reservoir which was constructed in 1993, with a capacity of 1,200 ML and is located approximately 11.5 km north of Hamilton.

Nos. 1 and 2 storages are located on high ground on the northern outskirts of Hamilton and serve the city as raw water balancing basins. The basins are interconnected and have a combined capacity of 132 ML (66 ML each).

The five storages are filled by gravity and all, with the exception of Hayes Reservoir, are emptied by gravity. Treated water is delivered to clear water storage tanks with a total capacity of 13 ML before being supplied to the reticulation system.

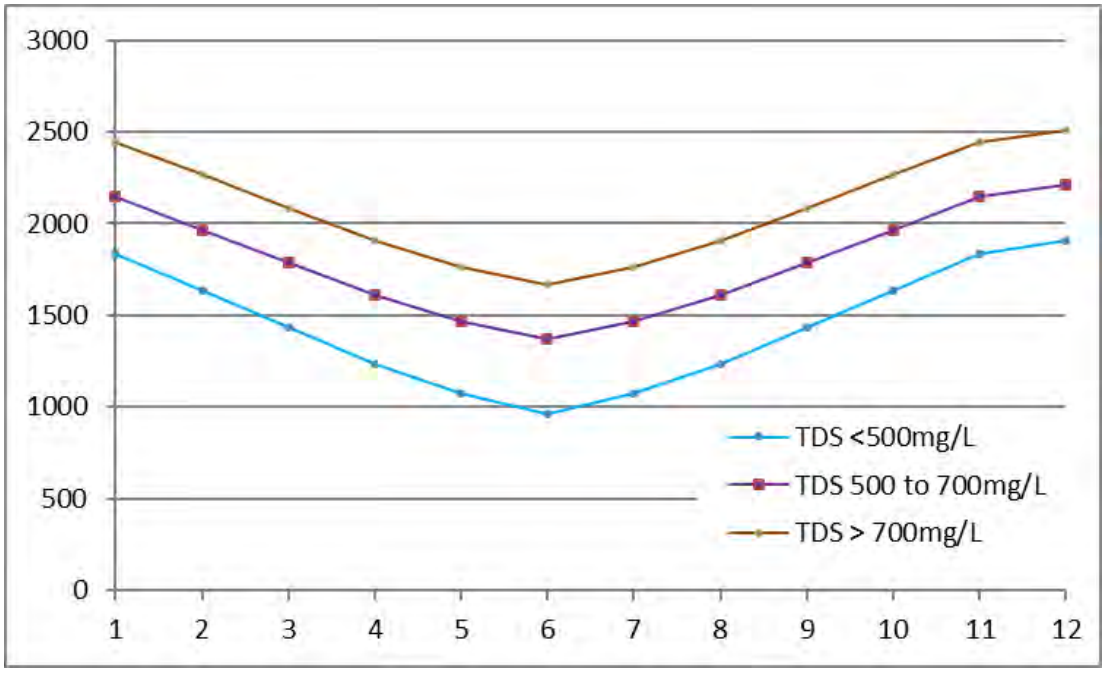
The township of Tarrington was connected to the Hamilton system in 1972 and is supplied via a pumped rising main to a 1ML tank located on the top of Mount Pierrepoint. Water then gravitates from this storage to a small elevated tower in Tarrington and then by gravity to the township.

The township of Cavendish was connected to the Hamilton system in 1970 via a 100 mm diameter diversion pipeline from the main Grampians pipeline serving Hamilton. Water is supplied by gravity to a 2.25ML shadecloth-covered storage on high ground to the east of the township. Water gravitates from the reservoir to the township. During summer low flow periods, when all the stream flow is used to meet the environmental flow requirements, the Headworks bore is used to supply the town.

The township of Dunkeld was connected to the Hamilton system in 1998 via a 33 km pipeline to a new clear water (lined and covered) storage (6.3 ML). Prior to connection to the Hamilton system, the Dunkeld system consisted of three storages, being the No. 1 Service Basin (36 ML), the No. 2 Service Basin (36 ML) and the No. 3 Reservoir (110 ML). A weir on Waterfall Creek supplies water to the No. 3 and No. 2 storages. Although not treated, this system could be used as an emergency supply as was the case in the 2006 bushfires.

Operating rules have been developed which aim to maximise the yield from the combined supply sources, whilst mitigating water quality risks associated with the higher salinity supply from Rocklands Reservoir. Storage operating curves have been developed which define usage of the total available resource according to the quality of water in Rocklands Reservoir. When the quality of water in Rocklands Reservoir is less than 500 mg/L TDS, the risk that the resource will become unsuitable for use is relatively low, therefore water is preferentially retained in Rocklands Reservoir and use of the local storages is maximised. When the quality of water in Rocklands Reservoir increases above 500 mg/L TDS, then a larger reserve volume is required in local storages to facilitate blending which prolongs the use of the Rocklands resource. Storage operating curves were developed in 2010 to allow for this. These curves are revised here to allow some airspace in the local storages to maximise the potential to harvest from the local streams. The adopted storage operating curves are illustrated in Figure C2.

Figure C2 Operating Curves for Hamilton System Storages



The system operating rules specify the usage of the available resource in the following priority order:

- Streamflow is diverted from the Grampians Headworks streams, subject to individual passing flow requirements with a total diversion up to 12.8 ML/d;
- Water transferred from Rocklands Reservoir up to 8 ML/d with transfers limited to the allocation held in Wannon Water's allocation bank account (including water held as carryover). Allocations are based on 2,120 ML/a bulk entitlement volume;
- Diversion from the Grampians Bores, up to 400 ML/a;
- The local storage are filled in the following priority order, Hartwichs Reservoir ; Cruckoor Reservoir then Hayes Reservoir, noting that for water quality purposes water from Rocklands Reservoir is never stored in Cruckoor Reservoir; and
- Hartwichs Reservoir is used for blending purposes.

The Balmoral township sources its water directly from Rocklands Reservoir. The Rocklands Reservoir was constructed in 1953 and Balmoral was connected to it in 1966. Water is pumped from Rocklands to a service basin in Harrow Road, which is located adjacent to the High School. The capacity of this basin is 0.54 ML. The reticulation system is pressurised by a multi-stage booster pump station.

C1.1.2 System Demands and Consumption

The total demand represents the unrestricted water usage from the headworks, inclusive of system distribution losses. The current (2021) average annual demand for the system is adopted for long term planning purposes.

Table C2 Components of the Current (2020/21) Average Annual Demand - Grampians

Component	Total Demand (ML)	Base Demand (ML)	Restrictable Demand (ML)
Residential	782	626	156
Non Residential	201	161	40
Rural	63	-	
Major	21	-	
Public Open Space	13	-	
Total Consumption	**1080**	**884**	**196**
Nonrevenue Water	141	-	
Bulk Usage (WTP Outflow+Pipeline customers)	1241	**1045**	**196**
WTP Losses	40	-	
System losses (upstream of WTPs)	400	-	
Total Raw Water Usage	1681	**1485**	**196**

Note 1 – Restrictable demand was estimated at 20% of resi and nonresi use based on data collected in Hamilton over the Millenium drought

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.Climate corrected water consumption in 2020/2021 for each of the towns supplied by the Grampians Water Supply System is provided in Table C3.

Table C3	**Consumption by Customer District - Grampians 2021 (climate corrected)**							
Customer District	**Major**	**Nonresi**	**Resi**	**Rural**	**Public Open Space**	**Customer totals**	**Bulk Meter**	**NRW**
Balmoral	0	8	16	8	1	34	38	4.1
Cavendish	0	1	8	1	0	10	9	-1.2
Hamilton	21	176	687	19	9	912	1031	119
Tarrington	0	1	23	4	0	28	35	7
Dunkeld	0	14	49	11	0	75	86	12
Hamilton pipeline	0	0	0	18	0	18	18	
Balmoral Pipeline	0	0	0	1	2	4	4	
Grampians system total	**21**	**201**	**782**	**63**	**13**	**1080**	**1221**	**141**
Figures exclude WTP and headworks losses. Volumes in ML.								

C1.1.3 System Yield and Security of Supply

For the Grampians System, the average annual demand that can be supplied at the adopted 95% annual reliability is 2,217 ML/a or 132% of current average annual demand (GHD, 2022). The frequency of Stage 1 restrictions is adopted by Wannon Water as the measurement of system reliability. A 95% annual reliability target equates to a 1 in 20 year frequency for restrictions.

The estimated reliability of the current demand (1,681 ML/a) under historical streamflow and medium impact 2040 climate change conditions is 100%.

Table C4 shows the sources of supply.

Table C3 Diversions from the Environment by Source (in ML)

	2017/18	2018/19	2019/20	2020/21
Balmoral @ Rocklands	**25**	**52**	**43**	**42**
Hamilton - Rocklands	**3**	**1**	**1**	**43**
Grampians streams	**1419**	**1320**	**1697**	**1560**
Grampians bores	**314**	**256**	**302**	**169**
Dunkeld headworks weir	**13**	**11**	**18**	**29**
Grampians Raw Water	**1774**	**1640**	**2061**	**1843**

C1.2 Drought Experience

C1.2.1 Brief Analysis of Historic Droughts

Prior to, and including the 1982/1983 drought, restrictions on water use were regularly imposed. The 1982/1983 drought was the most severe drought experienced in the area in recent years. Water restrictions were imposed on consumers, limiting garden watering to a hand held hose for one hour on alternate days.

To meet water demands during the 1982/1983 drought the then Hamilton Water Board supplemented the system by operating its groundwater bores in the headworks catchment.

Bullawin Bore was re-commissioned on 2 November 1982, (this bore had been constructed during the 1967/1968 drought) and operated until 22 March 1983 producing a total flow of 182 ML (1.3 ML/day). Headworks Bore was commissioned on 19 January 1983 and operated intermittently until 23 February 1983. When operating, this bore produced approximately 0.7 ML/day. When both bores were operating they contributed 2 ML/day to the supply system.

After the drought the Hamilton Water Board embarked on a 10 year program to increase the harvest of winter flows and to increase the storage capacity. Over 30 km of pipeline duplications and replacements have seen the pipeline capacity increase from 7 ML/day to 12.8 ML/day (only 12.8 ML/day when filling

Hayes Reservoir). Water can be pumped from Hayes Reservoir at the rate of 15 ML/day. Hayes Reservoir, with a capacity of 1 200 ML, was commissioned in 1993.

Hamilton also had water restrictions for two weeks during February 1990 but this was due to the last section of mainline to Nos. 1 and 2 not being capable of supplying enough water to meet the demand. This section of main was duplicated in 1991 and the entire pipeline system now has a capacity of 12.8 ML/day under gravity feed.

Restrictions were regularly imposed for the Dunkeld Water Supply System during the 1990s. The level of water in this system dropped to a point in 1998 and the township was in danger of running out of water. Stage 3 restrictions were applied and a pipeline was constructed from Hamilton, culminating in restrictions being lifted in April 1999. Dunkeld is now permanently connected to the Hamilton system and the original Dunkeld system is maintained as an emergency supply. This emergency supply was used, for the first time, during the 2006 Australia Day bush fire and from December 2006 to September 2007 to conserve the supply in the Hamilton reservoirs for the Hamilton and Tarrington systems.

The Hamilton system had restrictions imposed during 2000 and 2001. Restrictions were again re-introduced in January 2006, following a relatively dry spring inflow period. By late 2006, storages fell to critically low levels following the driest spring period in recent history. By December 2006, Stage 4 restrictions were introduced and remained in place until November 2007 when they were replaced with Stage 3 restrictions. The level of restriction was further reduced to Stage 2 in November 2009.

In 2007, planning work commenced to augment the system via a 52km pipeline connection to Rocklands Reservoir. This pipeline was commissioned in 2010. The groundwater bores in the Grampians headworks were operated during the times that restrictions were in place (two additional bores, Geerak and McCutcheons, were constructed during this period). Stage 2 restrictions were lifted in August 2010.

During the 1967/1968 drought, the level of the Rocklands Reservoir was very low. While there was adequate water to meet normal demands the State Rivers & Water Supply Commission requested that water restrictions be implemented in Balmoral. Restrictions were applied from 1 December 1967 and were not lifted until 1 July 1968.

It was necessary to extend the pump suction line in the Reservoir in order to maintain supply.

In March of 1988 the State Rivers & Water Supply Commission advised that in future droughts the level of Rocklands would not be allowed to fall below 5 000 acre feet (6 200 ML) with such water being reserved for Balmoral and landholders along the Glenelg River.

Consumers were informed of the need for restrictions by circular.

In the 1982/1983 drought restrictions were implemented on the 1 April 1983 and lifted in October the same year. No other operational measures were necessary.

Stage 1 restrictions were imposed in January 2003 as a result of the recent ongoing drought. The restrictions moved to Stage 2 in April 2006 and to Stage 4 in October 2006. Stage 4 restrictions remained in place until they were lifted in October 2009.

A summary of water restrictions since 1995 is provided in Table C5.

Table C4 Recent History of Restrictions

Date	System	Stage	Action
4/03/1995	Dunkeld[1]	2	Introduced
17/06/1995	Dunkeld [1]	2	Lifted
13/09/1997	Dunkeld[1]	1	Introduced
26/02/1998	Dunkeld[1]	2	Introduced
29/08/1998	Dunkeld[1]	3	Introduced
17/04/1999	Dunkeld	3	Lifted
5/02/2000	Hamilton	1	Introduced
11/03/2000	Hamilton	2	Introduced
21/09/2000	Hamilton	1	Reduced from Stage 2
14/10/2000	Hamilton	1	Lifted
27/01/2001	Hamilton	1	Introduced
10/03/2001	Hamilton	2	Introduced
8/09/2001	Hamilton	2 & 1	Lifted
18/01/2003	Balmoral	1	Introduced
21/01/2006	Hamilton	1	Introduced
01/04/2006	Hamilton, Balmoral	2	Introduced
14/10/2006	Balmoral	4	Introduced
4/11/2006	Hamilton	3	Introduced
5/12/2006	Hamilton	4	Introduced
3/11/2007	Hamilton	3	Reduced from Stage 4
04/10/2009	Balmoral	PWSR	Stage 4 Lifted – returned to PWSR
1/11/2009	Hamilton	2	Reduced from Stage 3
1/08/2010	Hamilton	PWSR	Stage 2 Lifted – returned to PWSR

1. Operated as an independent system prior to 1999.

C1.3 Drought Response Options

C1.3.1 Introduction

Response options in the Grampians System can be classified into two broad categories; demand management and su**p**ply enhancement. In this section of the Drought Response Plan, potential demand management and supply enhancement options for the Wannon Water are identified.

C1.3.2 Demand Reduction During Droughts

Summary of Options

There are a number of demand reduction options that can be employed during times of water shortage. A summary of demand reduction options is shown in Table C6 below.

Table C5 Summary of Demand Reduction Options

Option	Details	Comments
Community Education Programs	Water efficiency awareness (showerhead rebates, information brochures), linked to ongoing State Government programs. Estimated savings are of 2-5% of total demand over next 2 years.	Being progressively implemented by Wannon Water.
Voluntary Demand Reduction Measures	Self regulated water conservation measures aimed at increasing effectiveness of measures within the Permanent Water Saving Plan, and potential savings if water restrictions are implemented.	Water savings from this option are expected to exceed the savings already achieved from the Permanent Water Saving Plan.
Mandatory Water Restrictions	Option available under By-Law No. 6.	See Appendix B for requirements and prohibitions on water usage.
Compliance Officer/s	Additional resources may be required during extended periods of moderate to severe restrictions to monitor the performance of targeted water savings measures.	
Restrict Supply to Rural Customers	Possible under agreement only.	A restriction policy for rural customers requires further development.

Voluntary Demand Reduction Measures

Voluntary demand measures are an initial measure in the event of a drought. The importance of public awareness, understanding and involvement in meeting demand reduction objectives cannot be underestimated.

Wannon Water is committed to communicating effectively with its Grampians System customers to encourage take up of voluntary water saving measures and in turn deliver the best possible outcomes in demand reduction.

Supporting these voluntary water saving measures with initiatives including showerhead exchanges, trigger nozzles and other merchandise, Wannon Water aims to encourage its customer base to play an active role in managing their water supply and play their part in times of water shortages to ensure efficient use of their precious resource.

A broad base of local media (press and electronic) can be utilised to raise community awareness of system supply levels and encourage voluntary water saving measures.

Wannon Water will raise the profile of system levels and support the take-up of voluntary measures through extensive 'tips' and media coverage on its website, regular informative media releases, advertising, distributing publications with customer accounts and distributing information at community events throughout the service region. Wannon Water will also liaise with its Customer Engagement Committee where appropriate and consider holding community information sessions to raise awareness.

Publication of information including changes in water usage, rainfall levels, streamflows or bore performance details can assist in raising the profile of shortages and demand needs. Recent experience has shown that in combination, all of the above communication tools have been effective in heightened public awareness and consciousness of water efficiency measures, particularly over summer months.

As well as engaging the community in voluntary demand reduction measures Wannon Water can liaise with major consumption customers to work out strategies to reduce consumption. Major customers include the local shire, community groups, industrial and rural water users.

Mandatory Water Restrictions

The main purpose of water restrictions is to conserve dwindling supplies during drought periods.

Drought response triggers have been revised following augmentation of the system in 2010 with the completion of the pipeline from Rocklands Reservoir. The revised drought response triggers are related to the total volume of water available in the local Hamilton storages and water held by Wannon Water in the Available Bank Account from the Wimmera/Glenelg system.

The anticipated water savings for each level of restriction is shown in Table C7. These savings have been tested by comparing residential KL per connection over the period 2005/2006 to 2010/2011 for Hamilton against other towns not subject to water restrictions. The residential consumption rates shown in Table C7 provide guidance on the level of consumption which should be targeted to achieve the stated water savings.

Table B6 Anticipated Water Savings from Water Restrictions for the Hamilton System

Restriction Level	Estimated Water Saving			Target Residential Consumption Rate	
	% of Restrictable Demand[1]	Volume (ML)	% of Total Raw Water Use[2]	KL/ connection/ yr	L/ person/ day
PWSM				167	200
Stage 1	13% - 16%	30-35	2%	156	185
Stage 2	40% - 50%	90-110	5-6%	146	173
Stage 3	60% - 75%	130-160	8-9%	140	166
Stage 4	95% -100%	220	13%	130	154

1. Ranges adopted from VicWater, 2005.
2. Total raw water use inclusive of distribution, treatment and systems losses.

C1.3.3 Supply Augmentation Options During Drought

A summary of the short term supply augmentation options for the Grampians System is shown in Table C8 .

Table C7 Supply Augmentation Options During Drought

Option	Details	Available Supply / Notes
Groundwater Pumping	Headworks , Bullawin , Geerak and McCutcheons	• Pumps are remote from Hamilton and are powered using diesel motors and hence need checking on a daily basis. • Geerak bore cannot be used until emergency trigger levels (ie Stage 4 restrictions) are in place.
Dunkeld Storages	Accessing water from unused supplies held in Dunkeld storages	• 146 ML/yr (total). • Low reliability and variable water quality. • Possible emergency supply for Dunkeld.
Purchase Additional Water	Purchase additional allocation from Wimmera-Glenelg System	• Early warning of intent to trade may be necessary to ensure storage operator reserves water in Rocklands Reservoir.
Qualification of Rights	Apply to the Minister to increase surface and/or groundwater extractions beyond the conditions of the entitlements.	

Wannon Water is able to carry-over unused allocation in the Glenelg/Wimmera system from year to year. Water that is carried over is held in a spillable water account, which can accumulate from year to year. Water which is carried over is effectively stored in what would otherwise have been “air space” in the reservoir. However, this means that if the storages spill, then all water held in the spillable water account is lost.

For Wannon Water, carryover provides an effective method to mitigate the impacts of low allocation years which may occur in the Glenelg/Wimmera system. That is, when base allocations are low, Wannon Water may be able to call on water which has been carried over, to maintain minimum supply requirements.

C1.4 Drought Response Actions

System monitoring is undertaken to assess the status of the supply system according to one of the following three operational modes:

Mode 1 – General Monitoring 

Mode 2 – Heightened Awareness 

Mode 3 – Drought Response 

C1.4.1 Mode 1 – General Monitoring (Pre-Drought Phase Activities)

The zone for the General Monitoring mode is defined by the system storage capacity as the upper bound and a trigger which is set just above the system operating curve, as the lower bound.

There are a number of important factors in pre drought monitoring and planning which will influence the decision to declare the system as being in the General Monitoring mode. These include:

- Storage contents, stream flows and bore performance data to monitor availability of supply;
- Climatic trends and seasonal outlooks as indicators of the possible onset of drought;
- Consumption trends to indicate changes in Customer's usage of water; and
- Forecasting storage behaviour over a 6-12 month period.

The Annual Water Outlook tool is used to monitor supply and demand side aspects of the system. During the General Monitoring mode, the system status is updated on a weekly basis and a report prepared weekly. A summary of the key system performance indicators for the Grampians Supply System which should be included in the Annual Water Outlook and System Status Report is provided in Table C9.

Table C8 Requirements for Annual Water Outlook and System Status Monitoring and Reporting

Item	Requirements
Rainfall, seasonal climate outlook	Information accessed from Bureau of Meteorology website.
State-wide status	Bureau of Meteorology and Department of Environment, Land, Water and Planning websites provide status reports on rainfall, streamflow, storage levels, groundwater and urban water restrictions across Victoria on a monthly basis.
System storage contents	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.
Inflows from Headworks streams	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.
Allocation Forecasts	Seeking updates on allocations within the Wimmera/Glenelg system and information on likely increases during low allocation periods.
Water levels in ground water supply systems are monitored at least monthly and are able to be compared against pump depths.	The frequency of monitoring should be increased to weekly or daily if a decline in water level raises concern on the security of the system.
System Demands (bulk meter consumption)	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.

The trigger mechanism for actions is the total system resource volume, using the Drought Response Triggers shown in Appendix C2.

Forward look projections of storage response forms an integral part of the short term planning during a drought. Projections assist to anticipate the “likely” response based on current climatic conditions. At a minimum, Wannon Water makes projections over the next 3-12 months based on its experience in previous droughts. However, seasonal forecasting over three month, six month and 12 month periods, incorporating information from low-frequency climate signals such as the El Nino Southern Oscillation Index and sea surface temperatures, may also be useful in this assessment. System modelling tools such as Ewater Source can also be utilised when undertaking forward look projections, as they can account for antecedent conditions such as soil moisture levels, and can translate rainfall and demand projections into changes in storage levels.

