Urban Water Strategy 2022

UWS 2022

WESTERNPORT WATER™

Acknowledgement

Westernport Water acknowledges Aboriginal and Torres Strait Islander Peoples as First Nations People and that the land, sea and water are of spiritual, cultural and economic importance. We recognise that we provide services on the traditional lands of the Bunurong Peoples of the Kulin Nation. The Bunurong Peoples have managed the resources on Millowl for thousands of years. We acknowledge them and their continued connection to this place, as we go about managing the water resources today.

The Bunurong are Aboriginal People of the Kulin Nation, who occupy South-Central Victoria, from the east of Port Phillip Bay, Western Port, Cape Liptrap and surrounding areas. The Victorian Aboriginal Heritage Council notes that there are many different spellings for Bunurong, some common alternative spellings include Boonwurrung, Boon wurrung, Bunwurrung, Boon Wurrung, and Boonoorong.

Artwork titled: Clans Water Connection By: Melissa McDevitt-Weston

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Managing Director Introduction

I am pleased to present our 2022 Urban Water Strategy.

The Strategy provides a 50-year outlook forecasting demand and supply and contributes to Westernport Water's vision to deliver sustainable water and wastewater services that improve the health and liveability of our community.

Westernport Water is in a fortunate position to have a secure water supply for our region from our three available sources, and carry over from the Melbourne Supply System. In addition we have 21 months of carryover. We know that with future demand and climate change impacts, the sustainable management of our water sources will be more critical than ever to ensure the resilience and liveability of our community and continued security of our supply. We will continue to monitor the system resources over the next five years and will present the Annual Water Outlook each year in December.

This Strategy sets out the key challenges facing our region over a 50-year outlook with consideration of climate and population projections based on the best available science, feedback and insights from our customers, and presents options and actions to preserve and enhance our communities, while balancing social, environmental, and economic costs and benefits. It considers the total water cycle and the principles of integrated water management, and will be updated in five years' time with new data and trends.

Over the next five years we will undertake the actions outlined in the Strategy including actively pursuing water conservation measures with a focus on leakage detection, and continue to work with our customers to raise public awareness of water use and promote water efficiency measures. In the years ahead we will also work to remove barriers to Traditional Owners' use of water and support partnerships between Traditional Owners and water managers, focussed on achieving the objectives outlined within the Central and Gippsland Region Sustainable Water Strategy.

We will also continue to increase our recycled water customer base to provide an alternative water source to potable water as well as reducing discharge to the ocean via the outfall.

Dona Tantirimudalige

Figure 1 King Road Waste Water Treatment Plant

Executive Summary

1. What are our challenges?

   Our biggest challenge across all our systems is climate change. The variability in rainfall is impacting the availability of water in our rivers whilst at the same time creating intense wet weather events that impact our wastewater systems.

   Ongoing population growth coupled with increasing tourism also presents challenges across both our water and wastewater networks

2. What did our customers say?

   a. Customers overwhelmingly supported decisions that prioritise consistent tasting drinking water, as opposed to choices that favour efficiency and cost control.

   b. Customers supported decisions that prioritise affordability if it only means occasional water supply interruptions.

   c. Customers supported affordability over maintaining community green spaces in dry periods or times of drought, even if they turn brown.

   d. Customers overwhelmingly support protecting the natural environment for the future, despite the costs that may be associated.

   e. Customers were asked to prioritise water use outcomes by rating each priority from (0-100) for importance. Healthy waterways, environment and urban amenity outcomes were rated the highest, along with support for agriculture and food production.

   f. Customers were asked to rank in order of preference how they would decide what water source to use. Based on the weighted average, customers favoured choosing the water source that has the least impact on climate change – followed by local source.

   g. The majority of customers continue to support the use of water restrictions when necessary, particularly during periods of drought or extended periods of low rainfall – 64% of customers were in favour of enforced water restrictions, while 36% of customers supported voluntary water restrictions.

   h. Westernport Water customers support a range of means through which consumption can be managed, including: water efficiency programs for high water use sectors, water restrictions, programs for improved water efficiency in the home and potential financial incentives to encourage water saving.

3. What are we going to do about it?

Westernport Water is privileged to have three different water sources for one water supply system including two surface water and a Bulk Entitlement to the Melbourne Supply System. In addition we have 21 months of carryover. As at February 1st 2022 this provides us with 47 months of total available resources putting us in a very secure position.

Strategic actions for the UWS:

- Westernport Water's aim is to provide the lowest practical cost of water to its customers while ensuring a reliable water supply.
- Westernport Water has adopted a service level that water restrictions are not required in 95 years out of 100 to maintain a supply demand balance.
- Westernport Water will report against the assumptions that underpin the UWS annually to monitor deviation from the demand and supply balance forecasts.
- Westernport Water will update this UWS within five years of the submission of the strategy.
- If required to meet future supply-demand shortfalls Westernport Water will seek an additional share from the Melbourne water supply system, currently the most cost-effective water source. Should pricing of the supply from the Melbourne system increase significantly as a result of the current review, consideration will be given to the Bass River diversion option.
- Westernport Water will actively pursue water conservation measures, including leakage detection, education and public awareness and implementing water efficiency programs.
- Westernport Water will continue to seek new customers for its Class A and B recycled water supply, relieving pressure on the potable supply and reducing outfalls to the ocean. WPW is also investigating a nature based solution at the KRWWTP to increase storage.

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Our Vision

Westernport Water leads through collaboration and innovation to deliver sustainable water and wastewater services that improve the health and liveability of our community.

We seek to realise this vision through the following strategic focus areas:

We meet the expectations of our customers

Westernport Water is committed to providing products and services that meet customer expectations. We will do so by understanding and learning from our customers, valuing our customers through a positive customer-first culture, striving to continually improve the quality of our water and serving our customers with accessible and consistent information. We will continue to provide and promote flexible payment options for customers experiencing hardship, whilst continuing to seek opportunities to deliver increased value.

Our people are safe and well, every day

Every one of our people has an important reason to remain safe at work. Workplace Health & Safety (WHS) is a collaborative effort – we are all responsible for our own safety as well as that of those around us. It is the responsibility of everyone within the organisation to exercise their duty of care to ensure that hazards and incidents are reported and rectified. We care about each other, we have the courage to speak up when something isn't safe and we are committed to being safe and well every day.

We are a great place to work

Westernport Water is proud of its inclusive, diverse and engaged workforce. As the winner of the IPAA Leading Employer Award in 2018 and finalist in 2019, we are recognised by our peers as a great place to work. At Westernport Water, we aim to embed diversity in all that we do, increasing our understanding and embracing the benefits of a diverse and inclusive workforce. We are also committed to developing a strong workplace culture, as evidenced by five consecutive years of improvement in employee engagement scores.

Our assets enable the sustainable delivery of products and services

We aim to create a vibrant and engaged culture of asset management, enabling reliable service delivery in a warmer and drier climate, whilst continuing to provide reliable safe drinking water and sustainable wastewater treatment and disposal services.

We are a valued member of the community we serve

Westernport Water will engage effectively and transparently with our community, building strong partnerships and working collaboratively to meet our strategic objectives. We will seek to represent and reflect our community's priorities. In addition, we will deliver shared benefits through water management opportunities and strategic partnerships that support social and recreational benefits to create a more liveable and resilient community.

We value and protect our natural environment

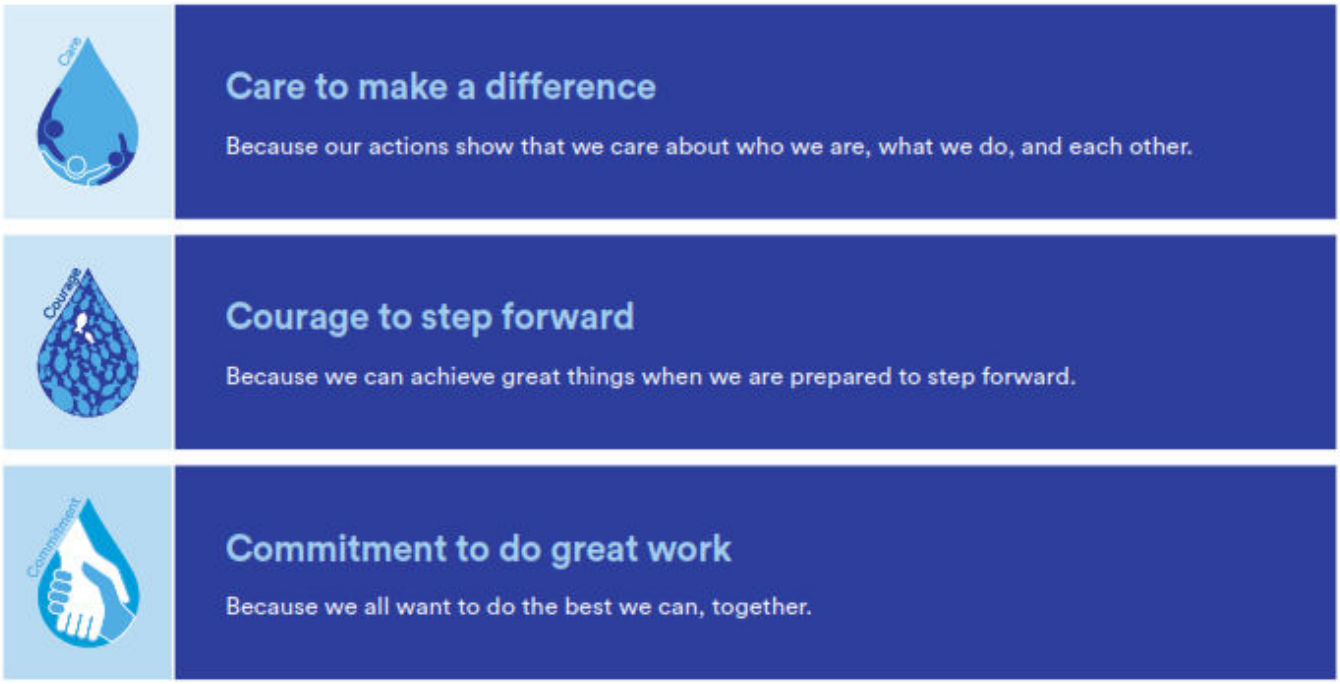
Westernport Water is conscious that our operations have the potential to impact the environment and we are committed to protecting and enhancing the environment within our service area.