4.2 Mode 2 – Heightened Awareness

The zone for the Heightened Awareness mode is designed to provide early warning of a pending water shortage. The Heightened Awareness mode is triggered following consideration of:

- Storage contents, stream flows and bore performance data to monitor availability of supply;
- Climatic trends and seasonal outlooks;
- Consumption trends to indicate changes in Customer's usage of water; and
- Forecasting storage behaviour over a 3-6 month period.

The key actions are summarised in Table C10 (in order of increasing impact from water shortages).

Table C9 Grampians System Action Plan for Mode 2 – Heightened Awareness

Action	Trigger	Response
Action 1	High likelihood that total storage contents cannot be maintained above the System Operating Curves	1. Reconvene the Drought Response Monitoring Committee
Action 2	Moderate to high likelihood that total storage contents cannot be maintained above the Level 1 Drought Response Trigger	2. Provide weekly updates of the System Status Report 3. Implement demand reduction options such as Community Education Programs, Voluntary Demand Reduction Measures via increased media,
Action 3	High likelihood that storage contents cannot be maintained above the Level 1 Drought Response Trigger	4. Alert public to the imminent water shortages and possible need for restrictions in the future. 5. Promote “voluntary restrictions” via media advertising campaigns to inform consumers about water conservation programs. 6. Declare operational mode as Mode 3 - Drought Response.

C1.4.3 Mode 3 - Drought Response

Mode 3 defines an active drought response period where supply and/or demand side measures are required to maintain supply security. Restriction rule curves are used to trigger an increase in the severity of the water shortage. Management actions during each level of restriction are summarised in Table C11.

Table C10 Grampians System Action Plan for Mode 3 – Drought Response

Action	Trigger	Response
Action 4	Total storage contents unable to be maintained above Level 1 Drought Response Trigger.	7. Consider implementation Stage 1 restrictions. 8. Monitor storage volume response and perform regular forward look storage projections. 9. Initiate an intensive advertising campaign and issue relevant leaflets.
Action 5	Total storage contents unable to be maintained above Level 2 Drought Response Trigger	10. Consider implementation Stage 2 restrictions, water patrols etc. 11. Monitor storage volume response and perform regular forward look storage projections. 12. Commence pumping from groundwater bores.
Action 6	Total storage contents unable to be maintained above Level 3 Drought Response Trigger	13. Consider implementation Stage 3 restrictions. 14. Monitor storage volume response and perform regular forward look storage projections. 15. Utilise Dunkeld resources 16. Implement preparatory steps for emergency action, including initial contact with water tanker contractors.
Action 7	Total storage contents unable to be maintained above Level 4 Drought Response Trigger (Emergency Level)	17. Consider implementation Stage 4 restrictions. 18. Monitor storage volume response and perform regular forward look storage projections.

C1.5 Post Drought Phase

Actions to be considered after a drought has occurred are summarised in Table C12. These include evaluating the appropriateness of the actions within each of the operational models and the associated triggers, the effectiveness of demand reduction and emergency supply augmentation options and the effectiveness of each level of restriction.

Table C11 Evaluate Operational Modes Trigger Levels and Associated Actions

Operational Mode	Action Sequence	Description	Assessment Procedure
General Monitoring	NA	Monitoring and evaluation	Were the indicators being used to monitor of system performance appropriate?
Heightened Awareness	Actions 1-6	Planning	Was there adequate time to undertake the activities detailed in Actions 1-3.
		Voluntary Demand Reduction	Was the community responsive? Was there a significant reduction in demand? Was the trigger level appropriate?
Drought Response	Actions 7-18	Water Restrictions	Was the expected reduction in demand achieved for each stage? Were the trigger levels appropriate? Were policing methods effective, if so, how?
		Groundwater pumping	Was groundwater effective at this stage or should it be started earlier? Was timing of groundwater input appropriate? Were pumps and equipment available? Was water quality acceptable to customers, particularly for industrial customers?
		Implement other emergency supply options	To what level was demand reduced? What was the cost and practicality of carting water if undertaken? Were individual emergency options implemented too late? Did other options arise; if so, what other options were available?

Table C13 summarises the assessment procedure for evaluating the impact of restrictions applied to customers, authority staff and supply systems. The intention is to learn from the methodologies that have been applied in order to minimise any future incidents of this nature.

Table C12 Evaluate the Impact of Restrictions

Stakeholders	Assessment Procedure
Domestic Users	Were the restrictions too severe?
	Was the right mix of media used to disseminate information?
	Was there enough warning of impending drought? If not, how could this be improved?
Environmental	Were flow triggers appropriate?
	What were the effects upon the aquifer and other users of pumping?
	What methods have been put into place to rectify any environmental effects?
Wannon Water Staff	Were many instances reported of restriction violations?
	Was it possible to effectively enforce the restriction policy?
	Was sufficient staff available to monitor system performance?
Supply Systems	Did restrictions achieve expected levels of water savings?
	Have supply systems been replenished? If so, how long did it take to achieve this level?
	What procedures were put in place to achieve this?

Table C14 summarises the assessment procedure for establishing the effectiveness of pumping groundwater to replenish the supply systems during drought.

Table C13 Evaluate Effectiveness of Groundwater Pumping

Action	Assessment Procedure
Evaluate effectiveness of ground water pumping	Did water quality problems occur?
	Should groundwater supplies have been introduced prior to where programmed in the Drought Response Plan?
	Did the volume of water extracted stay within the groundwater licence limit.

Part D
Glenthompson System Drought Response Plan

D1. Glenthompson Water Supply System

D1.1 Details of the Glenthompson Water Supply System

D1.1.1 System Description

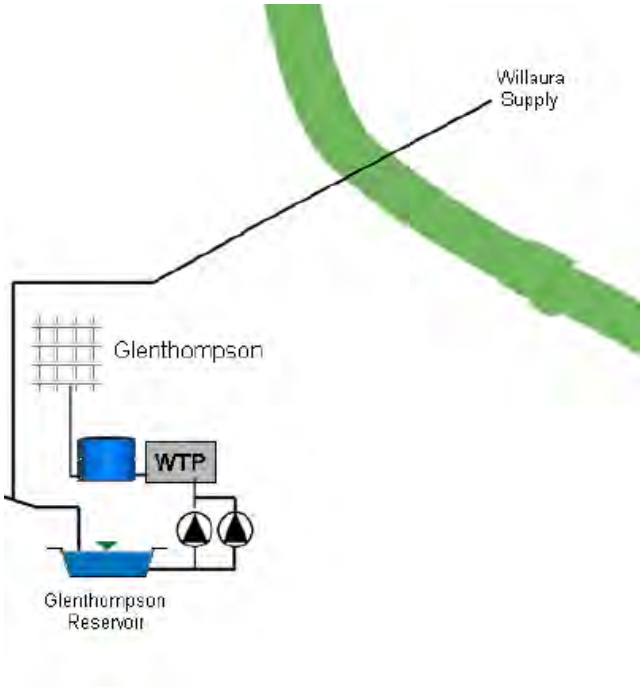
The Glenthompson Reservoir has a capacity of 110 ML, is located close to the township and has a small surface catchment. Infrastructure to harvest water from a nearby catchment (Railway Reservoir) was decommissioned in 2015 following cost-benefit analysis that identified its use did not substantially improve system security but required significant works. The Willaura pipeline is used to supply rural customers and supply the reservoir when it becomes low and draws water from Grampians Wimmera Mallee Water's Willaura system. The source for this is surface run-off from offtakes on Mount William Creek and Masons Creek in the Grampians National Park, supplemented by supply from a borefield on Mount William Creek. The borefield capacity was increased significantly to 1 ML/d in the Millennium drought.

An important feature of the system is that approximately half of the demand on the system is from the rural users along the Willaura pipeline, before the pipeline reaches the Glenthompson reservoir. These customers have similar access to water as Grampians Wimmera Mallee Water's (GWMW) rural customers on the upstream pipeline. However, due to the relatively high elevation of the Glenthompson storage and the associated hydraulics, Glenthompson storage is only supplied for limited periods requiring GWMW to isolate part of its system. Wannon Water liaises with GWMW in respect of the timing of delivery from the Willaura pipeline to Glenthompson Reservoir. The security of the town supply is heavily reliant on this delivery because the local catchment for Glenthompson reservoir does not produce runoff in dry years.

The Willaura System is managed by GWMW. The Glenthompson township and our pipeline customers only constitute a small proportion (15%) of the overall demand on the Willaura System.

A schematic of the proportion of the supply system managed by Wannon Water is shown in Figure D1. Connections for the rural properties are provided along the 24km pipeline.

Figure D1 Glenthompson Water Supply System



Water is treated and stored in a 0.15ML tank on elevated land adjacent to the reservoirs. Water is supplied to the town by gravity from this tank.

D1.1.2 System Demands and Consumption

The total demand represents the unrestricted water usage from the headworks, inclusive of system distribution losses. The current (2021) average annual demand for the system is adopted for long term planning purposes, including the development of Wannon Water's water restriction policies.

The estimated total average annual demand for the Glenthompson Water Supply System is 48 ML/year. The components of this demand are presented in Table D1.

Table D1 Components of the 2020/21 Average Annual Demand Estimate

Component	Total Demand (ML)	Base Demand (ML)	Restrictable Demand (ML)
Residential	8	6.4	1.6
Non Residential	1	0.8	0.2
Rural	25	25	-
Major	0	0	-
Public Open Space	0	0	-
Total Consumption	34	31.2	1.8
Nonrevenue Water	2	2	-
Bulk Usage (WTP Outflow+Pipeline customers)	36	34.2	1.8
WTP Losses	1	1	-
System losses (upstream of WTPs)	1	1	-
Total Raw Water Usage	38	36.2	1.8

D1.1.3 System Yield and Security of Supply

For the Glenthompson Water Supply System, the average annual demand that can be supplied at the adopted 95% annual reliability is close to current demand. Booster pumping of the pipeline from Willaura was implemented in 2020-21 utilising a portable pumping skid. The skid is stored at the Hamilton Depot for future use. The increased flow achieved using the booster is expected to secure this supply in the medium term.

D1.2 Drought Experience

During the 1982/1983 drought the Glenthompson Reservoir was full (110 ML) at the beginning of September, 1981, and did not receive any runoff for the period through to mid April, 1983, a period of 21 months. The storage was rapidly depleted and by 1 April, 1982, held only 17 ML. From that time until the drought ended the Glenthompson system was almost totally reliant on the Willaura pipeline. An estimated 3 ML was held in the storage just prior to the drought breaking.

Since 1995, restrictions have been implemented frequently as the reliability of inflows to the local storage has been low. Water restrictions were required continuously over the period 1995 to 2009, including a 12 month period of Stage 4 restrictions from October 2006. Whilst water restrictions only impacted the residential customers, demand from the rural customers taking raw water from the system was also lower as de-stocking occurred from 2007/2008 onwards.

Following customer concerns about the severity of the supply situation, exemptions were made under the Stage 4 restrictions allowing bucket watering of gardens. Restrictions were lifted in October 2009.

A summary of the restrictions since 1995 is provided in Table D3.

Table D2 Glenthompson System Recent History of Restrictions

Date	Stage	Action
18/02/1995	2	Introduced
17/06/1995	2	Lifted
17/01/1998	1	Introduced
11/07/1998	1	Lifted
12/09/1998	1	Introduced
12/12/1998	2	Introduced
21/09/2000	1	Reduced from Stage 2
14/10/2000	1	Lifted
12/11/2005	1	Introduced
01/04/2006	2	Introduced
14/10/2006	4	Introduced
3/11/2007	2	Reduced from Stage 4
4/10/2009	PWSR	Stage 2 Lifted – returned to PWSR

D1.3 Drought Response Options

D1.3.1 Introduction

There are two methods which can be applied in the event of a drought or water shortage, these being demand reduction and supply augmentation.

On the basis of the performance of existing systems during past droughts it is considered that demand management should form the first stage in this drought response program. Supply augmentation would be considered if this stage failed to achieve the response or if the severity of the drought necessitates it.

A condition of the Glenthompson bulk entitlement (subject to current application) will be the requirement to restrict urban demands in the system when GWMWater imposes water restrictions in their supply systems which source water from the Willaura system or reduce the maximum daily rate of taking water from the Willaura headworks to a rate agreed to by GWMWater.

Options for both these measures are detailed below.

D1.3.2 Demand Reduction During Droughts

There are a number of demand reduction options that can be employed during times of water shortage. A summary of demand reduction options is shown in Table D4.

Table D3 Summary of Demand Reduction Options

Option	Details	Comments
Community Education Programs	Water efficiency awareness (showerhead rebates, information brochures), linked to ongoing State Government programs. Estimated savings are of 2-5% of total demand over next 2 years.	Being progressively implemented by Wannon Water.
Voluntary Demand Reduction Measures	Self regulated water conservation measures aimed at increasing effectiveness of measures within the Permanent Water Saving Plan, and potential savings if water restrictions are implemented.	Water savings from this option are expected to exceed the savings already achieved from the Permanent Water Saving Plan.
Mandatory Water Restrictions	Option available under By-Law No. 6.	See Appendix B for requirements and prohibitions on water usage.
Compliance Officer/s	Additional resources may be required during extended periods of moderate to severe restrictions to monitor the performance of targeted water savings measures.	
Restrict Supply to Rural Customers	Possible under agreement only.	A restriction policy for rural customers requires further development.

Monitoring of the Glenthompson system is important due to reliance on surface supplies and limited access to supplementary sources. Accordingly, demand reduction forms the basis of the Drought Response Plan for Glenthompson and needs to be implemented early to be effective.

As with the Grampians System, it is proposed that the first phase of demand reduction should involve a request to the consumers for voluntary reduction in water usage.

Half of Glenthompson's demand is from supply-by-agreement rural users on the pipeline from Willaura. If supply from the Willaura system failed, supply to these users would not be guaranteed. For the Glenthompson township, voluntary and mandatory restrictions combined with community education programs would be the main tools used to manage demand.

The anticipated water savings for each level of restriction is shown in Table D5. These savings have been tested by comparing residential KL per connection over the period 2005/2006 to 2010/2011 for Hamilton against other towns not subject to water restrictions. The residential consumption rates shown in Table D5 provide guidance on the level of consumption which should be targeted to achieve the stated water savings.

Table D5 Anticipated Water Savings from Water Restrictions for Glenthompson

Restriction Level	Estimated Water Saving			Target Residential Consumption Rate	
	% of Restrictable Demand[1]	Volume (ML)	% of Total Raw Water Use[2]	KL/ connection/ yr	L/ person/ day
PWSM				167	200
Stage 1	13% - 16%	0.3	1%	156	185
Stage 2	40% - 50%	1	3%	146	173
Stage 3	60% - 75%	1.5	4%	140	166
Stage 4	95% -100%	2	6%	130	154

1. Ranges adopted from VicWater, 2005.
2. Total raw water use inclusive of distribution, treatment and headworks losses.

D1.3.3 Supply Augmentation Options During Drought

A summary of the range of short-term supply augmentation options for Glenthompson is shown in Table D6.

Table D6 Supply Augmentation Options During Drought

Option	Details	Available Supply
Existing Groundwater Bores	Willaura System bores operated by GWMWater.	Delivered via the Willaura pipeline, this resource is managed by GWMWater.
Water Cartage	From Dunkeld, Mortlake or Penshurst.	

D1.4 Drought Response Actions

System monitoring is undertaken to assess the status of the supply system according to one of the following three operational modes:

Mode 1 – General Monitoring 

Mode 2 – Heightened Awareness 

Mode 3 – Drought Response 

The trigger mechanism for actions is the storage volume in Glenthompson Reservoir, using the Drought Response Triggers shown in Appendix C3.

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D1.4.1 Mode 1 – General Monitoring (Pre-Drought Phase Activities)

The zone for the General Monitoring mode is defined by the system storage capacity as the upper bound and a trigger which is set just above the system operating curve, as the lower bound.

There are a number of important factors in pre drought monitoring and planning which will influence the decision to declare the system as being in the General Monitoring mode. These include:

- Storage contents, stream flows and bore performance data to monitor availability of supply;
- Climatic trends and seasonal outlooks as indicators of the possible onset of drought;
- Consumption trends to indicate changes in Customer's usage of water;
- Forecasting storage behaviour over a 6-12 month period;
- Regular consultation with GWMWater regarding the supply status for the Willaura System.

The Annual Water Outlook tool is used to monitor supply and demand side aspects of the system. During the General Monitoring mode, the system status is updated on a weekly basis and a report prepared weekly. A summary of the key system performance indicators for the Glenthompson Supply System which should be included in the Annual Water Outlook and System Status Report is provided in Table D7.

Table D7 Requirements for Annual Water Outlook and System Status Monitoring and Reporting

Item	Requirements
Rainfall, seasonal climate outlook	Information accessed from Bureau of Meteorology website.
State-wide status	Bureau of Meteorology and Department of Environment, Land, Water and Planning websites provide status reports on rainfall, streamflow, storage levels, groundwater and urban water restrictions across Victoria on a monthly basis.
System storage contents	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.
Inflows Willaura System	Monitored by GWMWater.
Water levels in ground water supply systems are monitored at least monthly and are able to be compared against pump depths.	The frequency of monitoring should be increased to weekly or daily if a decline in water level raises concern on the security of the system.
System Demands (bulk meter consumption)	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.

D1.4.2 Mode 2 – Heightened Awareness

The zone for the Heightened Awareness mode is designed to provide early warning of a pending water shortage. The Heightened Awareness mode is triggered following consideration of:

- Storage contents, stream flows and bore performance data to monitor availability of supply;
- Climatic trends and seasonal outlooks;
- Consumption trends to indicate changes in customer's usage of water; and
- Forecasting storage behaviour over a 3-6 month period.

The key actions are summarised in Table D8 (in order of increasing impact from water shortages).

Table D8 Glenthompson System Action Plan for Mode 2 – Heightened Awareness

Action	Trigger	Response
Action 1	High likelihood that total storage contents cannot be maintained above the System Operating Curves	1. Reconvene the Drought Response Monitoring Committee
Action 2	Moderate to high likelihood that total storage contents cannot be maintained above the Level 1 Drought Response Trigger	2. Provide weekly updates of the System Status Report 3. Implement demand reduction options such as Community Education Programs, Voluntary Demand Reduction Measures via increased media advertising,
Action 3	High likelihood that storage contents cannot be maintained above the Level 1 Drought Response Trigger	4. Alert public to the imminent water shortages and possible need for restrictions in the future. 5. Promote “voluntary restrictions” via media advertising campaigns to inform consumers about water conservation programs. 6. Declare operational mode as Mode 3 - Drought Response.

D1.4.3 Mode 3 - Drought Response

Mode 3 defines an active drought response period where supply and/or demand side measures are required to maintain supply security. Restriction rule curves are used to trigger an increase in the severity of the water shortage. Management actions during each level of restriction are summarised in Table D9.

Table D9 Glenthompson System Action Plan for Mode 3 – Drought Response

Action	Trigger	Response
Action 4	Total storage contents unable to be maintained above Level 1 Drought Response Trigger.	7. Consider implementation Stage 1 restrictions. 8. Monitor storage volume response and perform regular forward look storage projections. 9. Initiate an intensive advertising campaign and issue relevant leaflets.
Action 5	Total storage contents unable to be maintained above Level 2 Drought Response Trigger	10. Consider implementation Stage 2 restrictions, water patrols etc. 11. Monitor storage volume response and perform regular forward look storage projections.
Action 6	Total storage contents unable to be maintained above Level 3 Drought Response Trigger	12. Consider implementation Stage 3 restrictions. 13. Monitor storage volume response and perform regular forward look storage projections. 14. Implement preparatory steps for emergency action, including initial contact with water tanker contractors.
Action 7	Total storage contents unable to be maintained above Level 4 Drought Response Trigger (Emergency Level)	15. Consider implementation Stage 4 restrictions. 16. Monitor storage volume response and perform regular forward look storage projections. 17. Tanker water to Glenthompson

D1.5 Post Drought Phase

Actions to be considered after a drought has occurred are summarised in Table D10. These include evaluating the appropriateness of the actions within each of the operational models and the associated triggers, the effectiveness of demand reduction and emergency supply augmentation options and the effectiveness of each level of restriction.

Table D10 Evaluate Operational Modes Trigger Levels and Associated Actions

Operational Mode	Action Sequence	Description	Assessment Procedure
General Monitoring	NA	Monitoring and evaluation	Were the indicators being used to monitor of system performance appropriate?
Heightened Awareness	Actions 1-6	Planning	Was there adequate time to undertake the activities detailed in Actions 1-3.
		Voluntary Demand Reduction	Was the community responsive? Was there a significant reduction in demand? Was the trigger level appropriate?
Drought Response	Actions 7-17	Water Restrictions	Was the expected reduction in demand achieved for each stage? Were the trigger levels appropriate? Were policing methods effective, if so, how?
		Implement other emergency supply options	To what level was demand reduced? What was the cost and practicality of carting water if undertaken? Were individual emergency options implemented too late? Did other options arise; if so, what other options were available?

Table D11 summarises the assessment procedure for evaluating the impact of restrictions applied to customers, authority staff and supply systems. The intention is to learn from the methodologies that have been applied in order to minimise any future incidents of this nature.

Table D11 Evaluate the Impact of Restrictions

Stakeholders	Assessment Procedure
Domestic Users	Were the restrictions too severe?
	Was the right mix of media used to disseminate information?
	Was there enough warning of impending drought? If not, how could this be improved?
Rural Customers	What was the rural customers' reaction to restrictions?
Environmental	Were flow triggers appropriate?
	Should environmental flows be reassessed?
	What were the effects upon the aquifer and other users of pumping?
	What methods have been put into place to rectify any environmental effects?
Wannon Water Staff	Were many instances reported of restriction violations?
	Was it possible to effectively enforce the restriction policy?
	Were sufficient staff available to monitor system performance?
Supply Systems	Did restrictions achieve expected levels of water savings?
	Have supply systems been replenished? If so, how long did it take to achieve this level?
	What procedures were put in place to achieve this?

Part E

Groundwater Systems Drought Response Plan

E1. Groundwater Supply Systems

E1.1 Details of Groundwater Supply Systems

E1.1.1 System Descriptions

Wannon Water manages 10 water supply systems that use groundwater as the primary source of water. Whilst most of these systems typically supply one township, two have been set up to supply multiple townships via a piped distribution network. There are also distinct hydrogeologic regions which water is extracted from to supply these towns, these being from either shallower groundwater sources or from a deeper groundwater resource referred to as the Dilwyn Aquifer. The towns supplied from groundwater resources are shown in Tables E1 and E2.

Table E1 Shallow Groundwater Supply Systems

System	Towns Supplied and Other Users	Sources of Supply	Entitlements (ML)
Tullich	Casterton, Sandford, Merino, Coleraine	4 bores west of Casterton Konongwootong Reservoir[1]	1000
Penshurst	Penshurst	2 bores	250
Caramut	Caramut	2 bores	50
Darlington	Darlington	1 bores	10

Note 1 Kept as an emergency backup supply for the Tullich System

Table E2 Deep Groundwater Supply Systems

System	Towns Supplied and Other Users	Sources of Supply	Entitlements (ML)
Dartmoor	Dartmoor	1 bore	170
Heywood	Heywood	2 bores	333
Portland	Portland	3 bores	6222
Port Fairy	Port Fairy	2 bores	1026
Port Campbell	Port Campbell, Peterborough, Timboon	1 bore[1]	1009
Macarthur	Macarthur	1 bore	130

Note 1 Second bore to be constructed in 2022

Further details for each of the supply systems are provided in the following sections.

E1.1.2 Shallow Groundwater Systems

Tullich Groundwater System

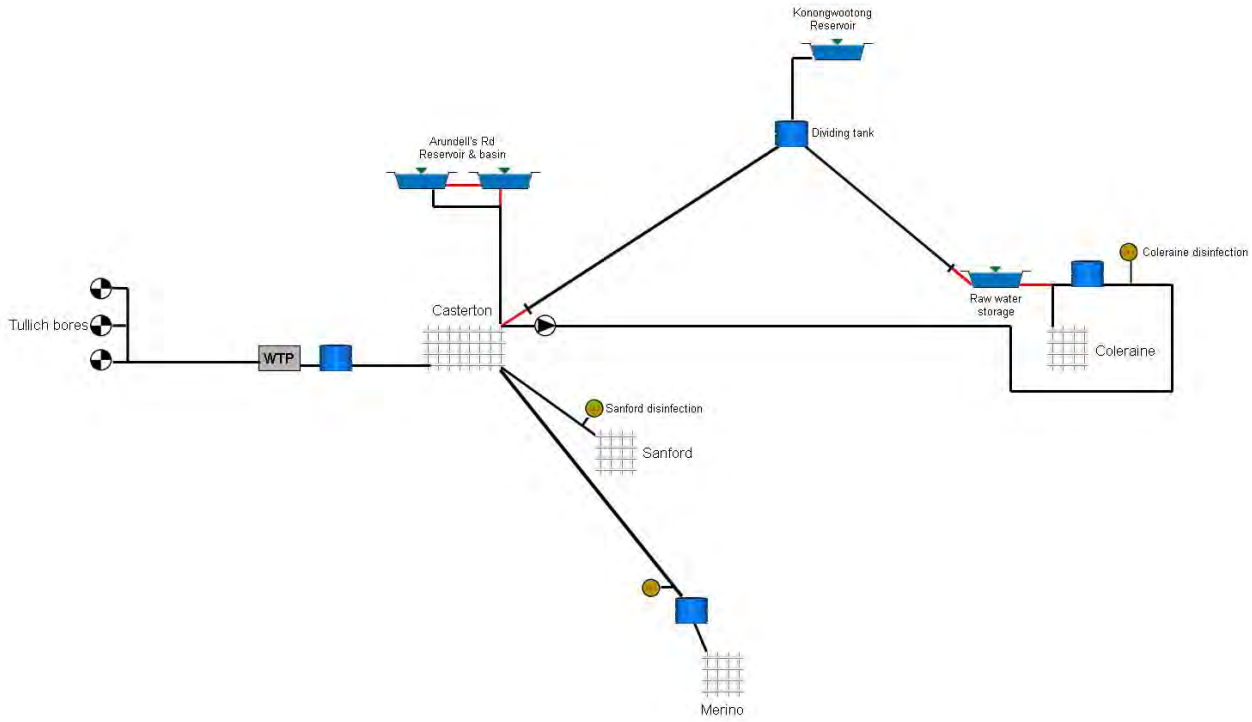
The Tullich Borefield consists of four production bores all of which are equipped. There are also two observation bores. Two production bores were constructed in 1989 and the other two in 2004. The observation bores were constructed in 2004.

Water from the Tullich Borefield is pumped to the treatment plant which is located on the western side of Casterton. The treated water is then fed into the Casterton, Coleraine, Sandford and Merino systems.

Merino was previously supplied with groundwater from the Mocamboro borefield but has been supplied from Casterton since December 2005. Water is pumped via a 14 km, 100 mm diameter rising main from Casterton via Sandford to the Merino service basin.

Coleraine has been supplied from the Tullich system since 2009.

Figure E1 Tullich Groundwater System

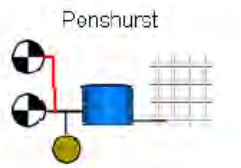


Penshurst Groundwater System

This water supply system consists of a main production bore located on the flanks of Mount Rouse adjacent to two service basins to the south of the township. The service basins have a combined capacity of 2 ML and act as a balancing storage.

A second emergency bore is located adjacent to the Hawkesdale Road to the south of the township and can be connected into the feeder main that supplies the town from the main Mount Rouse production bore.

Figure E2 Penshurst Groundwater System



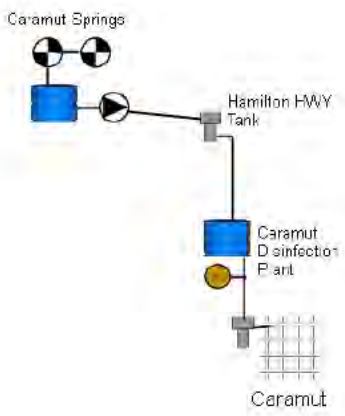
Caramut Groundwater System

The original supply to this small rural community was sourced from spring water which was collected in a small concrete basin and then pumped 11 km to a 45 kL elevated tank. Overflow from the elevated tank was then piped into an adjacent 15.5 ML service basin. Water then gravitated through a further 8.5 km of pipeline to a 45 kL elevated tank supplying the township.

In 1999 a 0.6 ML concrete tank was constructed adjacent to the service basin and the basin was taken out of service. The spring is no longer in use and two production bores have been installed at the spring site.

The transfer pump from the bores to the Caramut Tank has a design capacity of 30 000 L/hour.

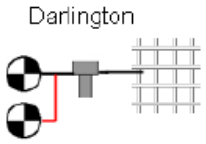
Figure E3 Caramut Groundwater System



Darlington Groundwater System

Two bores at Darlington provide a non potable water supply to 21 customers. The bores are both shallow (less than 40 m deep) and located adjacent to the Darlington CFA station. Construction of both bores is poorly understood. The newer of the two bores (58343) is used preferentially, and the second bore is retained as an emergency backup but not equipped.

Figure E4 Darlington Groundwater System



E1.1.3 Deep Groundwater Systems

Portland, Heywood, Port Fairy & Dartmoor Groundwater Systems

Deep bores extracting water from the Dilwyn Aquifer provide 100% of water supply for the towns of Portland, Heywood, Dartmoor and Port Fairy. The bore characteristics for the four towns are shown in Table E3.

Table E3 Bore Details for Portland, Heywood, Dartmoor and Port Fairy

Location	Depth (m)	Year Installed	Storage Available
Portland			
Bald Hill 3	1242	2008	36 ML Basin
Bald Hill 4	1241	2008	
Wyatt Street	1400	2017	4.5 ML Tank
Heywood			
No. 4	494	2004	4.5 ML Basin
No. 5	503	2016	0.3 ML Tower
Dartmoor			
No. 1	104	2004	0.4 ML Tower
Port Fairy			
No. 3	786	2001	2.27 ML Tower
No. 4	771	2004	

Figure E5 Portland Groundwater System

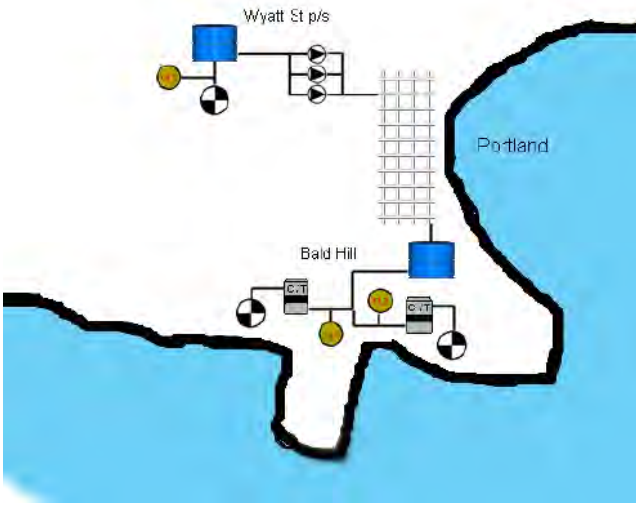


Figure E6 Port Fairy Groundwater System

Figure E7 Heywood Groundwater System

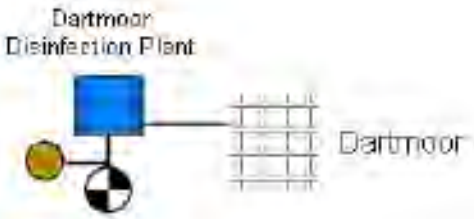


Figure E8 Dartmoor Groundwater System

Port Campbell Groundwater Systems

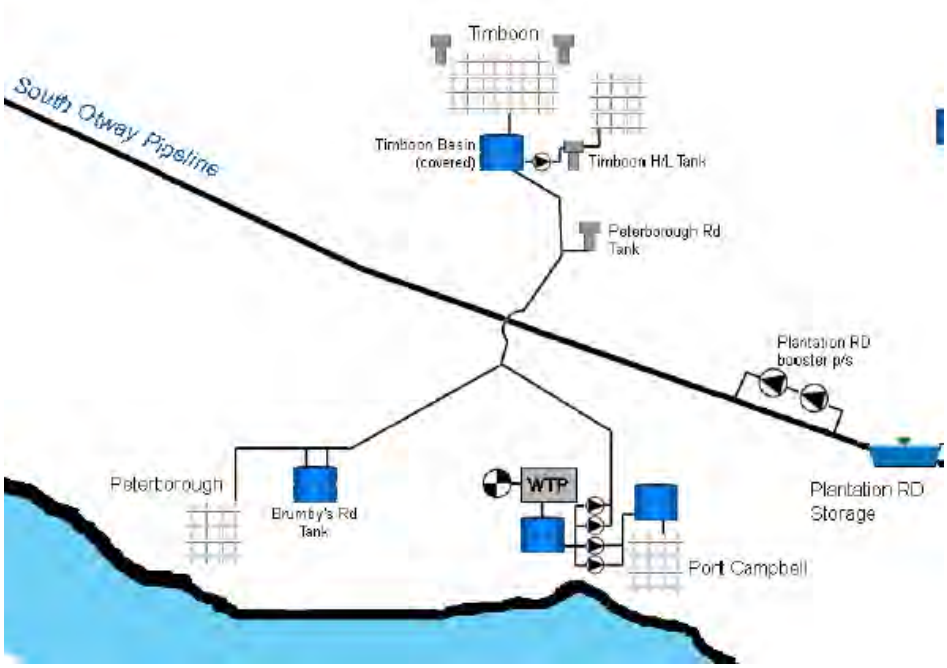
The townships of Port Campbell, Timboon and Peterborough together with the 12 Apostles visitor centre are supplied from an artesian bore harvesting water from the Port Campbell sub formation of the Dilwyn aquifer.

The supply bore was constructed at Port Campbell in 1998, originally supplying only Port Campbell and Timboon. The bore is 520 metres deep, has a small artesian flow and can be pumped at rates up to 40 litres/sec. Following the completion of a new supply system, Peterborough was connected to the Port Campbell bore in December 1998. The 12 Apostles visitor centre was connected in 2021 via a 10.5 km pipeline from the Port Campbell tank. A second bore is to be constructed in 2022.

Storage within this supply system includes a service basin, three ground level tanks, an elevated tank and several water towers

Demand for water varies seasonally due to the high tourist population during summer. Some 40 rural users also draw water direct from the rising main supplying Peterborough and Timboon.

Figure E9 Port Campbell Groundwater System

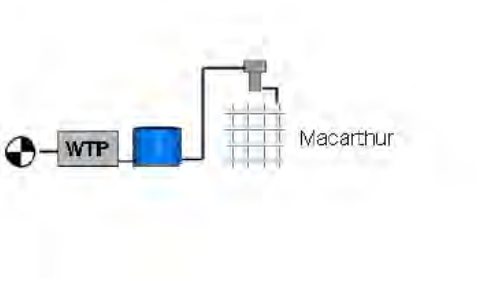


Macarthur Groundwater System

The Macarthur water supply system was commissioned in 1994 and is supplied with groundwater from one production bore, referred to as Macarthur No.1, which is located approximately 1 km to the north of the township.

Water from the bore is pumped to a treatment plant and then stored in a 500 kL clear water storage tank prior to being gravity fed to the township.

Figure E10 Macarthur Groundwater System



E1.1.4 System Demand

Table E4 shows demand in 2020/2021 for each of the Groundwater systems.

Components of the Current (2021) Annual Demand - Portland	
Component	Total Demand (ML)
Residential	**704**
Non Residential	**222**
Rural	**1**
Major	**326**
Public Open Space	**23**
Total Consumption	1276
Nonrevenue Water	**225**
Bulk Usage (WTP Outflow)	1501
WTP Losses	**157**
Total Raw Water Usage	1658
Components of the Current (2021) Annual Demand - Port Fairy	

Component	Total Demand (ML)
Residential	**276**
Non Residential	**107**
Rural	**0**
Major	**143**
Public Open Space	**5**
Total Consumption	532
Nonrevenue Water	**70**
Bulk Usage (WTP Outflow)	602
WTP Losses	**48**
Total Raw Water Usage	650
Components of the Current (2021) Annual Demand - Tullich System	
Component	Total Demand (ML)
Residential	**176**
Non Residential	**67**
Rural	**81**
Major	**0**
Public Open Space	**6**
Total Consumption	331
Nonrevenue Water	**50**
Bulk Usage (WTP Outflow)	381
WTP Losses	**13**
Total Raw Water Usage	394
Components of the Current (2021) Annual Demand - Pt Campbell System	

Component	Total Demand (ML)
Residential	**105**
Non Residential	**57**
Rural	**71**
Major	**0**
Public Open Space	**4**
Total Consumption	237
Nonrevenue Water	**45**
Bulk Usage (WTP Outflow)	281
WTP Losses	**44**
Total Raw Water Usage	325
Components of the Current (2021) Annual Demand - Heywood	
Component	Total Demand (ML)
Residential	**89**
Non Residential	**24**
Rural	**0**
Major	**0**
Public Open Space	**1**
Total Consumption	113
Nonrevenue Water	**20**
Bulk Usage (WTP Outflow)	133
WTP Losses	**11**
Total Raw Water Usage	144
Components of the Current (2021) Annual Demand - Dartmoor	

Component	Total Demand (ML)
Residential	**15**
Non Residential	**2**
Rural	**0**
Major	**0**
Public Open Space	**0**
Total Consumption	17
Nonrevenue Water	**6**
Bulk Usage (WTP Outflow)	23
WTP Losses	**0.5**
Total Raw Water Usage	23.5
Components of the Current (2021) Annual Demand - Penshurst	
Component	Total Demand (ML)
Residential	**37**
Non Residential	**12**
Rural	**0**
Major	**0**
Public Open Space	**2**
Total Consumption	52
Nonrevenue Water	**15**
Bulk Usage (WTP Outflow)	67
WTP Losses	**1**
Total Raw Water Usage	68
Components of the Current (2021) Annual Demand - Caramut	

Component	Total Demand (ML)
Residential	**7**
Non Residential	**3**
Rural	**2**
Major	**0**
Public Open Space	**3**
Total Consumption	16
Nonrevenue Water	**5**
Bulk Usage (WTP Outflow)	21
WTP Losses	**7**
Total Raw Water Usage	28
Components of the Current (2021) Annual Demand - Darlington	
Component	Total Demand (ML)
Residential	**3**
Non Residential	**0**
Rural	**0**
Major	**0**
Public Open Space	**0**
Total Consumption	3
Nonrevenue Water	**0.7**
Bulk Usage (WTP Outflow)	3.7
WTP Losses	**0.2**
Total Raw Water Usage	3.9
Components of the Current (2021) Annual Demand - Macarthur	

Component	Total Demand (ML)
Residential	**14**
Non Residential	**2**
Rural	**1**
Major	**0**
Public Open Space	**1**
Total Consumption	18
Nonrevenue Water	**7**
Bulk Usage (WTP Outflow)	25
WTP Losses	**3**
Total Raw Water Usage	28

E1.1.5 System Yields and Security of Supply

For the systems supplied from groundwater, the yield of the system is assumed to be equivalent to the current licensed volume (or entitlement). This yield estimate is currently not linked to reliability measures such as the frequency of restrictions. The adopted yield for each groundwater supplied system is summarised in Table E5.

Table E4 Estimated System Yield for Groundwater Systems

	Yield (ML/a)
Shallow Groundwater System	
Tullich	1,000
Penshurst	100
Caramut	50
Darlington	10
Deep Groundwater Systems	
West Dilwyn	
Dartmoor	170
Heywood	333
Portland	6,222
Port Fairy	1,026
East Dilwyn	
Port Campbell	1,009
Other	
Macarthur	130

The yield in all groundwater systems exceeds estimated demand.

Analysis has shown that all groundwater systems are currently reliable at the current level of development and are quite resilient to the impacts from climate change. The shallow groundwater systems have also been shown to be highly reliable at the full licence volume level of development. There is uncertainty about the reliability of the deeper groundwater systems at levels of demand which are higher than present.

E1.2 Drought Experience

Records indicate that all towns supplied by groundwater have not had water supply concerns as a result of drought, except for Caramut and Merino. Since 2006, water restrictions have not been required for any of Wannon Water's towns that are supplied with groundwater. Coleraine had Stage 1 restrictions in force from December 2006 to June 2007 while still supplied from the Konongwootong Reservoir water supply system.

Caramut

The Caramut water supply system was constructed in 1977. The spring supply proved to be totally inadequate during a drought. Severe water restrictions were imposed during 1982 and maintained until the drought broke in April 1983.

A bore was constructed adjacent to the spring in 1983 and a second bore was drilled in 1999. Whilst the spring ceased to flow over the summer of 2000 the bores maintained supply within acceptable drawdown limits. No water restrictions at Caramut have been required since 1983.

Merino

The Merino system was constructed during 1976 and so did not experience the 1967/1968 drought.

During the 1982/1983 drought restrictions were applied during January 1983 and remained in force until the end of the drought. With these in place the Merino system adequately catered for demand and had reasonable reserves at the end of the drought. It is noted that there was considerable demand for water from the Merino standpipe by people from outside the waterworks district.

In 2005 Merino was connected to the Casterton system and the Merino bores (Mocamboro borefield) were taken off-line. The bores were decommissioned in 2018 and the bore licence surrended.

Casterton, Coleraine and Sandford

The Konongwootong Reservoir did not receive any run-off during the winter of 1967 and accordingly the storage level was low. Restrictions were applied in September of 1967 for both Casterton and Coleraine and all of the rural consumers along the supply lines. The restrictions were up-graded in October 1967 to severe levels which banned the use of hoses. At the same time a series of investigations were commenced on alternative sources of supply.

In January of 1968 preliminary arrangements were made to facilitate pumping of water from the Konongwootong Reservoir from below the outlet level and these were subsequently implemented.

Restrictions were lifted in May of 1968 at the end of the drought.

The Tullich Borefield was identified as a supplementary water source for Casterton and brought on line in 1969 after the drought ended.

During the 1982/1983 drought the Tullich Borefield was used to provide as much water as possible for the Casterton Supply. As water levels at Konongwootong were somewhat higher at the end of the 1982 winter than they had been in 1967 and with the dual benefit of the Tullich supply and restrictions, the system catered for demands with the Konongwootong Reservoir dropping to a low of 3.4 m just prior to the end of the drought.

Restrictions were applied in early January of 1983 and remained in place until the end of the drought.

Some problems have been experienced at Tullich due to pumpset failures and diminished output from the bores. The bore problems were associated with clogging of the screens and not reduced output from the aquifer. This resulted in the construction of two new bores with improved construction materials in 1989.

For Casterton, Sandford and Coleraine Stage 1 restrictions were imposed in February 2000 and lifted in October 2000. Also Stage 1 restrictions were imposed in January 2001 and lifted in September 2001.

Coleraine, Sandford and two-thirds of Casterton were supplied from Konongwootong until March 2004 requiring the restrictions in 2000 and 2001.

A third and forth production bore were constructed in 2005, however only one of the new bores (Bore No.4) was equipped. In 2010, the remaining bore (Bore No.3) was equipped. . The expanded Tullich borefield has successfully supplied Casterton, Sandford and Merino since 2005. Stage 1 restrictions were introduced on 16 December 2006 and remained for approximately 6 months until they were removed on 9 July 2007.

A pipeline was constructed from Casterton to Coleraine with Coleraine being supplied from the Tullich system from 2009.

The Konongwootong Reservoir is maintained as the supply for rural customers and as an emergency supply for the Tullich system.

E1.3 Drought Response Options

E1.3.1 Introduction

For the shallower groundwater systems, reducing the extraction rate (through the implementation of restrictions) may have an impact on the rate of drawdown of the resource, however in most circumstances, the pressures placed on the resource by other groundwater users and a lack of recharge (considered in a more regional context), may be having a greater influence on drawdown.

Preceding climatic conditions will be the major factor associated with the decline in the resource, and therefore alternative supply arrangements should be considered as the primary method for responding to short term water shortages.