Our business is financially sustainable through sound governance and prudent investment

Westernport Water will continue to meet stakeholder expectations through a focus on our core systems, processes and governance. In addition, we will deliver improved customer value by building partnerships across the Victorian water sector to drive innovation, collaboration and efficiencies.

Our Values

We continue to work collaboratively to drive a positive workplace with common goals and values. Our core values are important to everyone at Westernport Water. They are the foundation of our workplace, essential to our success and serve as the lens through which we evaluate every business decision.



What is an Urban Water Strategy?

The purpose of Westernport Water's 2022 Urban Water Strategy (UWS) is to identify the optimum mix of supply options and demand reduction measures to maintain a balance between the demand for water and the water available for supply within Westernport Water's region now and into the future. The UWS has a 50-year outlook, forecasting potential demand and supply, from today until 2070, with uncertainty taken into account through the use of supply and demand scenarios. Also included, is a strategy for the wastewater system to ensure there are planned upgrades to sustainably accommodate future growth.

Water for Victoria identifies that our communities expect our cities and towns will be liveable and productive places that support vibrant communities. As a water services provider, Westernport Water plays a vital role in ensuring that our region continues to be amongst the most liveable and productive regions of Victoria. This UWS sets out the key challenges facing our region over a 50-year outlook with consideration of climate and population projections based on the best available science, and presents options and actions to preserve and enhance our communities.

Strategic context

As shown in Figure 2, UWSs are an important component of Victoria's key water planning tools and processes. They provide an input to, and are informed by, longer-term regional assessments of Victoria's water resources, including *Sustainable Water Strategies* and *Long-Term Water Resource Assessments*. The release of this UWS coincides with the release of the *Central and Gippsland Region Sustainable Water Strategy - Discussion Draft*, which includes the Westernport Water supply area, with the release of the final SWS scheduled for 2022.

UWSs are important inputs to the Victorian Government in its development of local, regional and state-wide policies and strategies such as the *Victorian Waterways Strategy*, the *Victorian Floodplain Management Strategy* and the *Water Grid Partnership*, as well as playing a role in delivering commitments to partner with Traditional Owners in water and natural resources management. This includes policy directions outlined in *Water for Victoria*, actions from Sustainable Water Strategies, relevant actions from Strategic Direction Statements as part of Integrated Water Management Planning, Regional Waterway Strategies and DELWP's commitment to delivery of the United Nations Sustainable Development Goals (SDG).

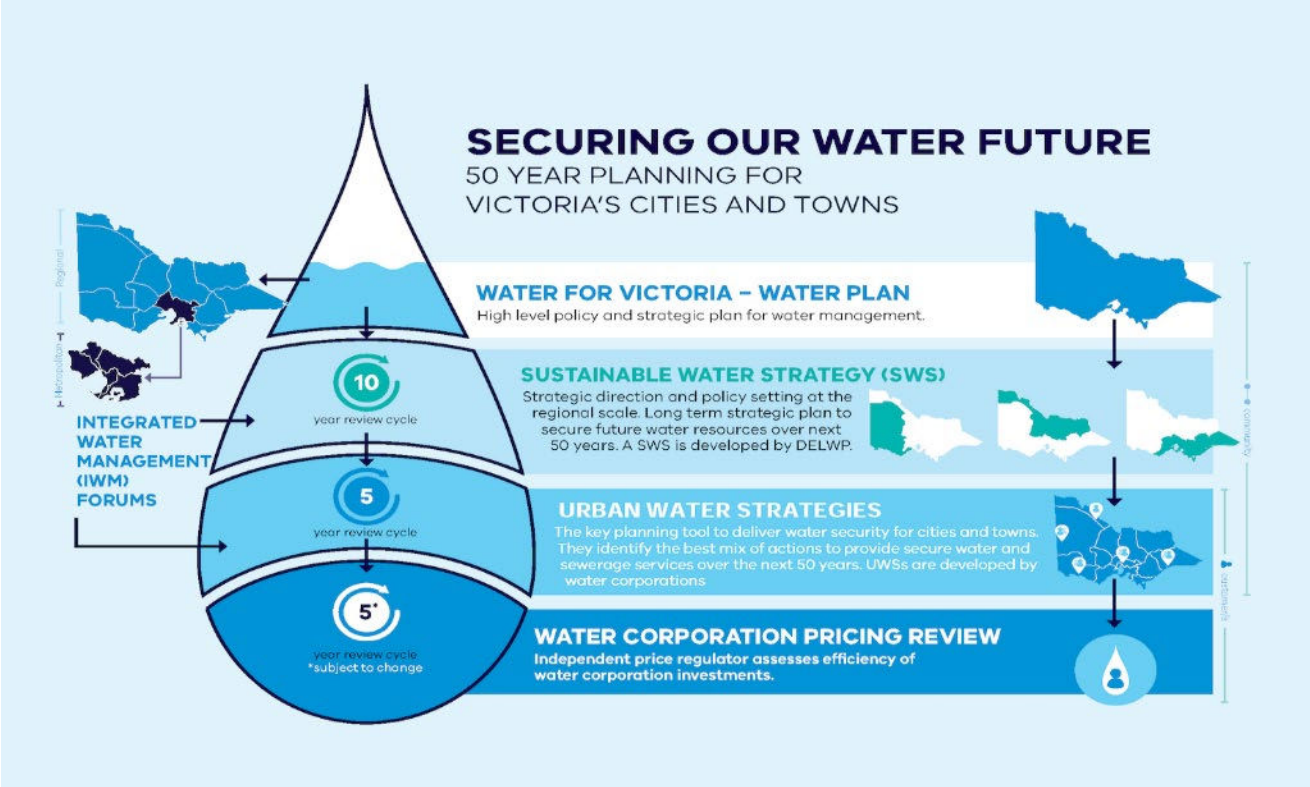


Figure 2 Victoria's water planning tools and processes

Water for Victoria outlines the water management opportunities and challenges facing Victoria over the coming decades. This includes a vision to transform Victorian cities and towns into the most resilient and liveable in the world. Table 1 provides an overview of the commitments outlined in *Water for Victoria* from an urban context.

Table 1 Strategic actions from the 2017 UWS

Urban commitments detailed in Water for Victoria	
Use diverse water sources to protect public spaces	Better urban water planning to address key challenges
Reinvigorate water efficiency programs for Melbourne and regional Victoria	Make the most of our investment in wastewater
Improve stormwater management for greener environments and healthier waterways	Work across government for healthy and resilient urban landscapes
Represent community values and local opportunities in planning	Put integrated water management into practice

The United Nations Sustainable Development Goals (SDG) provide a common overarching framework to deliver community wellbeing and a more sustainable future for all people of the world. *Water for Victoria* recognises Victoria's role as a global citizen and notes that the Victorian water sector will contribute to the United Nations SDGs particularly on 'clean water and sanitation' and 'sustainable cities and communities.

Figure 3 presents the United Nations SDGs of relevance to Victorian urban water corporations such as Westernport Water.

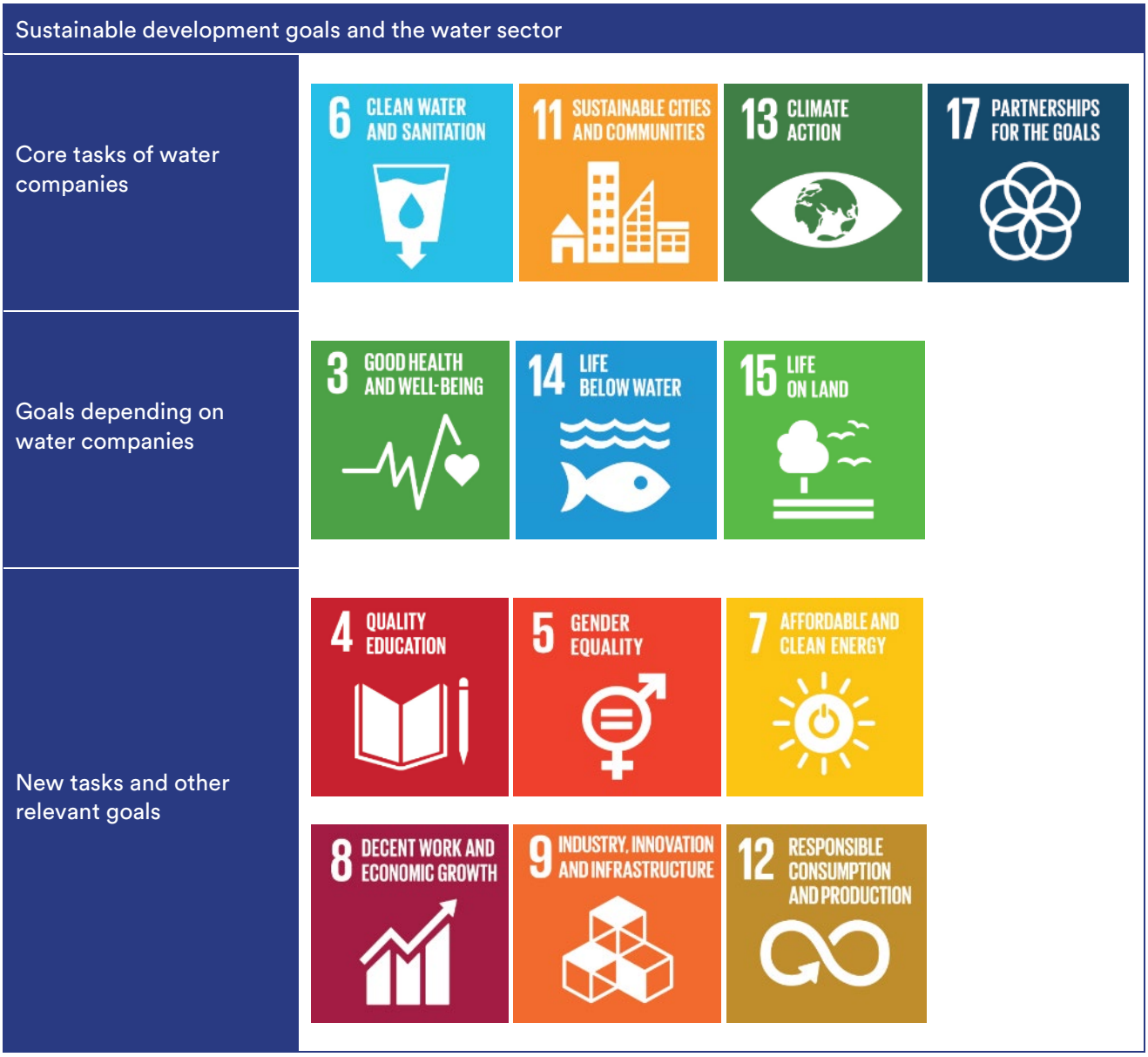


Figure 3 United Nations Sustainable Development Goals of relevance to Victorian urban water corporations (source: https://sdgs.un.org/goals)

2022 Urban Water Strategy development

Westernport Waters 2022 UWS builds upon the previous 2017 UWS, using the most recent consumption and water resource information, as well as consultation with our community. In developing this UWS, we have applied the latest guidelines issued by the Minister for Water for the development of the 2022 UWS, to ensure a consistent and rigorous approach for strategy development.

To date, development of the strategy has involved:

- Review of the water supply security of Westernport Water, including the level of service we will provide customers;
- Updating water demand forecasts based on current information about water consumption trends;
- Updating water supply forecasts (system yield) based on current supply infrastructure, and updated climate information outlined in the *Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria* (2020);
- Consideration of demand management and additional supply options that will allow Westernport Water to meet our strategic objectives;
- Extensive consultation with the Westernport Water community regarding preferences, priorities, concerns and values. Over 1,100 customers participated, reflecting approximately 5% of our customer base;
- Update of the Drought Preparedness Plan (DPP).

The final strategy incorporates feedback from DELWP and Westernport Water customers, a summary and key findings has been presented to the Board, and submitted to the Minister for Water by 31 March 2022.

Previous water strategies

Westernport Water's first Water Supply Demand Strategy (WSDS) was released March 2007, with a subsequent WSDS released in 2012 and an UWS released in 2017.

The 2007 WSDS identified demand management actions and options for securing additional water in the context of the drought conditions at the time. Following the development of the 2007 strategy, a number of the identified options were implemented. This included the connection of new supplies from Bass River and groundwater bores located in the Corinella Aquifer, as well as a range of water conservation actions.

The 2012 WSDS included two key supply upgrade commitments first identified in the *Central Region Sustainable Water Strategy*:

- Westernport Water committed to an upgrade of Candowie Reservoir to increase the storage capacity of the reservoir to 4,463 ML. Associated with this upgrade was an amendment to the bulk entitlement (BE) governing Westernport Water's diversion of water from Candowie Reservoir, the most significant change of which was the inclusion of environmental flow release requirements to mitigate the impact of raising Candowie Reservoir on the downstream environment. The project to upgrade Candowie Reservoir is now complete.
- Westernport Water was granted an entitlement allocation of up to 1,000 ML/yr under Bulk Entitlement (Melbourne Headworks System – Westernport Water) Order 2010 from Melbourne's Water Supply System. The 2010 bulk entitlement was repealed in 2014 and Westernport Water now holds water in the Melbourne system under the Bulk Entitlement (Greater Yarra System – Thomson River Pool – Westernport Water) Order 2014. The Westernport Water system is now connected to the Melbourne Water Supply System by installation of Desalination Point 6 (DP6) on the desalination pipeline.

The 2017 UWS included a greater focus on the sewerage systems operated by Westernport Water, while a decision was made to remove the groundwater supply as an available supply source for yield modelling, with the groundwater supply only to be used as an emergency water source. Further information was also available with the commissioning of the connection to the Melbourne water supply, this strategy includes an allowance from the Melbourne water supply enabling a more reliable assessment of potential supply arrangements.

Overview of Westernport Water

Westernport Water provides water and wastewater services - wherever economically, environmentally and socially practicable - to properties and communities throughout its district. Westernport Water provides services to 22,000 permanent customers (100,000+ in peak holiday periods) in an area covering 300 square kilometres, encompassing Phillip Island and the district stretching from The Gurdies to Archies Creek, as shown in Figure 4.

San Remo community

Water supply system

Westernport Water has access to a diversified water supply. Water is sourced from various Westernport Water managed supplies including:

- Tennent Creek catchment via Candowie Reservoir;
- Melbourne water supply system managed by Melbourne Water, via a connection at DP6;
- Bass River diversions;
- Groundwater bores in the Corinella Aquifer (emergency supply only).

In addition to traditional water supply and wastewater services, Westernport Water also produces recycled water from its treatment plant at Cowes and has upgraded the plant to supply Class A recycled water for dual-pipe systems and other community and commercial uses.

Wastewater systems

The wastewater system is divided into three catchments: Phillip Island (including San Remo), the waterline townships on the mainland including Grantville and the third covering Kilcunda/Dalyston. Westernport Water operates two treatment plants, the main Cowes Wastewater Treatment Plant (CWWTP) located in the middle of Phillip Island that treats approximately 85% of sewage, and the other King Road Wastewater Treatment Plant (KRWWTP) located at Coronet Bay treating approximately 15%. Under an agreement with South Gippsland Water, Kilcunda and Dalyston wastewater is transported and treated at the Wonthaggi Treatment Plant.

Disposal of the treated wastewater varies with the CWWTP operating an ocean outfall into Bass Strait at the southern tip of Phillip Island. KRWWTP irrigates all the treated wastewater on Westernport Water's own farmland at Coronet Bay or to surrounding farms.

Class A recycled water is produced at CWWTP and reticulated around the reuse network across Phillip Island and to the residential area in Cowes and Ventnor. See Figure 14 for the extent of this network and the major properties and developments that currently use Class A recycled water.

Class C recycled water is produced at both Cowes and King Road to irrigate on site tree plantations and crops. Irrigation customers are being sought to expand the system to provide appropriate uses for this water.

In June 2020, Westernport Water completed a 2-year trail to supply Class B recycled water from the CWWTP to a neighbouring farm. The agreement is ongoing.