For deeper groundwater systems, resource drawdown is influenced by events which have significant lead times, and response to drought conditions is often suppressed by these lag times. Therefore, reducing demand in unlikely to be an effective method of mitigating supply shortfalls. Furthermore, bores tapping the deeper groundwater systems, e.g., Lower Tertiary Aquifer, have a greater capacity to accommodate deepening of pumps to ensure continued extraction.

Further details on demand and supply side options during drought are provided in the following tables.

E1.3.2 Demand Reduction During Droughts

There are a number of demand reduction options that can be employed during times of water shortage. A summary of demand reduction options is shown in Table E6.

Table E5 Summary of Demand Reduction Options

Option	Details	Comments
Community Education Programs	Water efficiency awareness (showerhead rebates, information brochures), linked to ongoing State Government programs. Estimated savings are of 2-5% of total demand over next 2 years.	Being progressively implemented by Wannon Water.
Voluntary Demand Reduction Measures	Self regulated water conservation measures aimed at increasing effectiveness of measures within the Permanent Water Saving Plan, and potential savings if water restrictions are implemented.	Water savings from this option are expected to exceed the savings already achieved from the Permanent Water Saving Plan.
Mandatory Water Restrictions	Option available under By-Law No. 6.	See Appendix B for requirements and prohibitions on water usage.
Compliance Officer/s	Additional resources may be required during extended periods of moderate to severe restrictions to monitor the performance of targeted water savings measures.	
Restrict Supply to Rural Customers	Possible under agreement only.	A restriction policy for rural customers requires further development.

E1.3.3 Supply Augmentation Options During Drought

A summary of the range of short-term supply augmentation options for (shallow) groundwater systems is shown in Table E7.

Table E6 Supply Augmentation Options During Drought

Option	Details	Available Supply
Water Cartage	Cartage from adjacent system where surplus exists.	Available as either raw water or potable water. Supplied under Stage 4 restrictions to reduce supply volume.
Construct Emergency bores	Reduce demand pressure on existing bores	Lead times may be significant.

E1.4 Drought Response Actions

System monitoring is undertaken to assess the status of the supply system according to one of the following three operational modes:

Mode 1 – General Monitoring 

Mode 2 – Heightened Awareness 

Mode 3 – Drought Response 

E1.4.1 Mode 1 – General Monitoring (Pre-Drought Phase Activities)

The zone for the General Monitoring mode is defined by the groundwater level as the upper bound and a trigger which is set above pump level, as the lower bound.

There are a number of important factors in pre drought monitoring and planning which will influence the decision to declare the system as being in the General Monitoring mode. These include:

- Short and longer term trends in the groundwater level;
- Climatic trends and seasonal outlooks as indicators of the possible onset of drought;
- Consumption trends to indicate changes in customer's usage of water; and
- Forecasting groundwater levels over a 6-12 month period.

The Annual Water Outlook tool is used to monitor supply and demand side aspects of the system. During the General Monitoring mode, the system status is updated on a weekly basis and a report prepared weekly. A summary of the key system performance indicators for all groundwater systems which should be included in the Annual Water Outlook and System Status Report is provided in Table E8.

Table E7 Requirements for Annual Water Outlook and System Status Monitoring and Reporting

Item	Requirements
Rainfall, seasonal climate outlook	Information accessed from Bureau of Meteorology website.
State-wide status	Bureau of Meteorology and Department of Environment, Land, Water and Planning websites provide status reports on rainfall, streamflow, storage levels, groundwater and urban water restrictions across Victoria on a monthly basis. Review of observation bore data (remote from borefield) for seasonal trends. Review of Groundwater Management Area monitoring documents prepared by Southern Rural Water to assess monitoring trends and use trends.
Water levels in ground water supply systems are monitored at least monthly and are able to be compared against pump depths[1].	The frequency of monitoring should be increased to weekly or daily if a decline in water level raises concern on the security of the system.
System Demands (bulk meter consumption)	Monitored at least weekly and recorded in an operational database. Data recorded for all towns.

Note: 1. Enables determination of available drawdown, i.e. the amount of water above the pump intake

E1.4.2 Mode 2 – Heightened Awareness

The zone for the Heightened Awareness mode is designed to provide early warning of a pending water shortage. The Heightened Awareness mode is triggered following consideration of:

- Short term trend in the groundwater level;
- Climatic trends and seasonal outlooks;
- Consumption trends to indicate changes in Customer's usage of water; and
- Forecasting groundwater levels over a 3-6 month period.

The key actions are summarised in Table E9 (in order of increasing impact from water shortages).

Table E8 Groundwater Systems Action Plan for Mode 2 – Heightened Awareness

Action	Trigger	Response
Action 1	Moderate likelihood that groundwater levels will fall below the Mode 3 Trigger	1. Provide weekly updates of the System Status Report 2. Implement demand reduction options such as Community Education Programs, Voluntary Demand Reduction Measures via increased media advertising,
Action 2	High likelihood that groundwater levels will fall below the Mode 3 Trigger	3. Alert public to the imminent water shortages and possible need for restrictions in the future. 4. Promote “voluntary restrictions” via media advertising campaigns to inform consumers about water conservation programs. 5. Develop contingency plans for alternative supplies if water levels were to fall below pump levels. 6. Declare operational mode as Mode 3 - Drought Response.

E1.4.3 Mode 3 - Drought Response

Mode 3 defines an active drought response period where supply and/or demand side measures are required to maintain supply security. Water restrictions may be used to reduce demand to reduce the requirements from alternative supplies. Management actions for consideration during Mode 3 are summarised in Table E10.

Table E9 Groundwater Systems Action Plan for Mode 3 – Drought Response

Action	Trigger	Response
Action 3	Moderate likelihood that groundwater levels will fall below the pump level	7. Consider implementation of mild restrictions such as Stage 2, as preparedness for making alternative supply arrangements; 8. Progress contingency plans for alternative supplies to an implementation ready status, including obtaining any necessary permits or approvals. 9. Monitor bore condition and water quality. 10. Review and maximise pump depth setting' or if such capacity exists, install additional pump rising main and switch to hi-lift pump
Action 4	High likelihood that groundwater levels will fall below the pump level	11. Monitor groundwater levels and perform regular forward look storage projections. 12. Consider implementation Stage 3 restrictions, as preparedness for making alternative supply arrangements; 13. Communicate to customers the potential future impacts to supply their arrangements; 14. Implement contingency plans for alternative supplies.
Action 5	Groundwater levels fall below the pump level	15. Implementation Stage 4 water restrictions. 16. Communicate to customers the altered supply arrangements; 17. Commence alternative supplies. 18. Commence tankering water where required

Note that when there is a likelihood of water levels approaching pump intakes, there is an increased likelihood of damage to the pumps and possibly the bore i.e. increased maintenance, and water quality issues

It is therefore appropriate to continually review and maximise pump depth setting' or if such capacity exists, install additional pump rising main and switch to hi-lift pump. Permanently setting pumps at too great a depth results in higher operational costs outside of the drought periods.

E1.4.4 Drought Response Triggers

Shallow Groundwater Systems

The shallow groundwater systems developed by Wannon Water are mostly unconfined to semi-confined aquifers which are directly recharged by infiltrating rainfall. Therefore aquifer storage, groundwater use and water levels are affected by changes and in climate and dry conditions.

Water levels in the production bores can be used as a trigger to indicate the appropriate drought management regime. The current pump depth settings are indicated in Table E11. All elevations are approximate and in some cases pump depth setting was estimated and requires confirmation.

A water level at the pump intake will result in inability to extract water from the bore, additional drought response action must be taken if this occurs.

A level of 3 m above the pump will risk ability to extract water. A water level within 3 m of the pump, or the lowest pump for town supplied by multiple bores, indicate that drought response actions would have been implemented. The relevant drought response water level for each system is indicated in Table E11.

It is desirable that pre drought (Mode 2) actions be considered some time before drought action is required. An antecedence of 3 months is desirable from a management perspective, however in some cases water levels fluctuate widely and there is insufficient drawdown available to allow for a 3 month lag until drought response action is required. In these cases a lesser antecedence has been adopted to ensure that pre-drought actions are not considered too frequently. Drought response actions are ineffective if they need to be adopted every year.

As noted previously water quality (and bore maintenance) issues can occur if water levels fall below the top of the uppermost screen interval. It is suspected that this has occurred at the Tullich borefield, evidenced by an increase in iron precipitation. For this reason, the pre drought response trigger is considered to be the top of screen. Whilst extraction can continue to occur when water levels fall within the screen interval addition actions may be required:

- Increased frequency of water quality monitoring;
- Increased frequency of bore and infrastructure maintenances, e.g. bore development, pipe pigging, sludge removal; and,
- Consideration of post drought treatments:
  - Bore condition assessment;
  - Pump replacement / rebuild.

Table E11 includes a time lag to provide a response horizon for management. Modelling has been completed for some of the borefields and the time lag is calculated based on the average rate of drawdown in the worst year modelled. Where model data was not available, historic monitoring data has been used. The time lag is considered conservative as the modelled and recorded groundwater levels for the borefields in Table E11 typically do not approach the drought response trigger under both current demands, and historic climate. Where the time lag approaches 6 months or greater, it is likely that the real lag is greater than 1 year as the system will recover in winter before potentially continuing to decline.

Figure E11 Groundwater Systems Drought Reponse Triggers

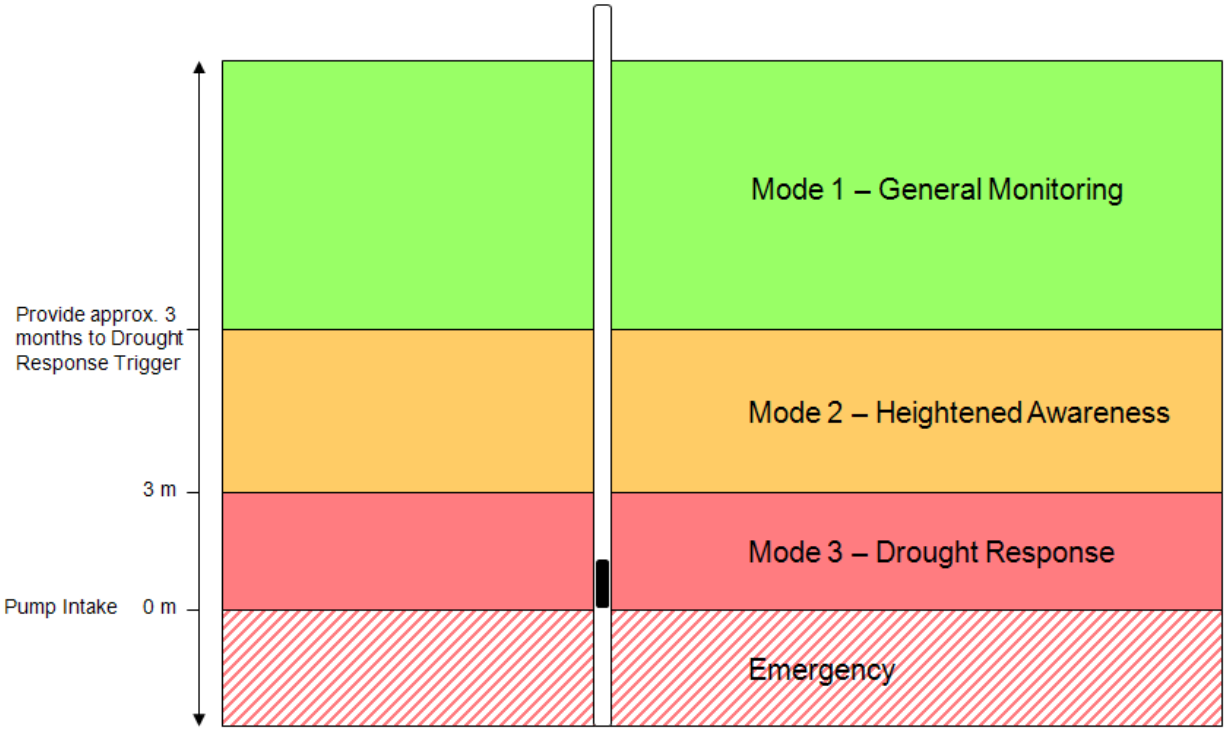


Table E10 Drought Response Action Triggers for Shallow Groundwater Systems

	Pump depth (depth to top of casing)	Mode 3 Trigger depth to top of casing)	Mode 2 Trigger (depth to top of casing)	Estimated Time Lag[1]
Caramut (No. 1)	43 m	40 m	22.6 m	3 months
Darlington (No. 1)	30 m	27 m	17 m	1 month[2]
Mortlake	22 m	19 m	17.5 m	< 1 month
Penshurst (No 2)	101 m	98 m	95 m	Unknown[3]
Tullich (no 2)	34.7 m	31.7 m	22 m	6 months

Note 1 – Time lag between Pre-drought response and drought response triggers in historic design drought (historic climate with current demand)
Note 2 – Darlington does nor respond to drought under model conditions, so only based on a historic drawdown over 2 weeks.
Note 3 – Water levels at the Penshurst bores need to be investigated, levels indicated an unexpected potentiometric gradient thus drought action triggers solely based on pump depth setting not draw down.

Deep Groundwater Systems

The coastal systems of Port Campbell, Portland, Heywood and Port Fairy are deeply confined and would not be affected by relatively short term drought conditions. A similar drought mode response regime to that developed for the shallow systems could be adopted, if water pressures in the deep confined aquifers were to drop for any reason.

The Dartmoor borefield, whilst behaving as a confined aquifer local to the bore, is located close to an interpreted intake area for the Lower Tertiary Aquifer system, i.e. where the Lower Tertiary Aquifer changes from confined through to unconfined conditions up basin. The Carlisle River borefield (part of the Otway Supply System) is also interpreted as having connection with surface water flows in the Gellibrand River. Under these conditions, both of these borefields are potentially susceptible to drought conditions as there may be a shortened lag time between drought and affects at the bore headworks.

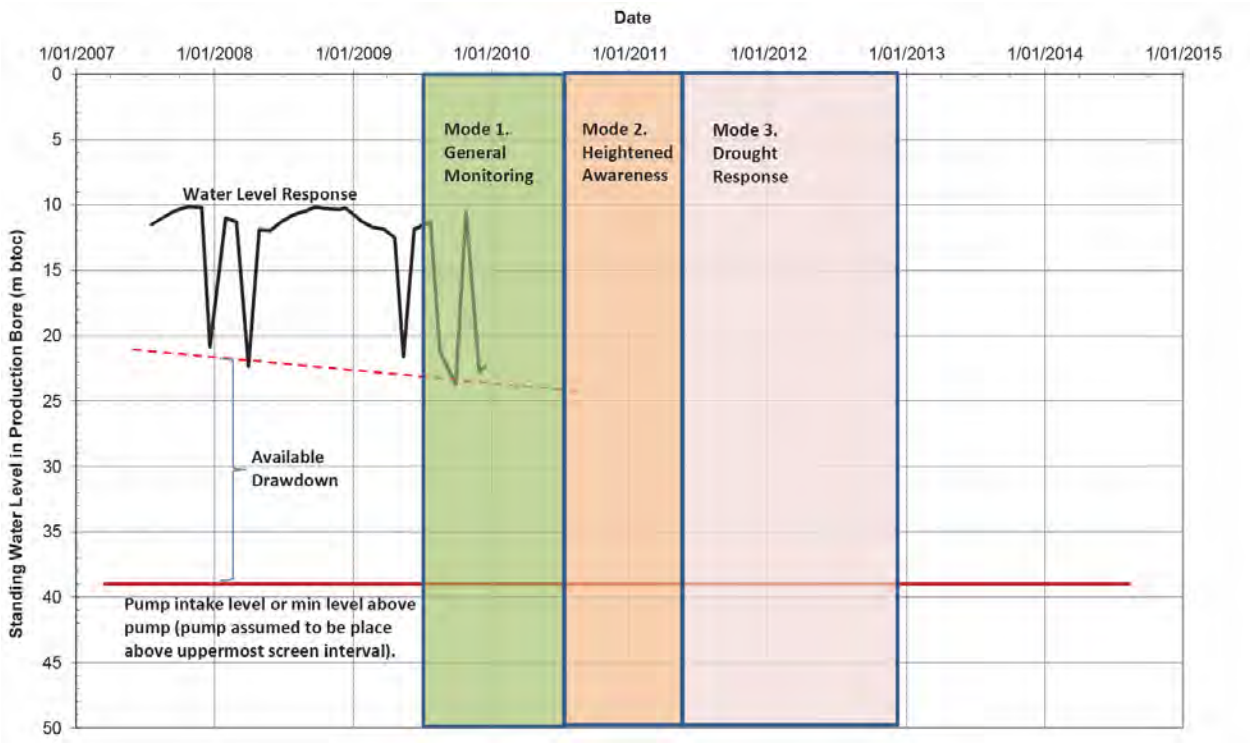
An issue with the bores developing the Lower Tertiary Aquifer, and the Macarthur production bore that develops the Clifton Formation, is that both of these aquifers have an underlying declining water level trend. Under these conditions, excluding the impact of a drought which may or may not be significant, the available drawdown in a production bore is being steadily eroded over time. This decline in available drawdown would be accelerated by changes in demand, which could be seasonal, or through growth. The establishment of a drought mode response using a trigger based solely on maintaining a minimum head above a production pump may not provide sufficient time for management intervention. A process that could be considered as been proposed below:

- The pumping water level response is monitored for each production bore in operation mode 1 – General Monitoring. Production bore hydrographs are prepared to identify seasonal response through the Annual Water Outlook Tool;
- Monitoring in a pumping bore can provide a 'noisy' response owing to the variable operation of production pumps. Therefore, filtering of the water level data is required. If the seasonal minimum is greater than 10% of the 95% confidence limit, operation mode 2 – Heightened Awareness is implemented. More frequent water level monitoring is implemented to characterise the rate of decline (and thus management planning horizon).
- Drought response (mode 3) is implemented based on the level of drawdown remaining in the bore.

This is shown schematically in Figure E12, and takes into account the potential for available drawdown to be eroded over time. This should provide management sufficient time to consider the need to replace or lower production pumps before available drawdown is reduced to supply threatening levels. A blanket approach adopted a minimum head above a production pump may limit time, particularly for cases where available drawdown can be eroded rapidly, e.g. under extreme conditions, interference effects may occur at Portland if sufficient recovery time between pumping events of individual production bores is not allowed for.

This is particularly useful as the deep groundwater systems tend to have limited surface storage, i.e. are not suited to long pumping stand-downs, and replacement pumps (owing to high yield and groundwater temperature requirements) can have significant procurement lead times. It is noted that for most deep groundwater supplies, underlying regional water level declines may be more significant than increased usage affected by drought conditions.

Figure E12 Deep Groundwater Systems Drought Reponse Triggers



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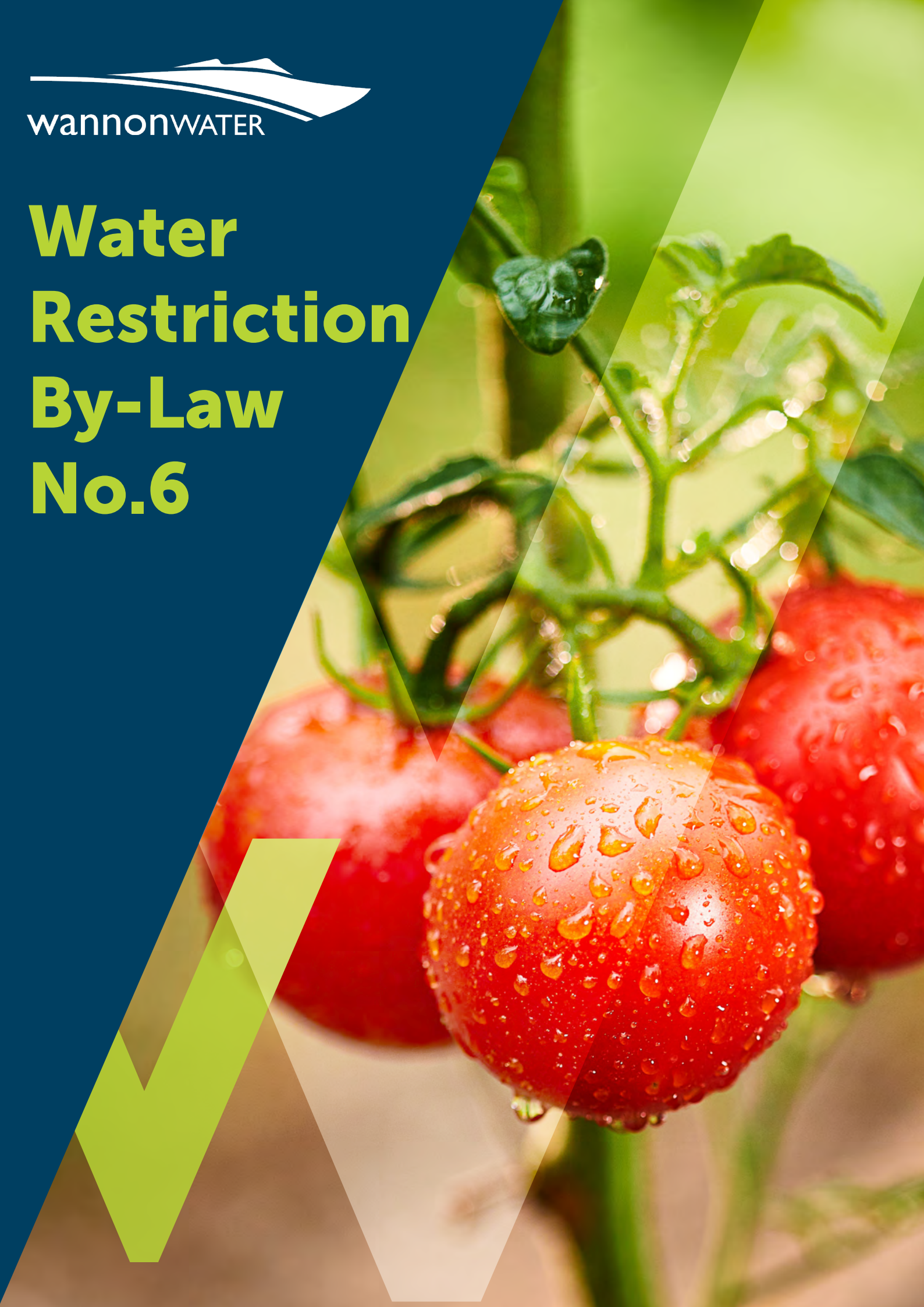
Glossary of Terms

AAD	Average Annual Demand The AAD represents the total (unrestricted) water usage from the headworks, inclusive of system distribution losses.
Action	A management response undertaken by Wannon Water as part of the Drought Response Plan when a trigger has been reached.
BE	Bulk Entitlement A bulk entitlement is a right to use and supply water which may be granted to water corporations, the Minister for Environment and other specified bodies under the *Water Act* (1989).
BE Metering Plan	The Bulk Entitlement Metering Plan has been developed to enable Wannon Water to demonstrate compliance with the obligations of each of it's surface water Bulk Entitlements.
DRMC	Drought Response Monitoring Committee
GWMWater	Grampians Wimmera Mallee Water
LTA	Lower Tertiary Aquifer system. Generally a deeply buried, regionally extensive aquifer system encompassing a number of geological formations, including the Dilwyn Formtion.
Mode	Wannon Water has three modes of operation: General Monitoring, Heightened Awareness and Drought Response Mode. A shift in operation mode will trigger a management response from Wannon Water, e.g. management responsibilities, communications and obligations.
Ewater Source	Water resource model – a software tool used to model harvesting and bulk distribution of surface water resources.
Reliability (of supply)	The ability to maintain a water supply free of water restrictions. Wannon Water has an objective of achieving a 95% reliability, i.e., restriction free on average for 95 in every 100 years.
Restrictions (water)	By Laws prepared by Wannon Water that are used to prevent or limit the use of water. The restrictions are consistent with the Victorian Uniform Drought Water Restriction Guidelines (VicWater, 2005)
Restricted (demand)	Demand for water (volume rate) with water restrictions implemented.
Stage (restrictions)	Wannon Water defines four stages of water restrictions (Stage 1 to 4) which influence domestic garden watering, vehicle washing, swimming pool topping etc.
System (water supply)	Linked networks of water sources (surface water, groundwater), storages, treatment and delivery pipelines. Wannon Water WSDS defines the following supply systems: Otway System (North and South Otway Pipelines), Hamilton System, Glenthompson System, and the Groundwater Systems.
TDS	Total Dissolved Solids A measure of groundwater salinity.
Trigger	Generally related to the total storage volume and the ability to maintain such a volume with specified restrictions in place. When triggers are reached, Wannon Water implements specified actions.
Annual Water Outlook	A process undertaken by Wannon Water to manage water supply and demands. It includes current and forecast water supply issues.

wannonWATER

Water Restriction By-Law No.6



CONTENTS

WATER RESTRICTION BY-LAW

PREAMBLE

The community understands there may be a need to change water-use behaviours in times of drought or other water shortage. This Water Restriction By-law sets out four stages of restrictions and prohibitions on the use of water that can be mandated by Wannon Water when it is considered necessary to conserve water.