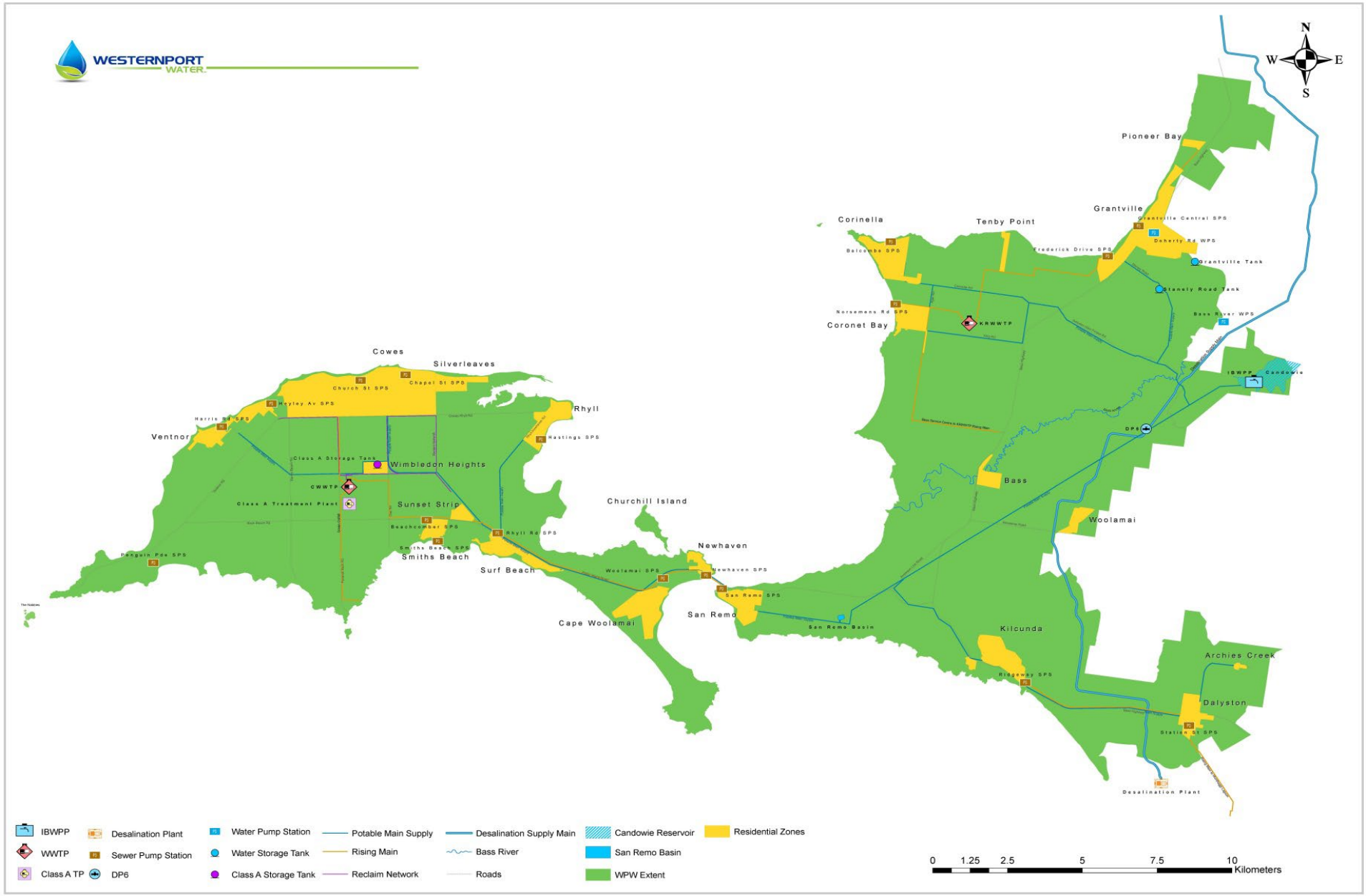


Figure 4 Westernport Water service area

Urban Water Strategy objectives

The strategic objectives of Westernport Water's UWS are to:

- Balance supply and demand at the lowest practical cost;
- Provide our customers with a reliable supply of water;
- Support the health of the local environment in which we operate; and
- Ensure that the UWS has the support of our customers and other stakeholders through community consultation.

Balancing supply and demand at the lowest practical cost

Westernport Water has access to a range of water supply infrastructure and water sources from which it can draw from. Each of these water supplies has a different cost associated with it. The cost of water from the Melbourne's Water Supply System has now been set by Melbourne Water, and is similar to water sourced from local supplies managed by Westernport Water. To effectively balance supply and demand, while balance cost impacts, Westernport Water intends to maximise the use of water available from catchment inflows to the upgraded Candowie Reservoir. When catchment inflows are predicted to not be able to meet system demand, Westernport Water will source water from the Melbourne water supply system, or from the Bass River when available. The system is constantly monitored with triggers in place to guide when these sources are to be utilised well in advance of supply challenges.

Providing Westernport Water customers with a reliable supply of water

Westernport Water understands that a key element of meeting the needs of its customers is to provide a reliable supply of water, while balancing cost impacts to ensure affordability of our services is maintained. A reliable supply is one where customers can be confident of accessing the volume of water they require. Westernport Water intends to maintain the supply demand balance at a level where the need to restrict access to water by implementing water restrictions is minimised to levels that meet our customers' expectations.

Westernport Water has adopted a supply demand balance target that ensures (on average) water restrictions are not required in 95 years out of 100.

Supporting environmental health

Westernport Water is conscious that our operations can have an impact on the environment, so we are committed to protecting and enhancing the local environment in which we operate. This is achieved through investing in best practice technology and continually monitoring water and wastewater treatment plants and their surrounding environment. We also have an Environmental Management System to manage environmental risks and are actively working with local environment groups to maintain and improve the lands we manage.

Sustainability means that we consider the environmental, social and financial impacts of our decisions or projects – locally in the Westernport region, and globally when considering challenges such as climate change. Sustainability is a critical element in the provision of Westernport Water's water and wastewater services. We are committed to environmental sustainability in our activities and across the region. As we move to secure water supplies for all our customers in the long-term, Westernport Water will strive to cut the environmental footprint of our business.

Managing our precious water resources extends beyond our daily water supply and wastewater treatment activities. Our vision for a sustainable future includes ensuring our water catchments are managed to protect and enhance the topography, soil condition, pasture and tree cover, revegetation, and through producing recycled water as a product that benefits the broader community.

To meet the needs of the environment and achieve our vision, Westernport Water has worked with the Bass Coast Landcare Network for over 15 years. Works undertaken with Landcare include the Phillip Island Wildlife Corridor Project, launched in 1997 to develop a link between two important stands of remnant bushland that stretched across 16 km and 11 farms. A significant proportion of one of the bio-links runs through Westernport Water's Cowes Wastewater Treatment Plant. Westernport Water also provides access to the tree plantation at our King Road Wastewater Treatment Plant to Phillip Island Nature Park to harvest fodder for Koalas in their care.

We recognise climate change is a significant challenge for Westernport Water, the environment and our community. As a water business our performance is directly linked to the climate. We rely on rainfall in our catchments to fill our dams. When it's hot our customers typically consume more water and this places additional strain on treatment plants, pump stations and pipes. During intense rainfall events stormwater gets into our sewer network and can sometimes result in overflows to drains, rivers and streams. The climate is changing more rapidly than it has in the past and there is scientific consensus that the emission of greenhouse gases from human activity is driving this change.

Action on climate change must take two forms – Mitigation and Adaptation. Mitigation focuses on reducing greenhouse gas emissions to the atmosphere to prevent rises on global temperatures, while adaptation involves preparing for the impacts of climate change on our assets, people, planning and day to day operations. Following the *Water for Victoria* plan and Statement of Obligations (Emission Reduction), all 18 water corporations in Victoria are committed to reduce collective emissions by 42% from the estimated total sector baseline period of 2011 to 2016, by 1 July 2025. Westernport Water has set organisational targets for emission reduction of a 90% reduction by 2030 and Net Zero by 2035. Implementation of the Emissions Reductions Pledge included the installation of solar panels at the Corporation's Newhaven Office, King Road Wastewater Treatment Plant, Cowes Waste Water Treatment Plant and Church Street Sewer Pump Station, with a total expected annual solar generation of 108,300 kWh reducing energy and emissions.

Community consultation

Westernport Water has undertaken an extensive community consultation program in association with the 2023 Price Review regarding customer preferences, priorities, concerns, and values. Since September 2021, over 1,100 customers have taken the opportunity to provide detailed feedback to shape our future. This reflects approximately 5 per cent of Westernport Water's customer base.

Consultation was undertaken online and in person and included an Urban Water Strategy specific survey. Unless otherwise specified throughout the document, customer preferences have been adopted in developing this strategy. Detailed results from the survey are included as an appendix, however a summary of customer preferences for managing demand and supply are as follows:

- 63 per cent of customers favour drinking water that tastes and looks the same every time, over drinking water that may be more affordable and safe, but is variable.
- 66 per cent of customers favour affordability, over keeping community spaces green, even during dry periods and drought.
- 63 per cent of customers favour affordability with occasional water supply interruptions, over more costly water services with minimum water restrictions.
- 81 per cent of customers value better protecting the natural environment we live in for the future, over improving affordability by delivering less environmental protection.
- Customers believe that using water to support healthy waterways, environment and urban amenity outcomes is the most important use of water beyond essential services.
- When deciding which water source to use, customers would prefer that the decision is made based on minimising impacts to climate change.

- Customers are still overwhelmingly in favour of using enforceable water restrictions to manage demand when necessary, such as during a period of drought or during extended periods of low rainfall. Customers are also supportive of water efficiency programs for high water use sectors.

Other findings from customer consultation relevant to the Urban Water Strategy are as follows:

- Delivering water that tastes and looks the same every time was the highest rated priority for Westernport Water (out of 17).
- Adapting to climate change and planning for future climate challenges was rated as the second-highest priority for Westernport Water (out of 17).
- Protecting and enhancing the natural environment was rated as the fifth highest priority for Westernport Water (out of 17).
- Avoiding water restrictions was ranked the least important responsibility for water corporations (out of 18), indicating that customers expect water corporations to proactively use water restriction to manage demand.

Traditional Owner engagement was undertaken with the Bunurong Land Council Aboriginal Council via the Central and Gippsland Region Sustainable Water Strategy. Where we have appropriate authority, Westernport Water will align its efforts to the following draft strategic actions that were identified:

- Increase Traditional Owner access to water entitlements
- Remove barriers to Traditional Owners' use of water
- Support partnerships between Traditional Owners and water managers
- Establish longer term goals for place-based, integrated land and water management.

Water supply and wastewater systems

Introduction

Westernport Water's water supply system is shown in Figure 4. The system has historically relied on Tennent Creek inflows to Candowie Reservoir for its potable water supply. Following the severe drought conditions experienced in the Westernport region in 2006/07, Westernport Water augmented its supply system to include an additional surface water supply from Bass River, and a groundwater supply from Corinella Aquifer. More recently, Westernport Water has increased the storage capacity of Candowie Reservoir doubling capacity in 2013, from 2,263ML to 4,463MLand also connected to Melbourne's water supply system.

This section details the existing water supply and wastewater systems, including associated water entitlements, and identifies the potential for upgrades to the existing infrastructure.