The restrictions in this By-law apply to water that is supplied by the main water supply works of Wannon Water, regardless of how that water is delivered. The restrictions also apply to any water that is a mix of this "mains" water and other water, for example, if a tank of rain water is topped up with mains water, the restrictions apply to the use of all of the mixed water in the tank. The restrictions do not apply in relation to recycled or reclaimed water, greywater or stormwater whether or not that water is supplied by the works of Wannon Water.

Water is an essential resource for maintaining life. The restrictions in this By-law therefore do not restrict the use of water for indoor purposes such as drinking, washing, cleaning or sanitation. Also, despite any restrictions in this By-law, water can be used at any time:

- for human health requirements;
- for watering of stock and animals;
- for fire fighting;
- for the safety, but not the cleaning, of vehicles and equipment; and
- for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency (in accordance with the permitted methods).

Where a restriction relates to a specific use of water, that restriction applies regardless of whether the use is indoors or outdoors. For example, indoor pools and fountains and undercover nurseries are covered by the same restrictions as equivalent outdoor facilities. However, water cannot be used outdoors for any purpose except in accordance with the restrictions in this By-law or with the written permission of Wannon Water. This means that unless the restrictions in this By-law specify rules about the way in which water can be used outdoors for a particular purpose, then water cannot be used for that purpose.

Wherever possible, the restrictions in this By-law are designed to be simple, easy to understand and straightforward to follow. For example, outdoor watering is restricted to "alternate days", which means odd numbered properties can be watered on odd numbered dates and even numbered (or no numbered) properties can be watered on even numbered dates. Everyone gets to water on the 31st of any month and the 29th of February.

The restrictions in this By-law are also designed to build upon the common sense rules set out in the Permanent Water Saving Plan of Wannon Water, which encourage the efficient use of water on an ongoing basis. For example, wherever restrictions in this By-law allow for water to be used from a hand-held hose for any purpose, that hose must be leak-free and used with a trigger nozzle, consistent with the permanent water saving rules.

Contravention of this By-law is an offence under the Water Act 1989, and so penalties may apply.

Exemptions from the restrictions in this By-law may be granted in certain circumstances. This By-law sets out the principles that Wannon Water will take into account when considering applications for exemptions from particular restrictions.

This By-law also provides for water to be used in accordance with a Water Use Plan approved by Wannon Water, despite the restrictions under the prevailing stage of restrictions. Water Use Plans will only be approved where the use of a Plan is expressly permitted for the particular use of water under the relevant stage of restrictions, or where it is required as part of an application for an exemption.

Wannon Water makes the following By-law:

1. AUTHORISING PROVISIONS

This By-law is made under sections 160, 171(1)(a), (ba), (bb), (e) and (j) and 287ZC of the Act.

2. PURPOSES

The purposes of this By-law are to:

(a) promote the efficient use and conservation of supplied drinking water; and

(b) set out four stages of restrictions on the use of supplied drinking water; and

(c) specify things which must not be done while each stage of restriction persists; and

(d) specify principles for considering applications for exemptions from particular restrictions; and

(e) prescribe offences and penalties for the contravention of this By-law, including for which an infringement notice may be served; and

(f) prescribe classes of persons for the purpose of issuing infringement notices.

3. DEFINITIONS AND INTERPRETATION

3.1 Definitions

The definitions set out in Part A of Schedule 1, apply in this By-law, unless the contrary intention appears.

3.2 Interpretation

In this By-law:

(a) A reference to a person means an individual, a body or an association (incorporated or unincorporated) or a partnership.

(b) An interpretation that would promote the efficient use of supplied water must be preferred to an interpretation that would not promote that use.

4. STAGES OF RESTRICTIONS

4.1 Stages of Restrictions

(a) Wannon Water may impose any of the following stages of restrictions, as the case requires, in any district:

Stage 1 Restrictions (Alert); or
Stage 2 Restrictions (Save); or
Stage 3 Restrictions (Just Enough); or
Stage 4 Restrictions (Critical),

(b) The stage of restrictions must be imposed, by publishing a notice to that effect in a newspaper circulating generally in the relevant district and on the website of Wannon Water.

4.2 **Imposing stages of restrictions**

Wannon Water may impose a stage of restriction in a district:

(a) in accordance with the process specified in its drought response plan; or

(b) if it reasonably concludes that:

(i) because of the failure or limitation of a major pipeline, pumping station, treatment plant or other key water supply work of Wannon Water *or any other water corporation*, Wannon Water will temporarily be unable to meet the demands of its customers; or

(ii) because of a major water quality issue arising from the failure of a key water supply work referred to in sub-paragraph (i), or from a bushfire or other emergency, Wannon Water will temporarily be unable to meet the demands of its customers; or

(iii) the prevailing stage of restriction has failed to provide the reductions in demand required by Wannon Water for that stage, in accordance with its drought response plan.

4.3 **Application of restrictions**

When a stage of restriction is imposed in a district under sub-clause 4.2, the relevant restrictions on water use designated for that stage in Schedule 1 apply in that district.

4.4 **Declining to impose a stage of restrictions**

Without limiting sub-clause 4.2, Wannon Water may decline to impose a stage of restriction in a district if it reasonably concludes that the circumstances indicating the need for that stage are likely to be so temporary that the public inconvenience caused by imposing that stage of restriction would outweigh the water conservation benefits to be gained from imposing that stage.

5. **GENERAL EXEMPTIONS**

5.1 **Health and Safety Exclusion**

Despite any provision of this By-law, including the restrictions set out in Schedule 1, supplied drinking water can be used at any time for:

(a) human health requirements; and

(b) stock and animal health requirements; and

(c) fire fighting; and

(d) the safety, but not the cleaning, of vehicles or equipment.

5.2 **General Exemptions**

(a) Wannon Water may, in relation to a specified district or districts prepare, adopt and publish general exemptions which exempt particular uses or particular users from any restrictions in Schedule 1.

(b) Wannon Water may amend or revoke at any time any general exemption adopted under paragraph (a).

(c) In deciding whether or not to grant a general exemption under this sub-clause, Wannon Water must have regard to:

(i) the security of available drinking water supplies in the district; and

(ii) recent climate patterns and prevailing seasonal forecasts; and

(iii) any anticipated change in demand attributable to the prevailing stage of restriction; and

(iv) any other relevant matter that Wannon Water thinks fit to have regard to.

(d) Without limiting paragraph 5.2(a), the general exemptions may set out:

(i) permissible uses of supplied drinking water that are exempted from a restriction set out in Schedule 1, without an application being made under clause 6; and

(ii) the conditions on which an exemption is granted.

(e) Exemptions adopted under paragraph 5.2(a) must be published on Wannon Water's website.

(f) Notice of any adoption, amendment or revocation of an exemption must be published in a newspaper circulating generally in the relevant district and on the website of Wannon Water.

(g) An exemption, or an amendment to an exemption under this sub-clause:

(i) will apply from the date on which a notice of the exemption is published in a newspaper circulating generally in the relevant district; and

(ii) will cease to apply in accordance with the terms of the exemption or when notice of the revocation is published in a newspaper circulating generally in the relevant district.

(iii) Wannon Water may prepare and publish general exemptions in co-operation with other water corporations.

6. PARTICULAR EXEMPTIONS

6.1 Guidelines regarding Particular Exemptions

(a) Wannon Water may prepare, adopt and publish guidelines about applying for exemptions under this clause.

(b) Wannon Water may amend or revoke at any time guidelines adopted under paragraph (a).

(c) Guidelines adopted under paragraph 6.1(a) must be published on Wannon Water's website.

(d) Notice of the adoption, amendment or revocation of guidelines must be published in a newspaper circulating generally in each district and on the website of Wannon Water.

6.2 Applications for Particular Exemptions

(a) A person may apply to Wannon Water for an exemption from a stage of restriction which has been, or which may in future be, imposed under clause 4.

(b) An application for exemption must be in a form approved by Wannon Water.

(c) Wannon Water:

(i) must consider an application for exemption within a reasonable period; and

(ii) must have regard to any adopted guidelines referred to in sub-clause 6.1; and

(iii) subject to this clause:

(A) may grant the application in full or in part and subject to such conditions as Wannon Water considers appropriate; or

(B) may refuse the application.

(d) Wannon Water may revoke any exemption at any time, by giving written notice to the applicant.

(e) An exemption ends at any time specified in the exemption, or when:

(i) the stage of restriction to which the exemption relates is lifted; or

(ii) a more severe stage of restriction is imposed.

6.3 Approval of Particular Exemptions

Subject to this clause, Wannon Water must not grant an application for exemption in relation to a particular stage of restriction, unless Wannon Water is reasonably satisfied that:

(a) the proposed exemption:

(i) is necessary to avoid an inequitable and disproportionately adverse impact upon the livelihood of the applicant which would be caused by the level of restriction; or

(ii) would result in less supplied drinking water being used by the applicant than the lesser amount of supplied drinking water that the applicant would otherwise have been allowed by Wannon Water to use; or

(iii) based on prior consumption, is likely to have used for the same purpose under that stage of restriction; or

(iv) is necessary because of the special needs of the applicant; or

(v) would avoid or minimise appreciable physical damage to a building or other structure owned or occupied by the applicant during that stage of restriction; or

(vi) is necessary to avoid any adverse effect on public health or safety; and

(b) the proposed exemption would not, in combination with the use of supplied drinking water in accordance with other exemptions granted or reasonably anticipated by Wannon Water to be granted for similar uses of supplied drinking water, have a significant impact on:

(i) the total daily demand for supplied drinking water by Wannon Water's customers; or

(ii) the security of available drinking water supplies in the district where the use will occur; and

(c) the proposed exemption would, in the opinion of Wannon Water, be generally supported by other Wannon Water customers who are affected by that stage of restriction.

6.4 **Particular Exemptions for Public Garden Areas**

Despite sub-clause 6.3, Wannon Water may grant an application for exemption to use supplied drinking water to water a public garden area during a period of stage 4 restrictions if:

(a) the application is accompanied by an approved Water Use Plan for the public garden area; and

(b) Wannon Water is reasonably satisfied that, if the garden is watered in accordance with the Water Use Plan, the exemption would not, in combination with the use of supplied drinking water in accordance with other exemptions granted, or reasonably anticipated by Wannon Water to be granted, under this clause, have a significant impact on:

(i) the total daily demand for supplied drinking water by Wannon Water's customers; or

(ii) the security of available drinking water supplies in the district where the use will occur.

6.5 **Particular Exemptions for Certain Playing Surfaces**

(a) Despite sub-clause 6.3, Wannon Water may grant an application for exemption to use supplied drinking water to water any playing surface during a period of any stage of restriction if:

(i) the application is accompanied by an approved Water Use Plan; and

(ii) the application relates to a playing surface that is to be used for an inter-State, national or international professional sporting competition, or in support of such a competition; and

(iii) the exemption is granted for a finite period, which includes the dates during which the competition is to be held, determined after consulting the applicant; and

(iv) *Wannon Water* is reasonably satisfied that, if the playing surface is watered with supplied drinking water in accordance with the Water Use Plan during the relevant stage of restrictions, the exemption would not, in combination with the use of supplied drinking water in accordance with other exemptions granted, or reasonably anticipated by *Wannon Water* to be granted, under this clause, have a significant impact on:

(A) the total daily demand for supplied drinking water by Wannon Water's customers; or

(B) the security of available drinking water supplies in the district where the use will occur.

(b) Despite sub-clause 6.3 and paragraph 6.5(a), Wannon Water may grant an application for exemption to use supplied drinking water to water a particular playing surface during a period of stage 4 restrictions if:

(i) the application is accompanied by an approved Water Use Plan for the particular playing surface that has been prepared for the purpose of stage 4 restrictions; and

(ii) Wannon Water is reasonably satisfied that, if the playing surface is watered with supplied drinking water in accordance with the Water Use Plan during the relevant stage of restrictions, the exemption would not, in combination with the use of supplied drinking water in accordance with other exemptions granted, or reasonably anticipated by Wannon Water to be granted, under this clause, have a significant impact on:

(A) the total daily demand for supplied drinking water by Wannon Water's customers; or

(B) the security of available drinking water supplies in the district where the use will occur.

6.6 **Particular Exemptions for Warm Season Grasses**

(a) This sub-clause applies if:

(i) a person applies to Wannon Water for an exemption to establish a warm season grass area at a specified property during a period of stage 1 or 2 restrictions; and

(ii) an exemption under this sub-clause for the property to which the application relates has not been granted in the past 12 months.

(b) Despite paragraph 6.2(c) and sub-clause 6.3 the person, unless and until notified otherwise, is taken to have been granted the exemption from the date the application is posted or sent by electronic mail to the correct address of Wannon Water, subject to the following conditions:

(i) the exemption allows the use of supplied drinking water for watering solely for the establishment of warm season grass; and

(ii) the exemption expires 28 days after the exemption is taken to have been granted.

7. WATER USE PLANS

7.1 Guidelines Regarding Water Use Plans

(a) Wannon Water may prepare, adopt and publish guidelines about approval of Water Use Plans under this clause.

(b) Wannon Water may amend or revoke at any time guidelines adopted under paragraph (a).

(c) Guidelines adopted under paragraph (a) must be published on Wannon Water's website.

(d) Notice of the adoption, amendment or revocation of guidelines must be published in a newspaper circulating generally in each district and on the website of Wannon Water.

7.2 Applications for Water Use Plans

(a) A person may make an application under this clause if:

(i) a restriction on the use of drinking supplied water contained in Schedule 1 permits the use of drinking supplied water in accordance with an approved Water Use Plan; or

(ii) an application for an exemption under clause 6 must be accompanied by an approved Water Use Plan.

(b) An application for approval of a Water Use Plan must be in a form approved by Wannon Water.

(c) Wannon Water:

(i) must consider an application for approval of a Water Use Plan within a reasonable period;

(ii) must have regard to any adopted guidelines referred to in sub-clause 7.1; and

(iii) subject to this clause:

(A) may grant the application for approval, subject to any conditions Wannon Water considers appropriate; or

(B) refuse the application for approval.

7.3 **Approval of Water Use Plans**

Wannon Water must not approve a Water Use Plan unless:

(a) the Water Use Plan sets out:

(i) the person and property (where applicable) to which the Water Use Plan applies;

(ii) the use to which the Water Use Plan applies;

(iii) the stage of restrictions during which the Water Use Plan applies; and

(iv) when the Water Use Plan expires or ceases to apply; and

(b) in the case of an application under clause 7.2(a)(i), Wannon Water is reasonably satisfied that the use of supplied drinking water in accordance with the Water Use Plan:

(i) would result in supplied drinking water savings commensurable to the supplied drinking water savings that would result from the use of supplied drinking water in accordance with the restrictions (other than a Water Use Plan) applying to that use of supplied drinking water under the prevailing stage of restrictions; or

(ii) would not, in combination with the use of supplied drinking water in accordance with Water Use Plans approved or reasonably anticipated by Wannon Water to be approved for similar uses of supplied drinking water, have a significant impact on:

(A) the total daily demand for supplied drinking water by Wannon Water's customers; or

(B) the security of available drinking water supplies in the district where the use will occur; or

(iii) would, in the opinion of Wannon Water, be generally supported by other Wannon Water customers who are affected by the relevant stage of restriction; or

(iv) would, in the opinion of *Wannon Water*, be considered to demonstrate a best practice or highly efficient use of supplied drinking water for that purpose; or

(v) would provide a broader public benefit.

7.4 **Failure to Comply with a Water Use Plan**

For the avoidance of doubt, if an approved Water Use Plan is in place in relation to a use of supplied drinking water, but the use of supplied drinking water is not carried out in accordance with the approved Water Use Plan that use of supplied drinking water is subject to the restrictions for that use contained in Schedule 1.

8. **LIFTING A STAGE OF RESTRICTION**

8.1 **Lifting a stage of restrictions**

(a) Subject to sub-clause 8.2, Wannon Water may in accordance with paragraphs 8.1(b) and 8.1(c):

(i) lift a prevailing stage of restriction and substitute a lesser stage of restriction; or

(ii) lift a prevailing stage of restriction.

(b) Wannon Water may make a decision under paragraph 8.1(a) whenever Wannon Water reasonably concludes, in accordance with the considerations specified in its drought response plan, that the relevant circumstances which led Wannon Water to impose the prevailing stage of restriction in a district:

(i) no longer exist; or

(ii) are about to change.

(c) The decision takes effect when Wannon Water publishes a notice of the decision:

(i) in a newspaper circulating generally in the relevant district; and

(ii) on the website of Wannon Water.

8.2 **Declining to lift a stage of restrictions**

Despite sub-clause 8.1, Wannon Water may decline to lift a prevailing stage of restriction if it reasonably concludes that either:

(a) continuing that stage of restriction is necessary or desirable to increase or conserve available drinking water supplies; or

(b) the change in circumstances which would otherwise justify Wannon Water in lifting the stage of restriction is likely to be so temporary that the public inconvenience caused by lifting and subsequently re-imposing a stage of restriction would outweigh the benefits to Wannon Water's customers of temporarily lifting the prevailing stage of restriction.

9. **EMERGENCY MEASURES**

If it is considered by Wannon Water that stage 4 restrictions are insufficient to reduce consumption to a level adequate to meet future demands at that level of restriction, Wannon Water may declare emergency measures to further restrict water consumption in the specified area.

10. **OFFENCES AND PENALTIES**

10.1 **Contravention of the By-law is an offence**

A person who receives a supply of drinking water from Wannon Water must not contravene any restriction or prohibition on the use of that water imposed by or under this By-law. The contravention is an offence.

10.2 **Penalties**

The penalty for any offence referred to in sub-clause 10.1 during a stage of restriction set out in a column of the Table is:

(a) for a first offence, the relevant number of penalty units or the period of imprisonment set out in that column for a first offence;

(b) for a subsequent offence, the relevant number of penalty units or the period of imprisonment set out in that column for a subsequent offence; and

(c) for a continuing offence, an additional penalty of 5 penalty units for each day on which the offence continues (up to a maximum of 20 additional penalty units):

(i) after service of a notice of contravention on the person, under section 151 of the Act; or

(ii) if no notice of contravention is served, after conviction of the person for the offence.

Offence	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**
First offence	15	20	30	40 or 3 months' imprisonment
Subsequent offence	30	40	60 or 3 months' imprisonment	80 or 6 months' imprisonment

10.3 **Infringement notices**

An infringement notice may be served on any person who receives a supply of drinking water from Wannon Water and contravenes any restriction or prohibition on the use of that water imposed

by or under this By-law (other than an offence for contravening an emergency measure imposed under sub-clause 9.1).

10.4 **Penalties**

The infringement penalty for any offence referred to in sub-clause 10.3 during a stage of restriction set out in Column 1 of the Table is the relevant penalty set out in Column 2 in respect of that Stage of restriction.

COLUMN 1	**COLUMN 2**
STAGE OF RESTRICTION	**PENALTY UNITS**
1	2
2	3
3	4
4	5

Notes:

1 *In this By-law "**penalty unit**" has the same meaning as in section 110 of the* Sentencing Act 1991*. The value of a penalty increases each year under the* Monetary Units Act 2004*. The current value of each penalty for contravening a restriction or prohibition is set out on* Wannon Water*'s website* (wannonwater.com.au).

2 *The Act also makes it an offence to waste, misuse or excessively consume water and imposes **substantial penalties** which include one or more of fines, imprisonment and daily penalties.*

3 Wannon Water *has further power to reduce, restrict or discontinue the supply of water to a person who contravenes the Act, regulations or a by-law in relation to misuse or taking of water.* Wannon Water *can also disconnect the supply of water to a property in relation to which a notice of contravention has been issued and not complied with.*

11. **REPEAL**

Water Restriction By-law No. 5 is repealed.

12. AUTHORISATION BY WANNON WATER

This By-law is made by Wannon Water on 10th December 2021.

The COMMON SEAL of WANNON REGION)

WATER CORPORATION 2007 was hereunto affixed)

in the presence of:)

_____ Director

_____ Secretary

SCHEDULE 1

SCHEDULE OF WATER RESTRICTIONS

PART A – DEFINITIONS

"Act" means the *Water Act 1989*.

"alternate day" means:

(a) in the case of a property with an odd street number, each odd-numbered day of any month; and

(b) in the case of a property:

(i) with an even street number; or

(ii) without a street number,

each even-numbered day of any month; and

(c) in the case of any property, the 31st day of any month or the 29th day of February.

"alternative source of water" means a source of water other than supplied drinking water, including:

(a) recycled water; and

(b) reclaimed water; and

(c) greywater; and

(d) rainwater other than rainwater from a rainwater tank in which rainwater is mixed with supplied drinking water.

"animal husbandry" includes keeping, raising or breeding any animals or birds either:

(a) for commercial purposes; or

(b) on such a scale, or in such a manner, as could reasonably be considered to be comparable to a commercial undertaking.

"**approved Water Use Plan**" means a Water Use Plan approved by Wannon Water

"Automatic Water Top Up Device" means any automatic top up device with appropriate backflow protection that maintains a water level at the minimum level required for the safe and efficient operation of, and to maintain the integrity of, the equipment which the device is servicing.

"building façade or window" means any external surface of, or attached to, a building, including any roof, wall, window or blind of that building.

"commercial car wash" means any commercial facility for washing vehicles.

"commercial market garden" means an area (indoors or outdoors) used wholly or primarily to propagate, cultivate or harvest fruit, vegetables, vines or other edible plants for sale (retail or wholesale) or distribution for profit.

"commercial or Council plant nursery" means an area (indoors or outdoors) used wholly or primarily to propagate, cultivate or harvest plants (including seed stock, turf and flowers):

(a) for sale (retail or wholesale) or distribution for profit; or

(b) for any Council use.

"construction or renovation" means construction or renovation works on any building or structure including:

(a) erecting, altering (including painting or other protection works), repairing, demolishing or removing any building or structure; and

(b) civil engineering; and

(c) any preparatory works for the purposes of construction or renovation; and

(d) any directly associated on-site or off-site activity.

"Council" means a council under the *Local Government Act* 2020.

"dam or tank" does not include a pond or lake.

"district" means one of the following districts serviced by *Wannon Water* or part of any of those districts as specified by *Wannon Water*:

Balmoral Waterworks
Caramut Rural
Caramut Water Supply
Casterton Urban
Cavendish Urban
Coleraine and Casterton Waterworks
Coleraine Urban
Dartmoor Water
Derrinallum Urban
Dunkeld Urban
Glenthompson Urban
Hamilton Urban
Hamilton Waterworks
Heywood Urban
Heywood Waterworks
Koroit Water
Lismore and Derrinallum Waterworks
Lismore Rural
Lismore Urban
Macarthur Water District
Merino Urban
Mortlake Water
Otway Rural
Otway Urban
Otway Waterworks
Penshurst Urban
Peterborough Water
Port Campbell Urban
Port Fairy Urban
Port Fairy Waterworks
Portland Urban
Portland Waterworks
Purnim Urban
Sandford Urban
Shire of Dundas Waterworks
Shire of Glenelg Waterworks
Shire of Heytesbury Waterworks
Shire of Mt Rouse Waterworks
Tarrington Urban
Timboon Urban
Town of Camperdown Water Supply
Warrnambool and Urban Environs Water

"drinking water" has the same meaning as in the *Safe Drinking Water Act 2003*;

"dripper watering system" means:

(a) a watering system (automatic or manual) which drips water on the root zone of plants, by drippers at a fixed rate of flow, not exceeding 9 litres per hour for every linear metre of the watering system; or

(b) a "non-dripper" watering system (automatic or manual) which to the satisfaction of Wannon Water is of equal efficiency to or greater efficiency than a dripper water system described in paragraph (a).

"drought response plan" means a plan developed by *Wannon Water*, for the purpose of responding to drought or other water shortage, as required under its Statement of Obligation issued under section 4I of the *Water Industry Act 1994*.

"edible plants" includes plants that can be eaten, imbibed or used to flavour food or drinks.

"existing " means in existence at the time when the prevailing stage of restriction was declared.

"fill" means adding water to the current volume, if the relevant receptacle is less than 75% full.

"fountain or water feature" means any (indoor or outdoor) ornamental fountain or water feature of any capacity that projects, circulates or moves water, or otherwise causes water to flow, for an aesthetic or decorative purpose.

"garden area" means any land on which vegetation of any kind, including trees, other than lawn, grows or is cultivated, for other than commercial purposes. (*See "Lawn area"*).

"general playing surface" means any playing surface that is not a particular playing surface.

"general or particular playing surface" means a general playing surface or a particular playing surface.

"greywater" means waste water from bath tubs, showers, laundry troughs and clothes washing machines, but excludes water from kitchens (except from a clothes washing machine), dishwashing machines and toilets.

"hand-held hose" means a leak-free hose that:

(a) is held by hand, when it is used; and

(b) is fitted and used with a trigger nozzle; and

(c) that has an internal diameter of:

(i) no more than 50mm, in the case of commercial and construction activities; or

(ii) no more than 25mm, in the case of any other activities.

"hard surface" includes any courtyard, decking, footpath, driveway or other external area, with a concrete, asphalt, brick, tile, bitumen, timber or similar impervious surface.

"high pressure water cleaning device" means a machine which has a pump to increase the pressure of water delivered from a trigger nozzle, at a rate of no greater than 9 litres per minute, forming part of the device, but does not include a hand-held hose.

"hose-connected water toy" means any toy that is operated by running water, supplied through a hose.

"lawn area" means any land, grassed or sown with grass seed but excludes any playing surface. *See "garden area".*

"mobile spa" means any spa that is capable of being moved for use in different locations.

"mobile water tanker permit" means a valid permit issued by Wannon Water for the filling or topping up of a water tanker with supplied drinking water from hydrants and fireplugs in accordance with the conditions of the permit.

"motor vehicle dealer, repairer or detailer" means a person that is a commercial operator that either sells, trades or repairs motor vehicles or is required to clean motor vehicles as part of its operation but excludes a commercial car wash.

"new" means not existing.

"Other Use" means any use or purpose for which water may be used outside a building, which is not a use or purpose expressly referred to in this document.

"particular playing surface" means:

(a) any of the following at a sporting or recreational facility:

(i) a turf wicket for competition cricket;

(ii) a turf practice wicket for cricket but only if an alternative practice wicket that does not require watering (such as a synthetic wicket) is not available;

(iii) a lawn or other type of running track (whether for use by humans or animals);

(iv) a lawn, en tous cas, or other type of tennis court other than a concrete, bitumen or asphalt tennis court;

(v) a baseball or softball diamond, including the infield and any en tout cas running area;

(vi) a hockey or lacrosse pitch;

(vii) a green for lawn bowls or croquet or similar sport;

(viii) the penalty areas of a soccer pitch;

(ix) a golfing tee or green (but not fairways or approaches); or

(b) a soft-fall area at a child-care facility or public playground.

"permanent water saving rule" means a restriction or prohibition on the use of supplied drinking water contained in Wannon Water's Permanent Water Saving Plan (available at wannonwater.com.au) or from Wannon Water.

"playing surface" means any outdoor area used or capable of being used for any organised sport or recreation.

"pond or lake" includes any collection of water (indoors or outdoors) for ornamental or urban drainage retention purposes, but does not include a fountain or water feature or a tank that is used to house fish or other aquatic life.

"public garden area" means any:

(a) garden area at any park, reserve or other outdoor area, used or available for public recreation or amenity; or

(b) garden area at any cemetery, crematorium, central road area or roundabout under the management or control of a public statutory body; or

(c) trees located in a nature strip,

but does not include any:

(d) residential or commercial garden area; or

(e) playing surface; or

(f) nature strip (other than the trees located in the nature strip).

"public lawn area" means any lawn area:

(a) at any park, reserve or other outdoor area, used or available for public recreation or amenity; or

(b) at any cemetery, crematorium, central road area or roundabout under the management or control of a public statutory body,

but does not include:

(c) any residential or commercial lawn area; or

(d) any playing surface; or

(e) any nature strip.

"public garden or lawn area" means any public garden area or any public lawn area.

"public pool or spa" means a swimming pool or spa (indoors or outdoors):

(a) for public use, which is operated by, or on behalf of, a public statutory body; or

(b) for limited public use, which is operated by, or on behalf of, a school or educational facility; or

(c) for limited public use for the purposes of physical rehabilitation, which is operated by, or on behalf of, a public statutory body or a private enterprise.

“rainwater” means water collected directly from roof run-off.

“rainwater tank” means a tank or a number of connecting tanks designed to collect rainwater from roof catchments.

"reclaimed water" means water that is not drinking water or recycled water, but is recovered from sources such as stormwater.

"recycled water" means water derived from sewage or trade waste that has been treated for the purpose of re-use.

"residential or commercial garden area" means any garden area associated with any residential, commercial or industrial premises and includes any garden area associated with any:

(a) dwelling; or

(b) commercial or industrial building; or

(c) hospital or nursing home; or

(d) sporting club; or

(e) religious facility; or

(f) day-care centre, kindergarten, school, university or other educational facility or research institute; or

(g) any garden area on an adjacent nature strip in a road adjoining a premises referred to in paragraphs (a) to (f),

but does not include:

(h) any commercial market garden; or

(i) any commercial or Council plant nursery.

"residential or commercial garden or lawn area" means any residential or commercial garden area or any residential or commercial lawn area.

"residential or commercial lawn area" means any lawn area associated with any residential, commercial or industrial premises and includes any lawn area associated with any:

(a) dwelling; or

(b) commercial or industrial building; or

(c) hospital or nursing home; or

(d) sporting club; or

(e) religious facility; or

(f) day-care centre, kindergarten, school, university or other educational facility or research institute,

(g) lawn area on an adjacent nature strip in a road adjoining a premises referred to in paragraphs (a) to (f),

does not include any lawn area associated with:

(h) any commercial market garden; or

(i) any commercial or Council plant nursery.

"residential or commercial pool or spa" means a swimming pool or spa (indoors or outdoors), operated for private use or commercial purposes, or in conjunction with any commercial premises (including any hotel), other than a public pool or spa.

"restriction" includes prohibition.

"season" means summer, autumn, winter or spring.

"sporting or recreational facility" means a sporting or recreational facility that is:

(a) for public, commercial or general community use; or

(b) associated with a university, school or other educational institution,

but does not include any part of a sporting or recreational facility that is associated with a private club or similar private organisation.

"stock and animal health requirements" means the provision of a reasonable quantity of water for drinking by, or cleaning of, domestic or commercial stock or animals, to maintain their health and wellbeing.

"stormwater" means water sourced from the stormwater drainage network of Wannon Water or any other water corporation or a Council.

"suitable alternative source of water" means an alternative source of water:

(a) that is suitable for the purpose for which it is to be used; and

(b) complies with the following requirements or guidelines for the use of that source of water:

(i) issued by the Wannon Water; or

(ii) applying under any other Act or law.

"supplied drinking water" means:

(a) drinking water supplied by the works of Wannon Water or any other water corporation (including reticulated systems, stand pipes, hydrants, fireplugs and aqueducts) whether or not that water is delivered directly to the location of its use via those works or is delivered by alternative means including a water tanker; or

(b) a mix of rainwater collected by an occupier of land in a rainwater tank on that land and drinking water described in paragraph (a) that is added to the tank.

but does not include:

(c) recycled or reclaimed water; or

(d) greywater; or

(e) stormwater; or

(f) rainwater collected by an occupier of land in a rainwater tank on that land that is not mixed with drinking water described in paragraph (a).

"top up" means adding any water to the current volume, if the relevant receptacle is at least 75% full.

"trigger nozzle" means a nozzle controlled by:

(a) a trigger which must be depressed continuously, or locked in the "on" position, by hand for water to flow; or

(b) a discreet switch which can be turned on and off by hand, with a single movement.

"vehicle" includes a car, van, truck, boat, tram or train, aircraft and any other vehicle, however it is propelled or moved.

"vehicle for mass transportation" means a bus, tram, train, aircraft, ferry or other vehicle however it is propelled or moved, that transports people en masse, but does not include:

(a) a taxi (whether a car or van); or

(b) a car; or

(c) a bus or van used for private purposes.

"Wannon Water" means Wannon Region Water Corporation.

"warm season grass" means Buffalo, Couch or Kikuyu grass varieties that are appropriate for use in a lawn area.

"water corporation" means a water corporation as defined in the Act.

"Water Use Plan" means a document, in writing or by plans, prepared to the satisfaction of Wannon Water which governs the use of supplied drinking water for specified purposes, and for the specified stage of restrictions.

"watering system" means a watering system that is:

(a) an automatic watering system that is set to turn on and off automatically, at pre-determined times, without human intervention and, in the case of use for a public lawn or garden or playing surface, is also fitted with a rain or soil moisture sensor; or

(b) an automatic watering system, operated manually, rather than automatically; or

(c) a manual watering system.

"water tanker" means any vehicle, including a trailer, configured to transport a volume of water at least one cubic metre or greater.

PART B – SCHEDULE OF RESTRICTIONS

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
1. Watering Gardens, Lawns and Playing Surfaces with Supplied drinking water	(a) A: • residential or commercial garden or lawn area; or • public garden or lawn area; or • general or particular playing surface, cannot be watered with supplied drinking water except as required and then only: • with a hand-held hose, bucket or watering can at any time; or • by means of a watering system but only on alternate days between the hours of 6am and 10am **and** 6pm and 10pm.	(a) A: • residential or commercial lawn area; or • public lawn area; or • general playing surface, cannot be watered with supplied drinking water at any time.	(a) A: • residential or commercial lawn area; or • public lawn area; or • general playing surface, cannot be watered with supplied drinking water at any time.	(a) A: • residential or commercial garden or lawn area; or • public garden or lawn area; or • general or particular playing surface, cannot be watered with supplied drinking water at any time.
	(b) *Not used.*	(b) A: • residential or commercial garden area; or • public garden area; or • a particular playing surface, cannot be watered with supplied drinking water except as required and then only: • with a hand-held hose, bucket or watering can any time; or • using a watering system but only on alternate days between the hours of 6am and 8am **and** 6pm and 8pm.	(b) A: • residential or commercial garden area; or • public garden area; or • particular playing surface, cannot be watered with supplied drinking water except as required and then only on alternate days between the hours of 6am and 8am: • with a hand-held hose, bucket or watering can; or • using a dripper watering system.	(b) *Not used.*
	(c) Despite paragraph (a): • a public garden or lawn area; or • a general or particular playing surface, can be watered with supplied drinking water as required but only in accordance with an approved Water Use Plan.	(c) Despite paragraphs (a) and (b): • a public garden or lawn area; or • a general or particular playing surface, can be watered with supplied drinking water as required but only in accordance with an approved Water Use Plan.	(c) Despite paragraphs (a) and (b): • a public garden or lawn area; or • a general or particular playing surface, can be watered with supplied drinking water as required but only in accordance with an approved Water Use Plan.	(c) *Not used.*
2. Using Supplied drinking water for Aesthetic Purposes	(a) Supplied drinking water cannot be used to fill or top up a fountain or water feature unless the fountain or water feature recirculates the Water and then only by means of: • a hand-held hose, bucket or watering can; or • an Automatic Water Top Up Device.	(a) Supplied drinking water cannot be used to fill or top up a fountain or water feature at any time.	(a) Supplied drinking water cannot be used to fill or top up a fountain or water feature at any time.	(a) Supplied drinking water cannot be used to fill or top up a fountain or water feature at any time.

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
	(b) Supplied drinking water cannot be used to fill or top up a new or existing pond or lake with a capacity of 2,000 litres or less except by means of a hand-held hose, watering can or bucket.	(b) Supplied drinking water cannot be used to fill or top up a new pond or lake, regardless of capacity, at any time.	(b) Supplied drinking water cannot be used to fill or top up a new pond or lake, regardless of capacity, at any time.	(b) Supplied drinking water cannot be used to fill or top up a new pond or lake, regardless of capacity, at any time.
	(c) Supplied drinking water cannot be used to fill or top up a new or existing pond or lake with a capacity of greater than 2,000 litres except in accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used to fill or top up an existing pond or lake, regardless of capacity, unless the relevant pond or lake sustains aquatic fauna or bird life, and then only accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used to fill or top up an existing pond or lake, regardless of capacity, unless the relevant pond or lake sustains aquatic fauna or bird life, and then only in accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used to fill or top up an existing pond or lake, regardless of capacity, unless the relevant pond or lake sustains aquatic fauna or bird life, and then only in accordance with an approved Water Use Plan.
3. Using Supplied drinking water in Swimming Pools and Toys	(a) Supplied drinking water cannot be used to fill a new or existing: • residential or commercial pool or spa; or • public pool or spa, with a capacity of 2,000 litres or less, except by means of: • a hand-held hose, bucket or watering can; or • an Automatic Water Top Up Device.	(a) Supplied drinking water cannot be used to fill a new or existing: • residential or commercial pool or spa; or • public pool or spa, with a capacity of 2,000 litres or less, except by means of: • a hand-held hose, bucket or watering can; or • an Automatic Water Top Up Device.	(a) Supplied drinking water cannot be used to fill a new or existing residential or commercial pool or spa of any capacity.	(a) Supplied drinking water cannot be used to fill a new or existing residential or commercial pool or spa of any capacity.
	(b) Supplied drinking water cannot be used to fill a new or existing: • residential or commercial pool or spa; or • public pool or spa, with a capacity of greater than 2,000 litres, except in accordance with an approved Water Use Plan.	(b) Supplied drinking water cannot be used to fill a new or existing: • residential or commercial pool or spa; or • public pool or spa, with a capacity of greater than 2,000 litres, except in accordance with an approved Water Use Plan.	(b) Supplied drinking water cannot be used to fill a new or existing public pool or spa, of any capacity, except in accordance with an approved Water Use Plan.	(b) Supplied drinking water cannot be used to fill or top up a new or existing public pool or spa, of any capacity, except in accordance with an approved Water Use Plan.
	(c) Supplied drinking water cannot be used to top up a new or existing: • residential or commercial pool or spa; or • public pool or spa, of any capacity, except by means of: • a hand-held hose, bucket or watering can; or • an Automatic Water Top Up Device.	(c) Supplied drinking water cannot be used to top up a new or existing: • residential or commercial pool or spa; or • public pool or spa, of any capacity, except: • between the hours of 6am and 8am **and** 6pm and 8pm on alternate days by means of a hand-held hose, bucket or watering can; or • by use of an Automatic Water Top Up Device at any time; or • in accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used to top up: • an existing residential or commercial pool or spa; or • a new or existing public pool or spa, of any capacity, except: • between the hours of 6am and 8am on alternate days by means of a hand-held hose, bucket or watering can; or • by use of an Automatic Water Top Up Device at any time; or • in accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used to top up an existing residential or commercial pool or spa of any capacity, except: • by means of a bucket or watering can; or • In accordance with an approved Water Use Plan.

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
	(d) Supplied drinking water cannot be used to fill or top up a mobile spa except in accordance with an approved Water Use Plan that is obtained by the owner of the mobile spa.	(d) Supplied drinking water cannot be used to fill or top up a mobile spa except in accordance with an approved Water Use Plan that is obtained by the owner of the mobile spa.	(d) Supplied drinking water cannot be used to fill or top up a mobile spa at any time.	(d) Supplied drinking water cannot be used to fill or top up a mobile spa at any time.
	(e) Supplied drinking water cannot be used in or for the use of a hose-connected water toy at any time.	(e) Supplied drinking water cannot be used in or for the use of a hose-connected water toy at any time.	(e) Supplied drinking water cannot be used in or for the use of a hose-connected water toy at any time.	(e) Supplied drinking water cannot be used in or for the use of a hose-connected water toy at any time.
4. Storing or Transporting Supplied drinking water	(a) Supplied drinking water cannot be used to fill or top up a dam or tank except: • where the water in the dam or tank is to be used : - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 1 restrictions; or • in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used to fill or top up a dam or tank except: • where the water in the dam or tank is to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 2 restrictions; or • in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used to fill or top up a dam or tank except: • where the water in the dam or tank is to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 3 restrictions; or • in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used to fill or top up a dam or tank except: • where the Water in the dam or tank is to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 4 restrictions; or • in accordance with an approved Water Use Plan.
	(b) Supplied drinking water cannot be used to fill or top up a water tanker unless: • Wannon Water has granted a mobile water tanker permit to the operator of that tanker; and • the tanker is supplying the water to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 1 restrictions.	(b) Supplied drinking water cannot be used to fill or top up a water tanker unless: • Wannon Water has granted a mobile water tanker permit to the operator of that tanker; and • the tanker is supplying the water to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 2 restrictions.	(b) Supplied drinking water cannot be used to fill or top up a water tanker unless: • Wannon Water has granted a mobile water tanker permit to the operator of that tanker; and • the tanker is supplying the Water to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 3 restrictions.	(b) Supplied drinking water cannot be used to fill or top up a water tanker unless: • Wannon Water has granted a mobile water tanker permit to the operator of that tanker; and • the tanker is supplying the Water to be used: - for fire fighting, stock watering or other public health purposes but then only to the extent which it is reasonably necessary for those purposes; or - for domestic purposes inside a dwelling; or - for any other use of supplied drinking water permitted by means of a hand-held hose under stage 4 restrictions.