Water supply sources

Candowie Reservoir

Candowie Reservoir (Figure 5) is the primary source of supply for customers of Westernport Water. The reservoir is situated on Tennent Creek, a tributary of the Bass River about 8 km east of Grantville in the South Gippsland Basin. The reservoir catchment is a sub catchment of the Bass Catchment. It is approximately 1,900 hectares with an estimated 25 km of waterline. An open catchment comprising predominantly privately owned farmland, Westernport Water does not have control or management over the land within the catchment. Tennent Creek is the main tributary that feeds Candowie along with a minor tributary Tozar Creek, which enters Tennent Creek prior to entering the reservoir.

Candowie Reservoir was first commissioned in 1964 with a capacity of 1,130 ML. It was then raised 1.68 meters in 1978 to a capacity of 1,737 ML, and raised a further 0.80 meters in 1982 to a capacity of 2,264 ML. In 2013 the reservoir full supply level was raised a further 3.0 meters, doubling the storage capacity to 4,464 ML.

Candowie Reservoir is also used to store water supplied from the Bass River diversion and has historically been used to store groundwater from the Corinella Aquifer (refer below), noting that the groundwater supply is now only used as an emergency supply. Water from Candowie Reservoir is treated at the Ian Bartlett Water Purification Plant. Following treatment, water is pumped to San Remo basin and the Stanley Road tank for distribution to Westernport Water customers.

Westernport Water's use of water from Candowie Reservoir is governed by Bulk Entitlement (Westernport) Conversion Order 1997 as at September 2015, which allows diversions of:

- Up to 2,911 ML/yr from Candowie Reservoir;
- At a rate not exceeding 50 ML/day.

To mitigate the effect of increasing the storage capacity of Candowie Reservoir on the downstream environment, the following environmental releases are required from the reservoir. These environmental releases are intended to improve the river health of Tennent Creek and the Bass River.

- During the period from May to November inclusive each year, the lesser of—
  - 5 ML/day; and
  - the inflow to Candowie Reservoir from Tennent Creek; and
- During the period from December to April inclusive each year, the lesser of—

  - 0.1 ML/day; and
  - the inflow to Candowie Reservoir from Tennent Creek; and
- During the period from May to November inclusive, eight winter freshes of 7.5 ML/day for at least one day, with at least seven days between each winter fresh;
- The environmental releases may be discontinued if the level in Candowie Reservoir falls below 850 ML, but must resume when the level reaches 2,000 ML.

The environmental flows released are based on the requirements of the flora and fauna as identified in a Bass River flow study undertaken as part of the bulk entitlement (BE) amendment.

Figure 5 Candowie Reservoir

Bass River

Westernport Water holds an entitlement to divert water from Bass River at a pump station located on the Grantville – Glen Alvie Road, with the water transferred to Candowie Reservoir. Westernport Water's diversion of water from Bass River is governed by Bulk Entitlement (Westernport – Bass River) Order 2009, which allows diversions of:

- Up to 3,000 ML/year;
- at a rate not exceeding 25 ML/d between the months of May to November inclusive, subject to passing flow requirements; and
- with no diversions between the months of December to April inclusive.

The current pump station and transfer pipeline limit the daily diversion to approximately 16 ML/d. While the Bass River diversion is not a preferred supply due to its relatively high pumping costs and higher water quality risks due to the catchment, there is scope for Westernport Water to improve its utilisation of this resource by upgrading the pump station and transfer pipeline to allow diversions of up to 25 ML/d when the water is available. There are triggers in place to guide when pumping should be considered. This option is likely to increase greenhouse gas emissions, however, and will be subject to environmental design considerations that would mitigate the increase, as required in *Water for Victoria* Action 2.3 and the *Statement of Obligations (Emission Reduction)*.

Groundwater

Westernport Water holds a licence to extract water from the Corinella Aquifer, located within the Corinella Groundwater Management Area. Westernport Water has one deep production bore and three shallow bores (that can be upgraded within short notice in order to be used) in the Corinella area that extracts water from the aquifer, and transfers the water to Candowie Reservoir. This groundwater supply is only considered an option for emergency supplies.

The groundwater licence covering Westernport Water's extraction from Corinella Aquifer (Southern Rural Water, 2016 BEE050528) limits Westernport Water's extractions to:

- 490 ML/year; and
- at a rate not exceeding 3.65 ML/day, subject to specific pump operation rules.

The groundwater resource was developed as an emergency response to the critical water shortage experienced in the Westernport Water supply system during 2006/07. Since that time, the operation of the groundwater bores has been problematic, because:

- The operation of shallow bores are restricted by the characteristics of the aquifer and the effect on farmers stock bores.
- The deeper bore, while usable, has a high risk of seawater intrusion.

Based on these operating problems, Westernport Water has decided to only use the groundwater supply as an emergency supply, with the deeper bore used in priority to the shallow bores.

Melbourne water supply system

The Westernport Water system is connected to the Melbourne water supply system at a delivery point on the Desalination pipeline (DP6), as shown in Figure 6, with a transfer capacity of around 14 ML/d. When the Desalination Plant is operating, Westernport Water is able to supply water directly into Westernport Water's reticulation system without treatment. When the plant is not operating, Westernport Water can also access its allocations stored in the Melbourne water supply system by gravitating water back from Cardinia Reservoir.

Commissioning of the connection to the Melbourne water supply system has demonstrated that potable water can effectively be supplied to the Westernport Water reticulation system as an alternative to treated supply from the Candowie system. This has made the supply from the Melbourne water supply system a cost effective alternative which has no net impact on greenhouse gas emissions.

Westernport Water was granted an entitlement to an annual allocation of up to 1,000 ML from the Melbourne water supply system in 2010. In 2014, new bulk water arrangements came into effect for the Melbourne water supply system as a consequence of the Melbourne system bulk entitlement reforms. The purpose of the reform was to disaggregate and clarify the Retail Corporations' (City West Water, South East Water and Yarra Valley Water) and Regional Urban Water Corporations' (Barwon Water, South Gippsland Water, Western Water and Westernport Water) access to Melbourne's water resources. As an outcome of the Bulk Entitlement reforms, Westernport Water's entitlement was replaced with Bulk Entitlement (Greater Yarra System – Thomson River Pool – Westernport Water) Order 2014.

Under the new 2014 bulk entitlement, Westernport Water became a Primary Entitlement Holder of the Melbourne water supply system. This means Westernport Water has the right to a 1,000 ML entitlement share of the total resources available to the Greater Yarra System - Thomson River pool (624,310 ML). Water is made available to this entitlement by Melbourne Water through the seasonal determination process prescribed in the bulk entitlements. Water that is not utilised that year is then carried over and available for following years.

An additional share from the Melbourne water supply system currently offers the most cost-effective water source to meet any future supply shortfalls.

Figure 6 Westernport Water's desalination pipeline supply point (DP6)

Water treatment and distribution

The Ian Bartlett Water Purification Plant is located at Candowie Reservoir and treats all water supplied from Candowie Reservoir, noting supply from the Melbourne water supply system that does not require treatment. The maximum daily output of the plant is 20 ML/d.

Treated water from the plant is piped 37 km via a 650 mm diameter supply main to the main urban water demand centres in the region, with the capacity of the supply main being 28 ML/d. Offtake pipelines located along the main pipeline deliver water to other smaller urban areas on the mainland and to the rural areas west and south of Candowie Reservoir.

Table 2 summarises the major towns supplied through the Westernport Water supply system, together with population and connection information.

Table 2 Summary of Westernport region population and connections

Towns Supplied	Permanent Population (2016)[1]	Estimated Current Population (VIF pop forecast)[2]	Connections[3]		
			Residential	Non-Residential	Total
Grantville	931	925	16,543	1,109	17,652
Corinella / Coronet Bay	1,582	1,761			
San Remo	1,254	1,396			
Phillip Island	10,387	11,559			
Kilcunda	396	441			
Dalyston / Archies Creek	605	673			
Total System	15,055	16,754	16,543	1,109	17,652

[1] Based on 2016 Census Data (https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat)
[2] 2016 Census data multiplied by VIF (2019) population projection for Phillip Island VIFSA
[3] 2020/21 Westernport Water Annual Report

Wastewater system

Cowes Wastewater Treatment Plant (CWWTP)

The CWWTP has a maximum capacity of 7.5 ML/d with an average dry weather peak inflow of 6.8 ML/d. The peak inflow value represents the sewage inflows that are produced when population of the catchment is at its highest (peak season). The average wet weather peak inflow to CWWTP is estimated to be 12.1 ML/d, and indicates the effects of stormwater on wastewater flows. The CWWTP treated 1,439 ML sewerage, produced 367 tonnes of biosolids, 7.33 ML of Class B recycled water and 13.21 ML of Class C recycled water for the 2020-21 year.

The Master Plan for CWWTP shows that the short term planning to cater for increased flows due to population increase and to manage the peak high flows requires the following capital works implemented over the next 10 years.

The following projects were completed since the 2017 UWS:

- New clarifier to increase total clarifier capacity to 12 ML/day was completed in December 2021
- Replace existing return activated sludge and waste activated sludge pump stations

- Additional 55kW aerator in tank Bio Reactor 2
- Purchased 32 hectares of land for future irrigation

Capital works from 2023-2027 will include:

- Upgrade of the effluent transfer pumping system
- Replace Step Screen #1
- Replace 45kW with 55kW aerator
- Develop a “Cowes WWTP Master Plan 2050” considering future capacity (growth) up to 2050

King Road Wastewater Treatment Plant (KRWWTP)

The KRWWTP has a dry weather peak capacity of 0.94 ML/d with an average dry weather inflow of 0.55 ML/d. The average wet weather peak inflow to KRWWTP is estimated to be 1.3 ML/d, and indicates the effects of stormwater on wastewater flows. The main aeration tanks can be run in overload conditions to an 85 ML lagoon during peak wet weather flow. The disposal of the effluent on our own land is stored in a 200 ML winter storage. KRWWTP plant treated 247 ML of sewerage, produced 0.62 tonnes of biosolids and 98 ML of Class C recycled water for the 2020-21 year.

The current Master Plan for KRWWTP was developed in 2015 and identified capital works in the short term from 2018 - 2025.

Since the 2017 UWS the following works were completed:

- Installation of a permanent standby generator
- Purchased 16.7ha of land and developed further areas for irrigation
- Purchased spare motor for the 15kW high speed aerator

Capital works from 2023-2027 will include:

- Replacement of aerators with 15 kW low speed units
- Winter storage lagoon additional 60 ML (wetlands)
- Inlet screen replacement and upgrade
- Upgrade irrigation pump stations

Major Transfer System

The major transfer system is the cross Phillip Island system that transfers the wastewater from San Remo to the CWWTP and consists of five major pump stations and 15 kilometres of large diameter rising pressure main. The pumping stations are upgraded as needed on a replacement schedule when the components are at the end of their useful life. This will be monitored to determine the actual peak flows enabling short term upgrades to system components.

There are three large pump stations in the Cowes reticulation system (Ventnor to Silverleaves - refer Figure 4) that have served the system well for the past 50 years but have restrictions on their augmentation due to their location within residential zoned neighbourhoods. The long term plan for this area is to construct a large regional outfall pump station in a low density area that will transfer all the wastewater from the central, east and west pump

stations to the CWWTP. This is planned for implementation in the next 20 years but is dependent on the actual growth of residential or commercial tourist related developments or accommodation in the area. The first stage (which includes increasing sewer pressure main sizes) is scheduled to begin over the next 6 years as part of the capital works program.

Supply – demand balance

System water demand forecast

Approach to demand forecasting

As part of the development of this UWS, Westernport Water reviewed its water demand forecast to 2070. Water demand is typically difficult to forecast because it varies depending on weather conditions, changing population and water use behaviour. The Westernport region has an additional level of complexity associated with the large peaks in non-permanent population in summer and large number of tourists that visit the region. For the current update there is further uncertainty due to the changes brought about by COVID-19 in the way people work, and the potential for a proportion of the non-permanent residents to become permanent residents.

To reflect the uncertainty in forecast demand, Westernport Water developed a baseline demand forecast with an upper and lower bound to reflect a probable range of demand growth. These forecasts are based on historic water consumption, population growth projections for the area and recent trends in water use. Due to the high degree of uncertainty, the long term climate change impact on demand have not been quantified in these demand projections. Westernport Water will continue to work and gain a better understanding of growth and demand trends as it implements this UWS. Sensitivity testing showed the climate input in our demand model is insignificant when compared to the increase in demand during summer/change in property occupancy due to COVID-19, and would have less of an impact, compared to the 20% increase applied to the high demand scenario. This is an increase from the previous UWS where a 10% increase was estimated. Westernport Water will continue to better understand the impact of climate change on demand. Estimates from nearby towns in Gippsland indicate that there could be a 5% increase in annual demand under the High Climate Change scenario by 2065, and a similar increase in demand would be expected for the Westernport Water supply area.

Westernport Water are developing an approach to optimise the selection of supply. This included updating the existing monthly model to a daily model with increased functionality to incorporate:

- realistic flow capacities
- multiple supply modes
- operating and capital costs
- water trading
- GHG emissions
- optimisation functionality

Westernport Water will continue to refine this approach and will continue to better understand the impact of climate change on demand.

Westernport region population growth forecast

Westernport Water collects and reports on residential and non-residential connection data, and bulk, residential, non-residential and non-revenue water consumption. Population and dwelling growth data is available from Victoria in Future (VIF) 2019. The Westernport Water and VIF2019 data has been used to develop new demand forecasts for the period 2021/22 to 2069/70, noting the significant areas of uncertainty with demand forecasting in the Westernport region outlined above.

Westernport Water will continue monitoring population change and trends in water demand to gain a better understanding of water use behaviours in the region.

Connection growth rates

Westernport Water's number of residential connections has been increasing at an annual rate of around 2.0 per cent in recent years. Residential connections in the Westernport region are increasing at a greater rate than the estimated increase in population. This reflects a reduction in the number of people per household contained in the VIF population forecasts, and indicates that a proportion of the new residential connections have been holiday houses.

Growth in non-residential water connections has been increasing at an annual rate of around 0.6 per cent in recent years. Currently non-residential consumption constitutes approximately one third of total consumption and therefore changes to the number of non-residential connections may have a significant impact on water consumption in the region.

Annual growth rates of 2.0 per cent and 1.0 per cent have been adopted for forecasting residential and non-residential connections growth, respectively. The VIF2019 annual growth rate for occupied dwellings of 1.9 per cent for the period to 2026 and 1.8% thereafter has been included in the results as an alternative to the adopted growth rate of 2.0 per cent.

Recent trends in water consumption per connection

Analysis of Westernport Water consumption data has indicated a difference in the water consumption rates between new and old connections. On average, new residential connections use less water than existing connections. This observed difference between existing and new connections is due to new connections having improved water efficiency and typically smaller lot sizes then the existing connections. Similar differences have been observed in larger towns and metropolitan areas throughout Victoria, noting that the differences tend to be reducing as existing connections are retrofitted with more water efficient appliances and existing lots are sub-divided. The five year average for consumption per capita was 174 litres per day. In 2020-21 there was an increase of 94 litres to 238 litres per day due to non-permanent residents relocating to their secondary place of residence in our service area for a significant portion of the year. This was evident in the number of primary address changes required during that period.

Baseline demand forecast

The baseline demand forecast adopted for the 2022 UWS is shown in Figure 7 and has been developed based on recent observed demands and connection growth:

- Current annual unrestricted demand is 2,190 ML, based on the average demand over the past three years (2017/18 to 2019/20) (note that due to an anomalous non-revenue value in 2017/18 the 2016/17 volume was used);
- 2.0 per cent per annum increase in residential connections, based on actual residential connection growth over the five year period 2014/15 to 2019/20;
- 1 per cent per annum increase in non-residential demand;
- Annual residential water connections use 83 kL (based on the average residential water consumption per connection);
- Annual non-residential water connections use 579 kL (based on the average non-residential water consumption per connection), and
- 5 per cent non-revenue, based on combined residential and non-residential demand (i.e. operating losses).

Figure 7 shows Westernport Water's baseline demand forecast to 2070, segmented into the following key demand components:

- Residential;
- Non-residential;
- Public open space; and
- Non-revenue.

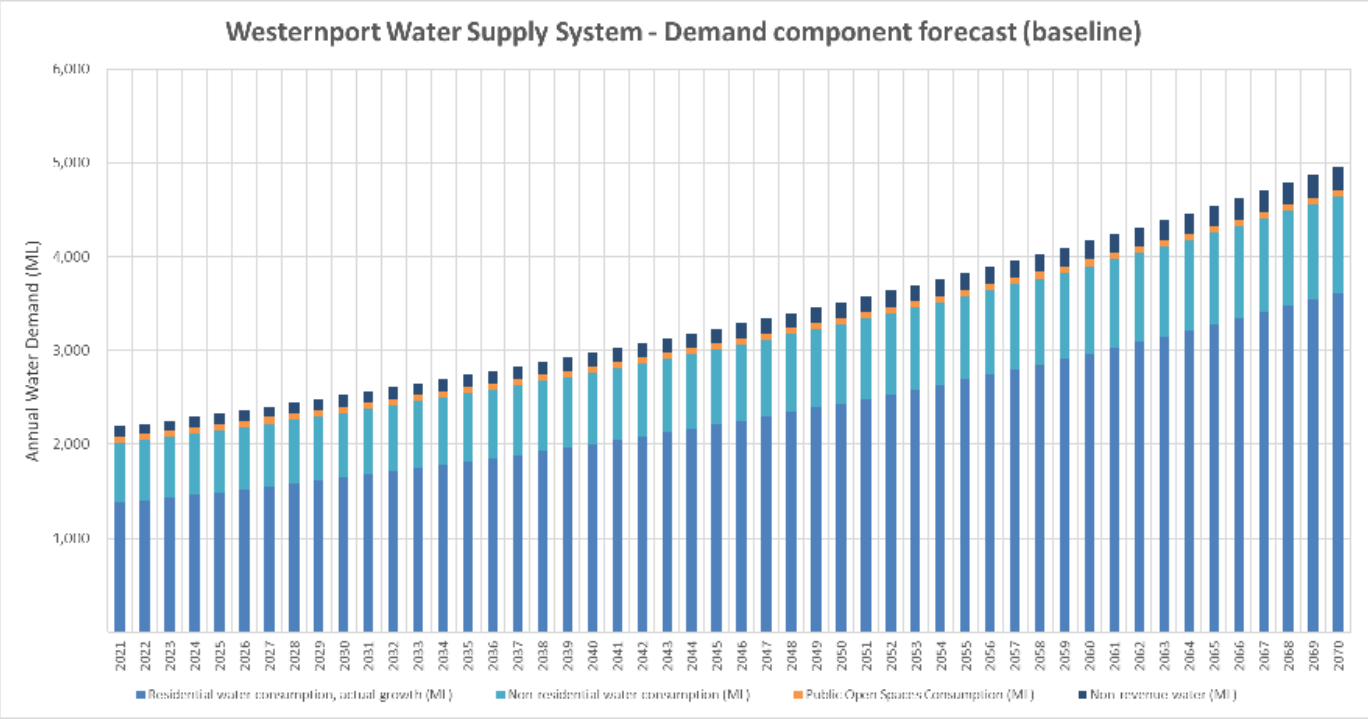


Figure 7 Westernport Water 2022 UWS baseline demand forecast with demand components

Uncertainty surrounding future water use behaviour

Recent trends in water use help develop a picture of future water use, however large uncertainties remain. There are some areas of uncertainty that Westernport Water will not be able to predict or manage, such as the impact of climate on water consumption, or future government water conservation policy. There is however scope for Westernport Water to improve its demand forecasts through better understanding consumer behaviour.