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
5. Cleaning Vehicles with Supplied drinking water	(a) Supplied drinking water cannot be used to clean a vehicle, except: • in the case of a vehicle being cleaned at the premises of or by a motor vehicle dealer, repairer or detailer, only in accordance with paragraph (c); or • in any other case by means of: - a high pressure water cleaning device; or - if such a device is not available, a hand-held hose, bucket or watering can; or • at a commercial car wash in accordance with paragraph (d); or • in the case of a vehicle for mass transportation, in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used to clean a vehicle except: • in the case of a vehicle being cleaned at the premises of or by a motor vehicle dealer, repairer or detailer, only in accordance with paragraph (c); or • in any other case by means of: - a high pressure water cleaning device; or - if such a device is not available, a hand-held hose, bucket or watering can; or • at a commercial car wash in accordance with paragraph (d); or • in the case of a vehicle for mass transportation, in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used to clean a vehicle except: • in the case of a vehicle being cleaned at the premises of or by a motor vehicle dealer, repairer or detailer, only in accordance with paragraph (c); or • in any other case by means of a bucket or watering can and even then only to the extent it is necessary for: - health and safety reasons; or - cleaning vehicle windows, mirrors, lights and registration plates; or - spot-removing corrosive substances, or • at a commercial car wash in accordance with paragraph (d); or • in the case of a vehicle that is used for mass transportation, in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used to clean a vehicle except: • by means of a bucket or watering can and even then only to the extent it is necessary for: - health and safety reasons; or - cleaning vehicle windows, mirrors, lights and registration plates; or - spot-removing corrosive substances; or • at a commercial car wash in accordance with paragraph (d); or • in the case of a vehicle for mass transportation, in accordance with an approved Water Use Plan.
	(b) Despite paragraph (a), Supplied drinking water can be used to clean inside a food transport vehicle if it is necessary, either to avoid contamination of the vehicle's contents or to ensure public health or safety, but only by means of: • a high-pressure water cleaning device; or • a hand-held hose, bucket or watering can.	(b) Despite paragraph (a), Supplied drinking water can be used to clean inside a food transport vehicle if it is necessary, either to avoid contamination of the vehicle's contents or to ensure public health or safety, but only by means of: • a high-pressure water cleaning device; or • a hand-held hose, bucket or watering can.	(b) Despite paragraph (a), Supplied drinking water can be used to clean inside a food transport vehicle if it is necessary, either to avoid contamination of the vehicle's contents or to ensure public health or safety, but only by means of: • a high-pressure water cleaning device; or • a hand-held hose, bucket or watering can.	(b) Despite paragraph (a), Supplied drinking water can be used to clean inside a food transport vehicle if it is necessary, either to avoid contamination of the vehicle's contents, or to ensure public health or safety, but only by means of: • a high-pressure water cleaning device; or • a hand-held hose, bucket or watering can.
	(c) Supplied drinking water cannot be used at the premises of or by a motor vehicle dealer, repairer or detailer to clean a vehicle except: • by means of: - a high pressure water cleaning device; - a commercial car wash in accordance with paragraph (d); or - a bucket or watering can; or • in accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used at the premises of or by a motor vehicle dealer, repairer or detailer to clean a vehicle except: • by means of: - a high pressure water cleaning device; - a commercial car wash in accordance with paragraph (d); or - a bucket or watering can; or • in accordance with an approved Water Use Plan.	(c) Supplied drinking water cannot be used at the premises of or by a motor vehicle dealer, repairer or detailer to clean a vehicle except: • by means of: - a high pressure water cleaning device; - a commercial car wash in accordance with paragraph (d); or - a bucket or watering can; or • in accordance with an approved Water Use Plan.	(c) *Not used.*
	(d) Supplied drinking water cannot be used to wash vehicles at a commercial car wash unless:	(d) Supplied drinking water cannot be used to wash vehicles at a commercial car wash unless:	(d) Supplied drinking water cannot be used to wash vehicles at a commercial car wash unless:	(d) Supplied drinking water cannot be used to wash vehicles at a commercial car wash except

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
	• for those car washes built prior to 1 July 2012, no more than 100 litres of water is used for each vehicle washed; and • for those car washes built on or after 1 July 2012, no more than 70 litres of water is used for each vehicle washed; or • the use is in accordance with an approved Water Use Plan.	• for those car washes built prior to 1 July 2012, no more than 100 litres of water is used for each vehicle washed; and • for those car washes built on or after 1 July 2012, no more than 70 litres of water is used for each vehicle washed; or • the use is in accordance with an approved Water Use Plan.	• the car wash uses no more than 70 litres of water, for each vehicle washed; or • the use is in accordance with an approved Water Use Plan.	by means of a bucket or watering can and even then only to the extent it is necessary for: - health and safety reasons; or - cleaning vehicle windows, mirrors, lights and registration plates; or - spot-removing corrosive substances
	(e) Supplied drinking water cannot be used to flush the inboard or outboard motor of a boat or other vessel unless: • a suitable receptacle filled by a hand-held hose is used; or • a flushing device, connected to a hose is used, and the tap is turned off immediately after flushing is complete.	(e) Supplied drinking water cannot be used to flush the inboard or outboard motor of a boat or other vessel unless: • a suitable receptacle filled by a hand-held hose is used; or • a flushing device, connected to a hose is used, and the tap is turned off immediately after flushing is complete.	(e) Supplied drinking water cannot be used to flush the inboard or outboard motor of a boat or other vessel unless: • a suitable receptacle filled by a hand-held hose is used; or • a flushing device, connected to a hose is used, and the tap is turned off immediately after flushing is complete.	(e) Supplied drinking water cannot be used to flush the inboard or outboard motor of a boat or other vessel unless: • a suitable receptacle filled by a hand-held hose is used; or • a flushing device, connected to a hose is used, and the tap is turned off immediately after flushing is complete.
6. Using Supplied drinking water for Other Cleaning or Maintenance Purposes	(a) Supplied drinking water cannot be used on hard surfaces or building facades (including windows), except: • in the course of construction or renovation but only as permitted under paragraph (c); or • for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency and then only by means of: - a high pressure water cleaning device; or - if such a device is not available, a hand-held hose, bucket or watering can, or • in the case of building facades (including windows), for any other type of cleaning (not referred to above) and then only by means of a bucket or watering can.	(a) Supplied drinking water cannot be used on hard surfaces or building facades (including windows), except: • in the course of construction or renovation but only as permitted under paragraph (c); or • for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency and then only by means of: - a high pressure water cleaning device; or - if such a device is not available, a hand-held hose, bucket or watering can, or • In the case of building facades (including windows), for any other type of cleaning and then only by means of a bucket or watering can.	(a) Supplied drinking water cannot be used on hard surfaces or building facades (including windows), except: • in the course of construction or renovation but only as permitted under paragraph (c); or • for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency and then only by means of: - a high pressure water cleaning device; or - if such a device is not available, a hand-held hose, bucket or watering can.	(a) Supplied drinking water cannot be used on hard surfaces or building facades (including windows), except: • in the course of construction or renovation but only as permitted under paragraph (c); or • for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency and then only by means of: - a high pressure water cleaning device; or - if such a device is not available, a hand-held hose, bucket or watering can.
	(b) Supplied drinking water cannot be used to suppress dust unless: • there is no suitable alternative source of water that it is reasonably practicable to use; and	(b) Supplied drinking water cannot be used to suppress dust unless: • there is no suitable alternative source of water that it is reasonably practicable to use; and	(b) Supplied drinking water cannot be used to suppress dust unless: • there is no suitable alternative source of water that it is reasonably practicable to use; and	(b) Supplied drinking water cannot be used to suppress dust unless: • there is no suitable alternative source of water that it is reasonably practicable to use; and

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
	• the dust is causing or is likely to cause a health or environmental hazard, and then only: • by means of a hand-held hose, bucket or watering can; or • with supplied drinking water r from a water tanker filled or topped up in accordance with restriction 4(b); or • in accordance with an approved Water Use Plan.	• the dust is causing or is likely to cause a health or environmental hazard, and then only: • by means of a hand-held hose, bucket or watering can; or • with supplied drinking water from a water tanker filled or topped up in accordance with restriction 4(b); or • in accordance with an approved Water Use Plan.	• the dust is causing or is likely to cause a health or environmental hazard, and then only: • by means of a hand-held hose, bucket or watering can; or • with supplied drinking water from a water tanker filled or topped up in accordance with restriction 4(b); or • in accordance with an approved Water Use Plan.	• the dust is causing or is likely to cause a health or environmental hazard, and then only: • by means of a hand-held hose, bucket or watering can; or • with supplied drinking water from a water tanker filled or topped up in accordance with restriction 4(b); or • in accordance with an approved Water Use Plan.
	(c) Supplied drinking water cannot be used in the course of construction or renovation except: • by means of a high-pressure cleaning device, hand-held hose, bucket or watering can; or • for the suppression of dust in accordance with paragraph (b); or • for construction equipment which requires a water supply for its safe and efficient operation; or • if required in the normal course of initial testing or flushing of pipes; or other works.	(c) Supplied drinking water cannot be used in the course of construction or renovation except: • by means of a high-pressure cleaning device, hand-held hose, bucket or watering can; or • for the suppression of dust in accordance with paragraph (b); or • for construction equipment which requires a water supply for its safe and efficient operation; or • if required in the normal course of initial testing or flushing of pipes; or other works.	(c) Supplied drinking water cannot be used in the course of construction or renovation except: • by means of a high-pressure cleaning device, hand-held hose, bucket or watering can; or • for the suppression of dust in accordance with paragraph (b); or • for construction equipment which requires a water supply for its safe and efficient operation; or • if required in the normal course of initial testing or flushing of pipes; or other works.	(c) Supplied drinking water cannot be used, in the course of construction or renovation except: • by means of a high-pressure cleaning device, hand-held hose, bucket or watering can; or • for the suppression of dust in accordance with paragraph (b); or • for construction equipment which requires a water supply for its safe and efficient operation; or • if required in the normal course of initial testing or flushing of pipes; or other works.
7. Using Supplied drinking water for Commercial Production of Plants and/or Animals:	(a) Supplied drinking water cannot be used at: • a commercial or Council plant nursery; or • a commercial market garden, except as required and then only by means of: • a hand-held hose, bucket or watering can at any time; or • a watering system at any time.	(a) Supplied drinking water cannot be used at: • a commercial or Council plant nursery; or • a commercial market garden, except as required and then only by means of: • a hand-held hose, bucket or watering can at any time; or • a watering system at any time.	(a) Supplied drinking water cannot be used at a commercial or Council plant nursery, except as required and then only: • by means of a hand-held hose, bucket or watering can at any time; or • in accordance with an approved Water Use Plan.	(a) Supplied drinking water cannot be used at a commercial or Council plant nursery, except as required and then only: • by means of a hand-held hose, bucket or watering can at any time; or • in accordance with an approved Water Use Plan.
	(b) *Not used.*	(b) *Not used.*	(b) Supplied drinking water cannot be used at a commercial market garden except as required and then only in accordance with an approved Water Use Plan.	(b) Supplied drinking water cannot be used at a commercial market garden except as required and then only in accordance with an approved Water Use Plan
	(c) Supplied drinking water cannot be used for animal husbandry except for: • drinking by animals or birds; or • cleaning animals or birds; or	(c) Supplied drinking water cannot be used for animal husbandry except for: • drinking by animals or birds; or • cleaning animals or birds; or	(c) Supplied drinking water cannot be used for animal husbandry except for: • drinking by animals or birds; or • cleaning animals or birds; or	(c) Supplied drinking water cannot be used for animal husbandry except for: • drinking by animals or birds; or • cleaning animals or birds; or

Category of water use	Stage 1 (Alert)	Stage 2 (Save)	Stage 3 (Just Enough)	Stage 4 (Critical)
	• cleaning pens, yards and cages, and then only if cleaning is done by means of a hand-held hose or bucket.	• cleaning pens, yards and cages, and then only if cleaning is done by means of a hand-held hose or bucket.	• cleaning pens, yards and cages, and then only if cleaning is done by means of a hand-held hose or bucket.	• cleaning pens, yards and cages, and then only if cleaning is done by means of a hand-held hose or bucket.
	(d) Supplied drinking water cannot be used for cooling a shed on a commercial poultry farm except by means of: • sprinklers used only for cooling and then only between the hours of 6am and 9pm when the inside temperature of the shed is 30°C or higher; and • fogging systems and cooling pads, which may be used at any time.	(d) Supplied drinking water cannot be used for cooling a shed on a commercial poultry farm except by means of: • sprinklers used only for cooling and then only between the hours of 6am and 9pm when the inside temperature of the shed is 30°C or higher; and • fogging systems and cooling pads, which may be used at any time.	(d) Supplied drinking water cannot be used for cooling a shed on a commercial poultry farm except by means of: • sprinklers used only for cooling and then only between the hours of 6am and 9pm when the inside temperature of the shed is 30°C or higher; and • fogging systems and cooling pads, which may be used at any time.	(d) Supplied drinking water cannot be used for cooling a shed on a commercial poultry farm except by means of: • sprinklers used only for cooling and then only between the hours of 6am and 9pm when the inside temperature of the shed is 30°C or higher; and • fogging systems and cooling pads, which may be used at any time.
8. Other Uses	Supplied drinking water must not be used for any Other Use without the prior written permission of Wannon Water.	Supplied drinking water must not be used for any Other Use without the prior written permission of Wannon Water.	Supplied drinking water must not be used for any Other Use without the prior written permission of Wannon Water.	Supplied drinking water must not be used for any Other Use without the prior written permission of Wannon Water.

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Permanent Water Saving Plan

wannonWATER

CONTENTS

PERMANENT WATER SAVING PLAN

PREAMBLE

The community recognises that water is a precious resource and should not be wasted. This Permanent Water Saving Plan reflects the value that the community places on water and sets out a set of common sense rules to encourage the efficient use of water and avoid wasting this precious resource.

The rules in this Plan are designed to support the commitment that Victorian communities have made to using water more efficiently. Many households and businesses are harvesting their own water through rainwater tanks, have installed water-efficient appliances, are adopting water-wise practices and are choosing to turn off their taps whenever possible. The rules in this Plan support this collective commitment by requiring the community to use common sense and best practices as part of their everyday use of water.

Wannon Water will continue to work with its community to support individual efforts to use water more efficiently. This will help to ensure there is enough water to sustain liveable and prosperous communities into the future.

The rules in this Plan are also supported by the provisions of the *Water Act 1989* which require that water must not be wasted. Allowing water to run off into a gutter, ditch, or drain or failing to repair a controllable leak from equipment or infrastructure is considered by Wannon Water to be wastage of water.

Water is an essential resource for maintaining life. This Plan therefore does not restrict the use of water for domestic, indoor purposes such as drinking, washing, cleaning or sanitation. Also, despite any rules in this Plan, water can be used at any time:

- for human health requirements;
- for watering of stock and animals;
- for fire fighting;
- for the safety, but not the cleaning, of vehicles and equipment; or
- for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency (in accordance with the permitted methods).

1. **AUTHORISING PROVISION AND COMMENCEMENT**

This Permanent Water Saving Plan is varied under section 170B of the *Water Act 1989*.

2. **PURPOSES**

The purposes of this Plan are to:

(a) set out the permanent water savings rules which guide the efficient use of Water on an ongoing and permanent basis in each district serviced by Wannon Water; and

(b) specify principles for considering applications for exemption from particular permanent water saving rules.

3. DEFINITIONS AND INTERPRETATION

3.1 Definitions

The following definitions apply in this Plan:

"approved Water Use Plan" means a Water Use Plan approved by Wannon Water

"construction or renovation" means construction or renovation works on any building or structure including:

(a) erecting, altering (including painting or other protection works), repairing, demolishing or removing any building or structure;

(b) civil engineering;

(c) any preparatory works for the purposes of construction or renovation; and

(d) any directly associated on-site or off-site activity.

"Council" means a council under the *Local Government Act* 1989.

"district" means a district serviced by Wannon Water or part of any such district.

"fountain or water feature" means any (indoor or outdoor) ornamental fountain or water feature of any capacity that projects, circulates or moves water, or otherwise causes water to flow, for an aesthetic or decorative purpose.

"garden area" means any land upon which vegetation of any kind, including trees, other than lawn, grows or is cultivated, for other than commercial purposes. (*See "Lawn area"*).

"greywater" means household waste water from bath tubs, showers, laundry troughs and clothes washing machines, but excludes water from kitchens, dishwashing machines and toilets.

"hand-held hose" means a hose that is held by hand when it is used.

"hard surface" includes any courtyard, decking, footpath, driveway or other external area, with a concrete, asphalt, brick, tile, bitumen, timber or similar impervious surface.

"high pressure water cleaning device" means a machine which has a pump to increase the pressure of water delivered from a trigger nozzle, at a rate of no greater than 9 litres per minute, forming part of the device, but does not include a hand-held hose.

"lawn area" means any land, grassed or sown with grass seed but excludes any playing surface. *See "garden area".*

"permanent water saving rule" means a restriction or prohibition on the use of Water contained in Schedule 1 of this Permanent Water Saving Plan.

"playing surface" means any outdoor area used or capable of being used for any organised sport or recreation.

"public garden area" means any:

(a) garden area at any park, reserve or other outdoor area, used or available for public recreation or amenity;

(b) garden area at any cemetery, crematorium, central road area or roundabout under the management or control of a public authority; or

(c) trees located in a nature strip,

but does not include any:

(d) residential or commercial garden area; or

(e) playing surface; or

(f) nature strip.

"public garden or lawn area" means any public garden area or any public lawn area.

"public lawn area" means any lawn area:

(a) at any park, reserve or other outdoor area, used or available for public recreation or amenity; or

(b) at any cemetery, crematorium, central road area or roundabout under the management or control of a public authority,

but does not include:

(c) any residential or commercial lawn area;

(d) any playing surface; or

(e) any nature strip.

"reclaimed water" means water supplied by Wannon Water that is neither potable water nor recycled water, but is recovered from sources such as stormwater.

"recycled water" means treated sewage or trade waste, supplied by Wannon Water.

"residential or commercial garden area" means any garden area associated with any residential, commercial or industrial premises and includes any garden area associated with any:

(a) dwelling;

(b) commercial or industrial building;

(c) hospital or nursing home;

(d) sporting club;

(e) religious facility; or

(f) day-care centre, kindergarten, school, university or other educational facility or research institute,

and also includes any garden area on an adjacent nature strip in a road adjoining the premises, but does not include:

(g) any commercial market garden; or

(h) any commercial or Council plant nursery.

"residential or commercial garden or lawn area" means any residential or commercial garden area or any residential or commercial lawn area.

"residential or commercial lawn area" means any lawn area associated with any residential, commercial or industrial premises and includes any lawn area associated with any:

(a) dwelling;

(b) commercial or industrial building;

(c) hospital or nursing home;

(d) sporting club;

(e) religious facility; or

(f) day-care centre, kindergarten, school, university or other educational facility or research institute,

and also includes any lawn area on an adjacent nature strip in a road adjoining the premises, but does not include any lawn area associated with:

(g) any commercial market garden; or

(h) any commercial or Council plant nursery.

"restriction" includes prohibition.

"season" means summer, autumn, winter or spring.

"stock and animal health requirements" means the provision of a reasonable quantity of water for drinking by, or cleaning of, domestic or commercial stock or animals, to maintain their health and wellbeing.

"stormwater" means water sourced from the stormwater drainage network of Wannon Water or any other water corporation or a Council.

"trigger nozzle" means a nozzle controlled by:

(a) a trigger which must be depressed continuously, or locked in the "on" position, by hand for water to flow; or

(b) a discreet switch which can be turned on and off by hand, with a single movement.

"**Wannon Water**" means Wannon Region Water Corporation.

"warm season grass" means Buffalo, Couch or Kikuyo grass varieties that are appropriate for use in a lawn area.

"Water" means:

(a) water supplied by the works of Wannon Water or any other water corporation (including reticulated systems, stand pipes, hydrants, fireplugs and aqueducts) whether or not that water is delivered directly to the location of its use via those works or is delivered by alternative means including a water tanker; and

(b) a mix of:

(i) the water described in paragraph (a); and

(ii) any other water, including the water described in paragraphs (c)-(f),

but does not include:

(c) recycled or reclaimed water;

(d) greywater;

(e) stormwater; or

(f) rainwater collected by an occupier of land in a rainwater tank from the roof of a building on that land, provided that rainwater within in the tank is not supplemented in anyway by Water (defined in paragraphs (a) and (b) above).

"water corporation" means a water corporation as defined in the *Water Act* 1989 or a licensee as defined in the *Water Industry Act* 1994.

"water tanker" means any vehicle, including a trailer, configured to transport a volume of water at least one cubic metre or greater.

"Water Use Plan" means a document, in writing **[***or by plans***]**, prepared to the satisfaction of Wannon Water which governs the use of Water for specified purposes, and for the specified stage of restrictions.

"watering system" means a watering system that is:

(a) an automatic watering system that is set to turn on and off automatically, at pre-determined times, without human intervention and, in the case of use for a public lawn or garden or playing surface, is also fitted with a rain or soil moisture sensor;

(b) an automatic watering system, operated manually, rather than automatically; or

(c) a manual watering system.

3.2 **Interpretation**

(a) A reference to:

(i) legislation (including subordinate legislation) is to that legislation as amended, re-enacted or replaced, and includes any subordinate legislation issued under it;

(ii) a document or agreement, or provision of a document or agreement, is to that document, agreement or provision as amended, supplemented, replaced or novated;

(iii) a party to any document or agreement includes a permitted substitute or permitted assign of that party;

(iv) a person includes any type of entity or body of persons, whether or not it is incorporated or has a separate legal identity and any executor, administrator or successor in law of the person; and

(v) anything (including a right, obligation or concept) includes each part of it.

(b) A singular word includes the plural and vice versa.

(c) If a word is defined, another part of speech has a corresponding meaning.

(d) If an example is given of anything (including a right, obligation or concept) such as by saying it includes something else, the example does not limit the scope of that thing.

(e) An interpretation that would promote the efficient use of water must be preferred to an interpretation that would not promote such use.

4. APPLICATION AND GENERAL PRINCIPLES

4.1 Water Supplied by Wannon Water

This Plan applies to Water supplied by Wannon Water in each district serviced by Wannon Water.

4.2 Application to Water - General Principles

This Plan applies to **Water** as defined in clause 3.1. Without limiting the meaning of that definition, this means that:

(a) The permanent water saving rules in Schedule 1 **do** apply to Water supplied by the works of *Wannon Water* or any other water corporation (including reticulated systems, stand pipes, hydrants, fireplugs and aqueducts) whether or not:

(i) that water is delivered directly to the location of its use via those works or is delivered by alternative means including a water tanker; and

(ii) whether or not that Water is mixed with any other water.

(b) The permanent water saving rules in Schedule 1 **do not** apply to recycled or reclaimed water supplied by Wannon Water.

(c) The permanent water saving rules in Schedule 1 **do not** apply to greywater.

(d) The permanent water saving rules in Schedule 1 **do not** apply to stormwater.

(e) The permanent water saving rules in Schedule 1 **do not** apply to rainwater collected by an occupier of land in a rainwater tank from the roof of a building on that land, provided that rainwater within the tank is not supplemented in any way by Water.

5. GENERAL EXEMPTIONS

5.1 Health and Safety Exclusion

Despite any provision of this Plan (including the permanent water savings rules in Schedule 1) Water can be used at any time for:

(a) human health requirements;

(b) stock and animal health requirements;

(c) fire fighting; or

(d) the safety of, but not the cleaning of, vehicles or equipment.

5.2 General Exemptions

(a) *Wannon Water* may, in relation to a specified district or districts:

(i) prepare, adopt and publish; and

(ii) amend or revoke at any time,

general exemptions which specify generally applicable exemptions from permanent water saving rules set out in Schedule 1.

(b) Without limiting paragraph 5.2(a), the general exemptions may set out:

(i) permissible uses of Water which are exempted from a permanent water saving rule set out in Schedule 1, without an application being made under clause 6; and

(ii) the conditions upon which any such exemption is granted.

(c) Exemptions adopted under paragraph (a) must be published on Wannon Water's website and notice of any adoption, amendment or revocation of exemptions must be published in a newspaper circulating generally in the relevant district and on the website of Wannon Water.

(d) An exemption, or an amendment to an exemption under this clause will apply from the date on which a notice of the exemption is published in a newspaper circulating generally in the relevant district and will cease to apply in accordance with the terms of the

exemption or when notice of the revocation is published in a newspaper circulating generally in the relevant district.

(e) Wannon Water may prepare and publish general exemptions in co-operation with other water corporations.

6. PARTICULAR EXEMPTIONS

6.1 Guidelines regarding Particular Exemptions

(a) Wannon Water may:

(i) prepare, adopt and publish; and

(ii) amend or revoke at any time,

guidelines about applying for exemptions under this clause.

(b) Guidelines adopted under paragraph (a) must be published on Wannon Water's website and notice of any adoption, amendment or revocation of guidelines must be published in a newspaper circulating generally in each district and on the website of Wannon Water.

6.2 Applications for Particular Exemptions

(a) A person may apply to Wannon Water for temporary or permanent exemption from a permanent water saving rule imposed by this Plan.

(b) An application must be in a form approved by Wannon Water.

(c) Wannon Water:

(i) must consider an application for exemption within a reasonable period;

(ii) must have regard to any adopted information or adopted guidelines referred to in sub-clause 6.1; and

(iii) subject to this clause:

(A) may grant the exemption in full or in part and subject to such conditions as Wannon Water considers appropriate; or

(B) may refuse the application.

(d) Wannon Water may revoke any exemption at any time, by giving written notice to the applicant.

(e) An exemption ends at any time specified in the exemption or when any stage of restrictions are imposed by Wannon Water.

6.3 **Approval of Particular Exemptions**

Wannon Water must not grant an application for exemption under this clause unless Wannon Water is reasonably satisfied that the exemption:

(a) is necessary to avoid an inequitable and disproportionately adverse impact upon the livelihood of the applicant, which would be caused by that particular rule, and is consistent with the water policy of the government; or

(b) is necessary to avoid any adverse effect on public health or safety.

6.4 **Particular Exemptions for Warm Season Grasses**

Despite paragraph 6.2(c) and sub-clause 6.3:

(a) if a person makes an application to Wannon Water for an exemption to establish a warm season grass area at a specified property; and

(b) an exemption under this sub-clause for the property to which the application relates has not been made in the past 12 months,

the person will, unless and until notified otherwise, be deemed to have been granted the exemption from the date the application is posted or sent by electronic mail to the correct address of Wannon Water, subject to the following conditions:

(c) the exemption allows Watering solely for the establishment of warm season grass; and

(d) the exemption expires 28 days after the exemption is deemed to have been granted.

7. **WATER USE PLANS**

7.1 **Guidelines regarding Water Use Plans**

(a) Wannon Water may:

(i) prepare, adopt and publish; and

(ii) amend or revoke at any time,

guidelines about approval of Water Use Plans under this clause.

(b) Guidelines adopted under paragraph (a) must be published on Wannon Water's website and notice of any adoption, amendment or revocation of guidelines must be published in a newspaper circulating generally in each district and on the website of Wannon Water.

7.2 **Applications for Water Use Plans**

(a) A person may make an application under this clause where a permanent water savings rule in Schedule 1 permits Water use in accordance with an approved Water Use Plan:

(b) An application for approval of a Water Use Plan must be in a form approved by Wannon Water.

(c) Wannon Water:

(i) must consider an application for approval of a Water Use Plan within a reasonable period;

(ii) must have regard to any adopted guidelines referred to in clause 7.1; and

(iii) subject to this clause:

(A) may grant the application for approval, subject to such conditions as Wannon Water considers appropriate; or

(B) refuse the application for approval.

7.3 **Approval of Water Use Plans**

An Wannon Water must not approve a Water Use Plan unless:

(a) the Water Use Plan sets out:

(i) the person(s) and property (where applicable) to which the Water Use Plan applies;

(ii) the use(s) to which the Water Use Plan applies; and

(iii) when the Water Use Plan expires or ceases to apply; and

(b) Wannon Water is reasonably satisfied that the use of Water in accordance with the Water Use Plan:

(i) would result in Water savings commensurable to the Water savings that would result from Water use in accordance with the restrictions (other than a Water Use Plan) for that use of Water under the permanent water saving rule contained in Schedule 1 that is relevant to that use; **OR**

(ii) would not, in combination with the use of Water in accordance with Water Use Plans approved or reasonably anticipated by Wannon Water to be approved for similar uses of Water, have a significant impact on the total daily demand for Water by Wannon Water's customers or the security of available Water supplies in the district where the use will occur; **OR**

(iii) would, in the opinion of Wannon Water, be generally supported by other Wannon Water customers who are affected by the permanent water saving rule; **OR**

(iv) would, in the opinion of Wannon Water, be considered to demonstrate a best practice or highly efficient use of Water for that purpose; **OR**

(v) would provide a broader public benefit.

7.4 Failure to comply with a Water Use Plan

For the avoidance of doubt, if an approved Water Use Plan is in place in relation to a use of Water, but the use of Water is not carried out in accordance with the approved Water Use Plan, that use of Water is subject to the permanent water savings rule contained in Schedule 1 that is relevant to that use .

8. PENALTIES FOR NON-COMPLIANCE

8.1 Offences under the legislation

The *Water Act 1989* makes it an offence:

(a) to contravene a permanent water saving rule on the use of water imposed under this Plan; and

(b) to waste, misuse or excessively consume water.

8.2 Penalties under the legislation

(a) The *Water Act 1989* also imposes **substantial penalties** for particular offences, which may include Penalty Infringement Notices or one or more of fines, imprisonment and daily penalties or disconnection of services to a property.

(b) The value of each penalty increases each year under the *Monetary Units Act 2004*. The current value of each penalty for contravening a particular permanent water saving rule is set out on Wannon Water's website *www.wannonwater.com.au*

SCHEDULE 1: PERMANENT WATER SAVING RULES

USE	PERMANENT WATER SAVING RULES
1. Hand-Held Hose	Water from a hand-held hose must not be used for any purpose (whether or not the use is subject to a permanent water saving rule) at any time unless the hose : • is fitted with a trigger nozzle; and • is leak-free.
2. Residential or Commercial Gardens and Lawns	A residential or commercial garden or lawn area cannot be Watered except: • with a hand-held hose, bucket or watering can at any time; or • by means of a watering system between the hours of 6pm and 10am on any day.
3. Public Gardens and Lawns and Playing Surfaces	A public garden or lawn area or a playing surface cannot be Watered except: • with a hand-held hose, bucket or watering can at any time; or • by means of a watering system fitted with a rain or soil moisture sensor between the hours of 6pm and 10am on any day; or • in accordance with an approved Water Use Plan.
4. Fountains and Water Features	Water cannot be used in a fountain or a water feature unless the fountain or water feature recirculates the Water.
5. Cleaning of Hard Surfaces	Water cannot be used to clean hard surfaces (including, driveways, paths, concrete, tiles, timber decking) except: • where cleaning is required as a result of an accident, fire, health hazard, safety hazard or other emergency; or • if staining to the surface has developed and then only once a season; or • in the course of construction or renovation, and then only by means of:

USE	PERMANENT WATER SAVING RULES
	• a high pressure water cleaning device; • or if such a device is not available, a hand-held hose or a bucket.

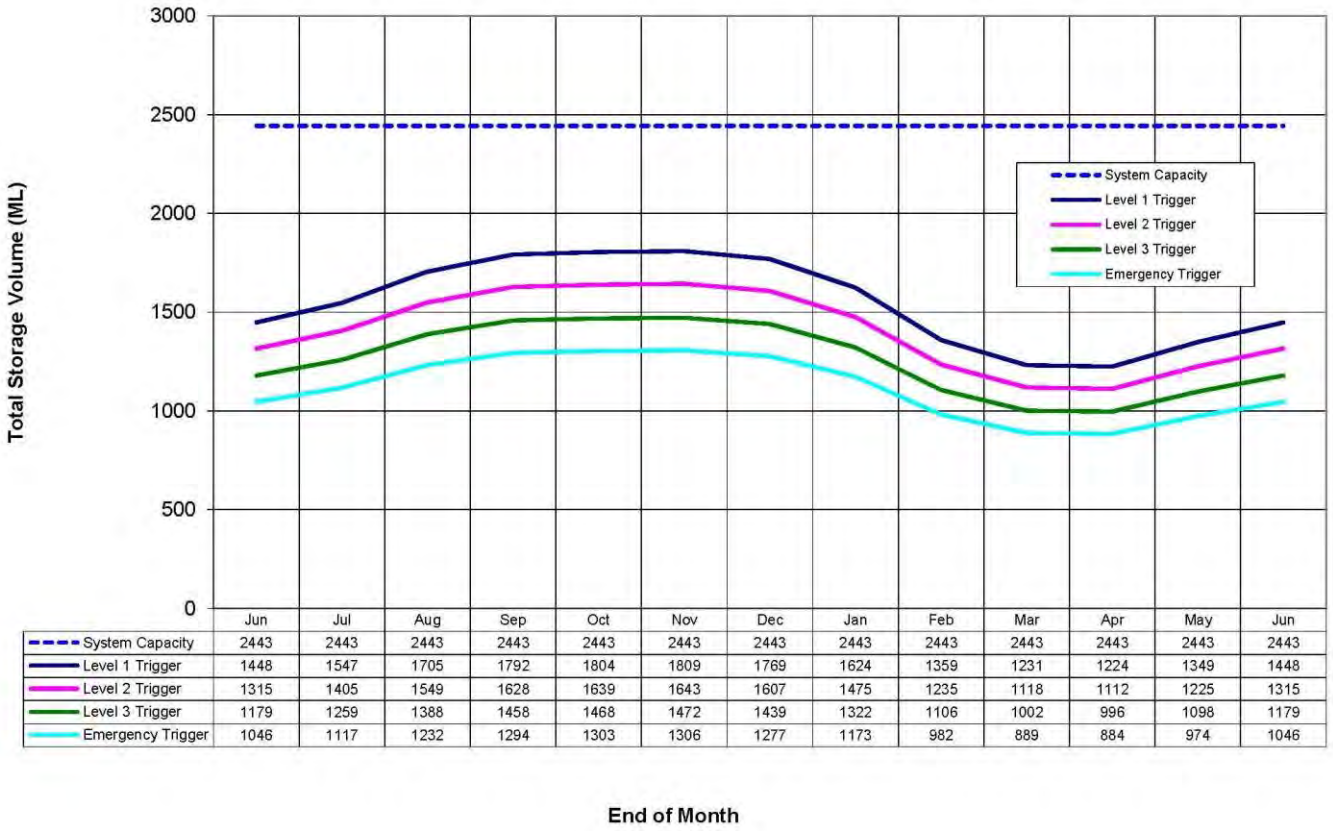
Appendix C Drought Response Triggers

C1 Otway System

C2 Grampians System

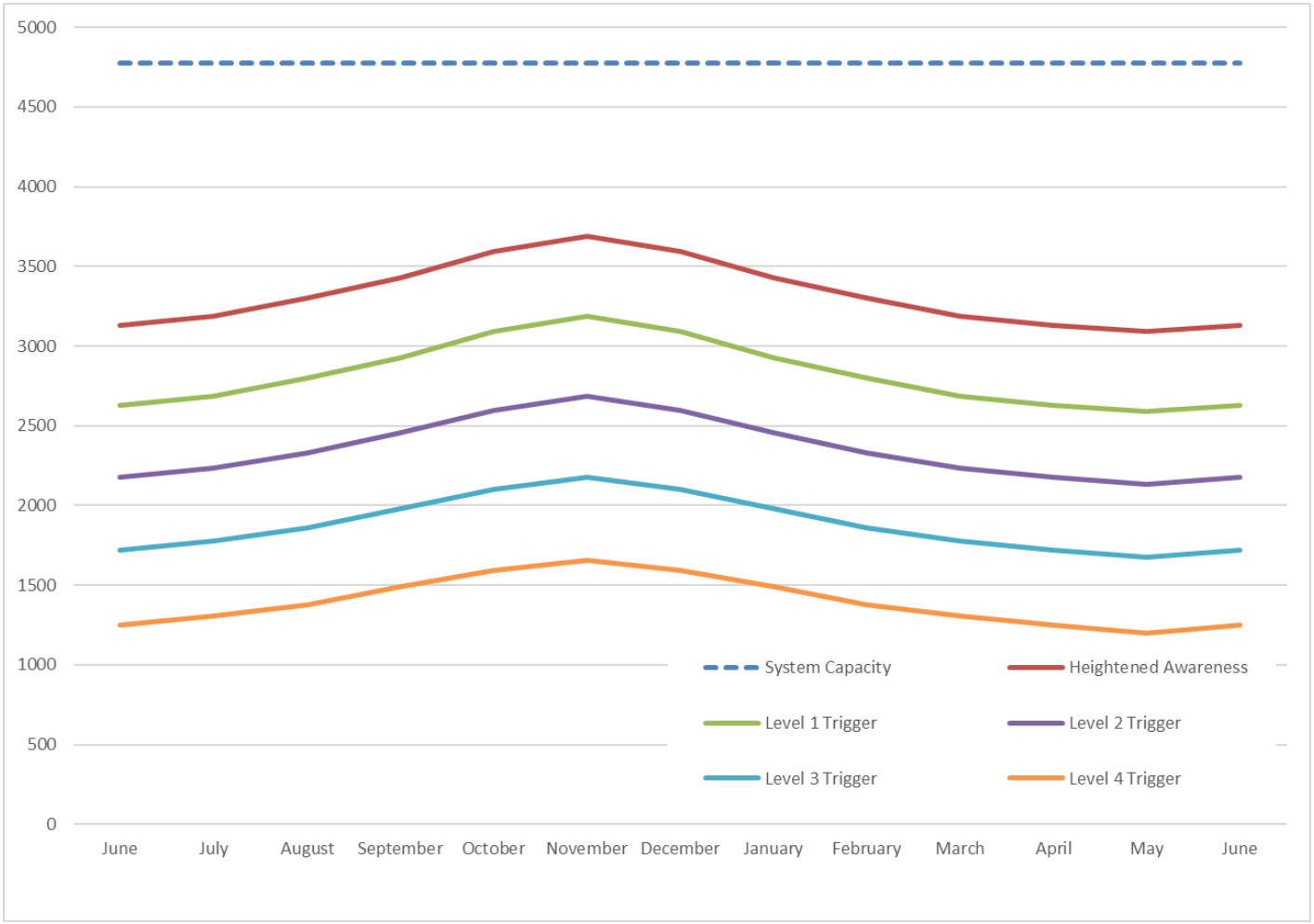
C3 Glenthompson System

APPENDIX C1. Otway System Drought Response Triggers



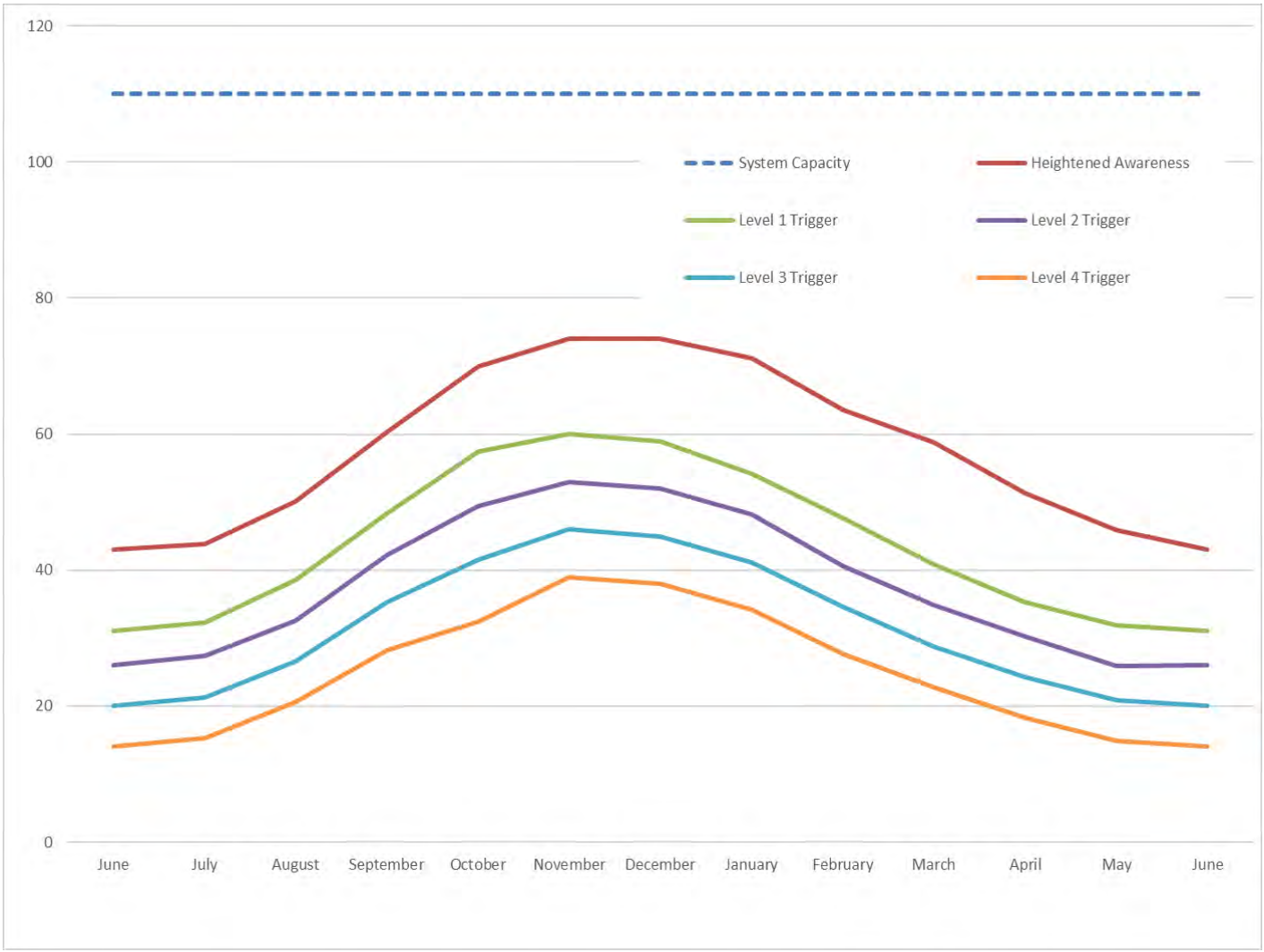
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
System Capacity	2443	2443	2443	2443	2443	2443	2443	2443	2443	2443	2443	2443	2443
Level 1 Trigger	1448	1547	1705	1792	1804	1809	1769	1624	1359	1231	1224	1349	1448
Level 2 Trigger	1315	1405	1549	1628	1639	1643	1607	1475	1235	1118	1112	1225	1315
Level 3 Trigger	1179	1259	1388	1458	1468	1472	1439	1322	1106	1002	996	1098	1179
Emergency Trigger	1046	1117	1232	1294	1303	1306	1277	1173	982	889	884	974	1046

APPENDIX C2. Grampians System Drought Response Triggers



	June	July	August	Septembe	October	November	December	January	February	March	April	May	June
System Capacity	4772	4772	4772	4772	4772	4772	4772	4772	4772	4772	4772	4772	4772
Heightened Awareness	3130	3188	3301	3430	3594	3690	3594	3430	3301	3188	3130	3091	3130
Level 1 Trigger	2630	2688	2801	2930	3094	3190	3094	2930	2801	2688	2630	2591	2630
Level 2 Trigger	2175	2232	2331	2456	2598	2685	2598	2456	2331	2232	2175	2132	2175
Level 3 Trigger	1720	1776	1862	1982	2102	2180	2102	1982	1862	1776	1720	1673	1720
Level 4 Trigger	1251	1306	1378	1493	1591	1659	1591	1493	1378	1306	1251	1200	1251

APPENDIX C3. Glenthompson System Drought Response Triggers



	June	July	August	September	October	November	December	January	February	March	April	May	June
System Capacity	110	110	110	110	110	110	110	110	110	110	110	110	110
Heightened Awareness	43	44	50	60	70	74	74	71	64	59	51	46	43
Level 1 Trigger	31	32	39	48	57	60	59	54	48	41	35	32	31
Level 2 Trigger	26	27	33	42	49	53	52	48	41	35	30	26	26
Level 3 Trigger	20	21	27	35	41	46	45	41	35	29	24	21	20
Level 4 Trigger	14	15	21	28	32	39	38	34	28	23	18	15	14