Areas where uncertainty in forecasting demand could be reduced include:

- differences in water consumption habits between permanent residents of the region and non-permanent residents;
- the potential of water tariff increases to reduce water consumption; and
- the scope for supplementing potable supply with alternative recycled water sources.

Westernport Water will engage with its customers to improve its knowledge of consumer habits and attitudes to water as well as water efficiency as an action of the 2022 UWS.

Upper Lower demand bound

To represent the uncertainty surrounding this forecast, upper and lower bands have been developed to represent a probable range of demand. The baseline demand forecast was developed on the following assumptions, and is shown in Figure 8:

A lower demand bound, shown in Figure 8, has been developed based on the following assumptions:

- Current annual unrestricted demand is 2,190 ML; and
- The baseline demand forecast with an applied factor of -10% to reflect uncertainty surrounding dwelling occupancy rates and water consumption per connections as a result of COVID-19.

An upper demand bound, shown in Figure 8, has been developed based on the following assumptions:

- Current annual unrestricted demand is 2,190 ML; and
- The baseline demand forecast with an applied factor of +20% to reflect uncertainty surrounding dwelling occupancy rates and water consumption per connections as a result of COVID-19.

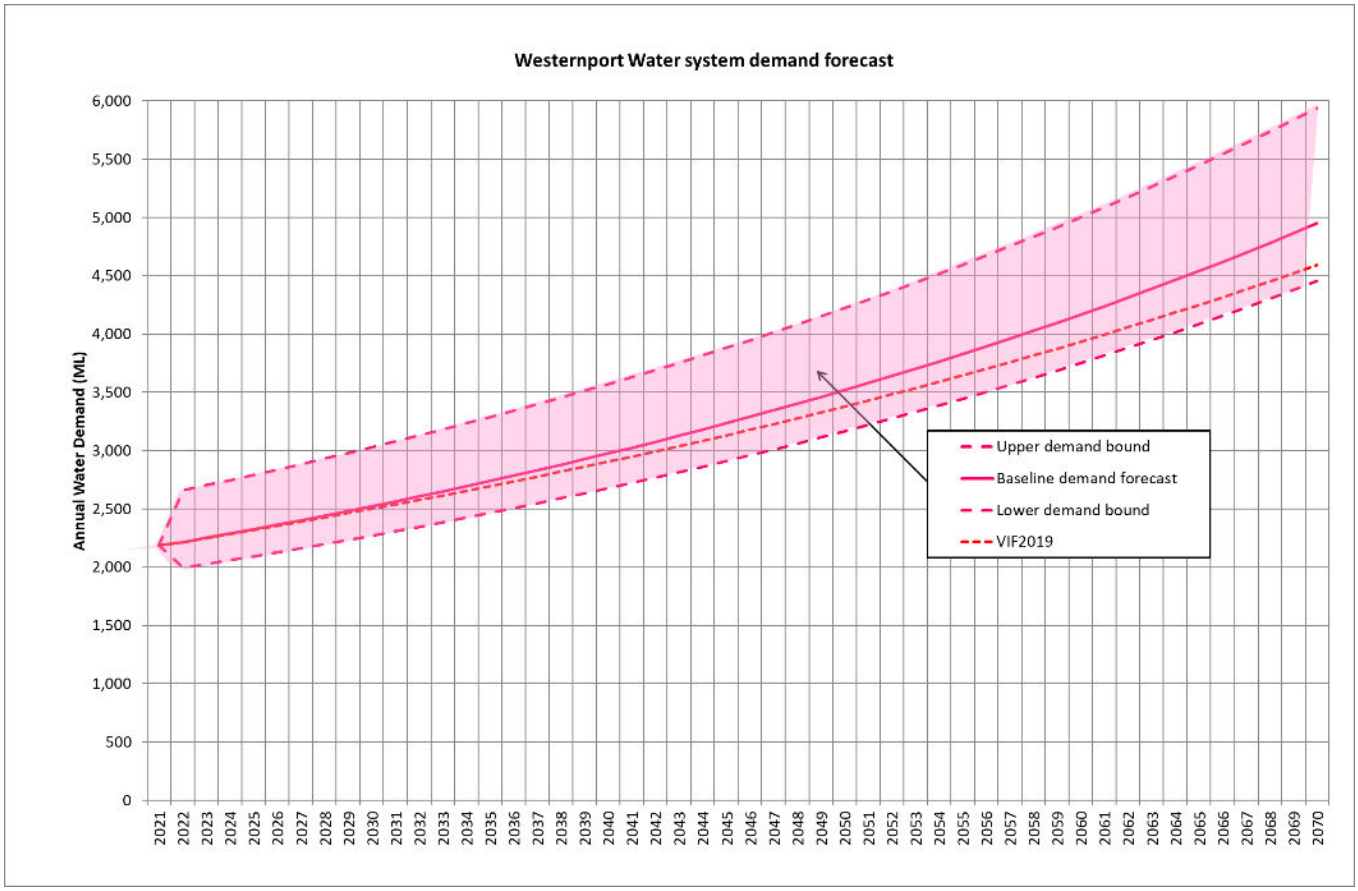


Figure 8 Westernport Water 2022 UWS demand forecast

The bands discussed above are shown plotted against the past five years of historical data in Figure 9

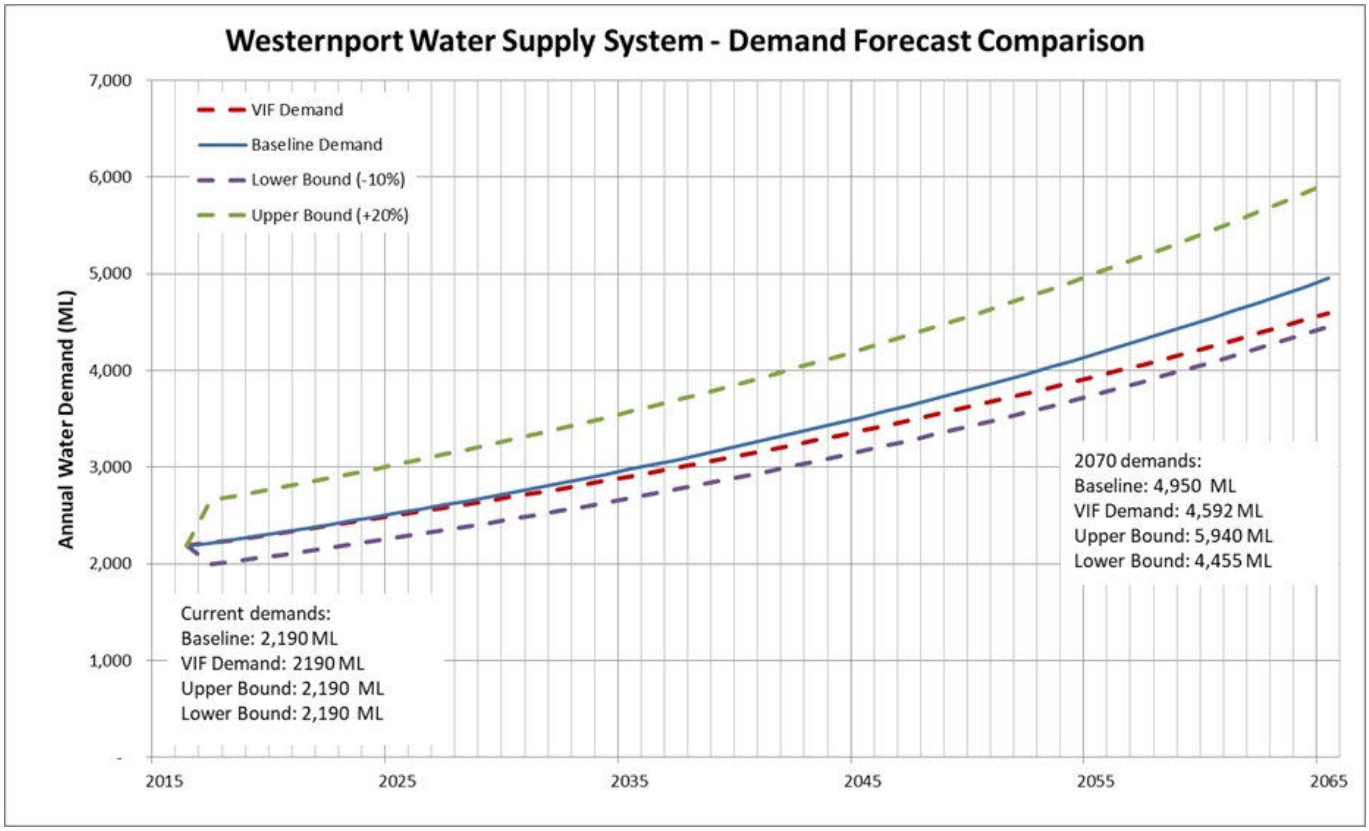


Figure 9 Demand forecast comparison with historical data.

System water supply forecast

System yield: how available water is described

For the Westernport region water supply system, yield is the average volume of water that can be extracted from the system on an annual basis without the imposition of restrictions more frequently than agreed (Westernport Water has adopted a level of service of 95 per cent annual reliability for its water supply). System yield is a function of system inflows, storage capacity and demand. Yield generally reflects the amount of supply available to meet demand in drier years. In average and wet years, more water will be available, while in very dry years (with restrictions) less water will be available.

Yield estimates were prepared using a daily Source model of the Westernport Water supply system. A large amount of work has gone into ensuring that the model accurately reflects the system infrastructure, entitlements and operating rules. This includes how Westernport Water operates the supply system under a range of different conditions.

Westernport Water has adopted a service level that water restrictions are not required in 95 years out of 100 to maintain a supply demand balance.

The minimum level of service is to supply Stage 4 restricted demands to urban customers.

Approach to supply forecasting

The yield of the Westernport Water supply system has been updated as part of the development of the 2022 UWS. The major influence on water availability is climate, although other factors including water infrastructure capacity and system operating rules (for example the provision of environmental flows in rivers), can also affect the availability of water.

For the purposes of the 2022 UWS, the Westernport Water supply system has been modelled to include all available supply sources, with the exception of the groundwater supply that Westernport Water has decided will only be used as an emergency water source. The details of the major supply infrastructure included in the yield assessment are contained in Table 3.

Table 3 Supply infrastructure adopted for supply forecast

Infrastructure	Status	Details
Candowie Reservoir (Tennent Creek)	Current	Storage: 4,464 ML Annual Entitlement: 2,911 ML Max diversion: 50 ML/d Treatment plant capacity: 22 ML/d
Melbourne water supply system	Current	Annual entitlement: 1,000 ML subject to seasonal water allocation, and any unused water in storage that was carried over from previous annual allocations.
Bass River	Current	Annual Entitlement: 3,000 ML Max diversion: 15.6 ML/d

Yield scenarios

Uncertainty relating to climate change has been incorporated into the yield assessment process by examining ten climate scenarios. These ten scenarios have been recommended in the 2020 *Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria* by DELWP to represent a bound of possible future supply, with climate change impacts applying to water sourced from Tennent Creek, Bass River and the Melbourne water supply system:

1. A Current Climate Baseline scenario based on historical inflows and climate conditions for the period from July 1975 to current, with the earlier period scaled down to match the post 1975 period

2. A Step Climate Change scenario based on historical inflows and climate conditions for the period from July 1997 to current, with the earlier period scaled down to match the post-1997 period

3. Low, Medium and High Climate Change scenarios at 2020, 2040 and 2065, based on the Current Climate Baseline (nine scenarios).

Yield modelling results

Figure 10 shows the supply forecast for the Low, Medium and High Climate Change scenarios. The figure also shows the Step Climate Change supply forecast. While there is no 'most likely' scenario, the Medium Climate Change supply forecast has been adopted for the 2022 UWS for planning purposes, with the Low Climate Change scenario representing the upper bound of the supply forecast, and the High Climate Change scenarios representing the lower bound. The supply forecasts assume a 5 year cap on unused water carried over in the Melbourne water supply system, meaning that supply available from the Melbourne system cannot exceed 5,000 ML 5 years was deemed an appropriate time frame to cap carryover for the system. Although this is not the case and carry over does extend beyond 5 years Westernport Water adopted a risk averse approach by capping the carryover at 5 years: being that the duration of this strategy is five years it was deemed appropriate. This will be monitored and reassessed in five years when the next UWS is constructed.

Due to the definition of yield, there can be a large difference between the supply that is available in a typical year and the service level-based yield, with the latter generally reflecting the amount of supply available to meet demand in drier years. At the time of preparing this UWS, the Westernport Water system is in a relatively secure position, with Candowie Reservoir relatively full and enough carryover in the Melbourne Pool to meet around two years of system demand. The lower yield estimates are based on a long term modelling assessment and reflect the annual demand that could be supplied with restrictions only needing to be implemented 5 years out of 100.

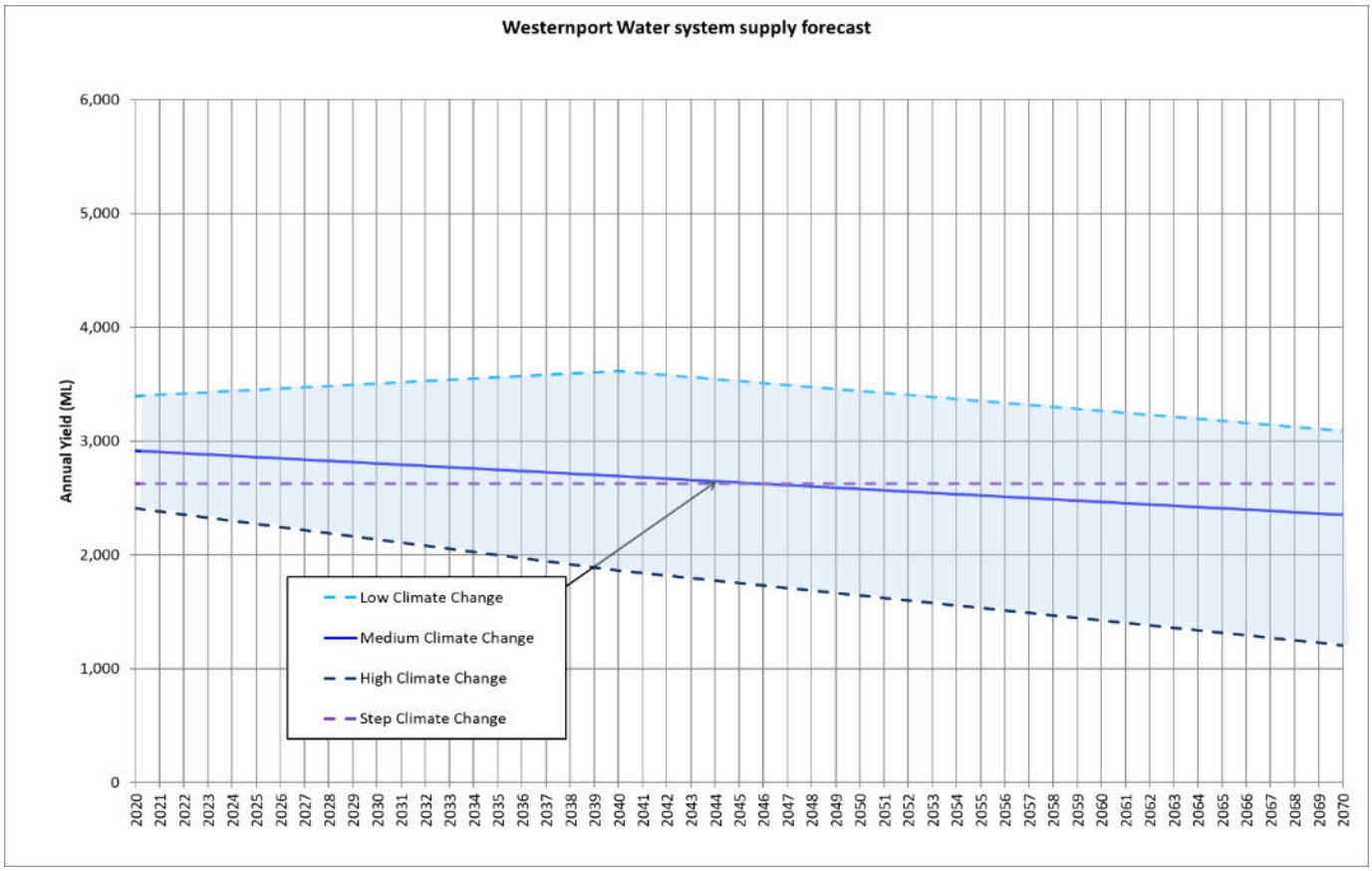


Figure 10 Westernport Water System yield forecast

Forecast water supply - demand balance

The forecast supply-demand balance for the Westernport Water system (based around baseline demand and a Medium Climate Change scenario) is shown in Figure 11.

Figure 11 presents the expected demand range due to the uncertainty in forecasting future trends, together with the supply range represented by the different climate scenarios. Due to uncertainties in estimating demand from the non-permanent population in the Westernport Water supply area, no attempt was made to develop estimates of climate-based demand, which can be used to quantify the impacts of future climate change on residential demand. Estimates from nearby towns in Gippsland however indicate that there could be a 5% increase in annual demand under the High Climate Change scenario by 2070, and a similar increase in demand would be expected for the Westernport Water supply area.

Augmentation due to water supply and demand

From Figure 11, the following scenarios have been assessed for system augmentation:

Under a high change scenario, if both the highest demand was maintained and high climate change reduces the available supply, system augmentation would be required in 2022.

Under an incremental change (base case) scenario, based on the baseline demand forecast and the medium climate change impacts on supply, system augmentation would be required in 2035.

Under a low change scenario, based on the lowest forecast demand and the least impact on the water supply due to climate change, system augmentation would be required in 2054.

Table 4 provides demand and supply options that would be implemented under each of the above scenarios.

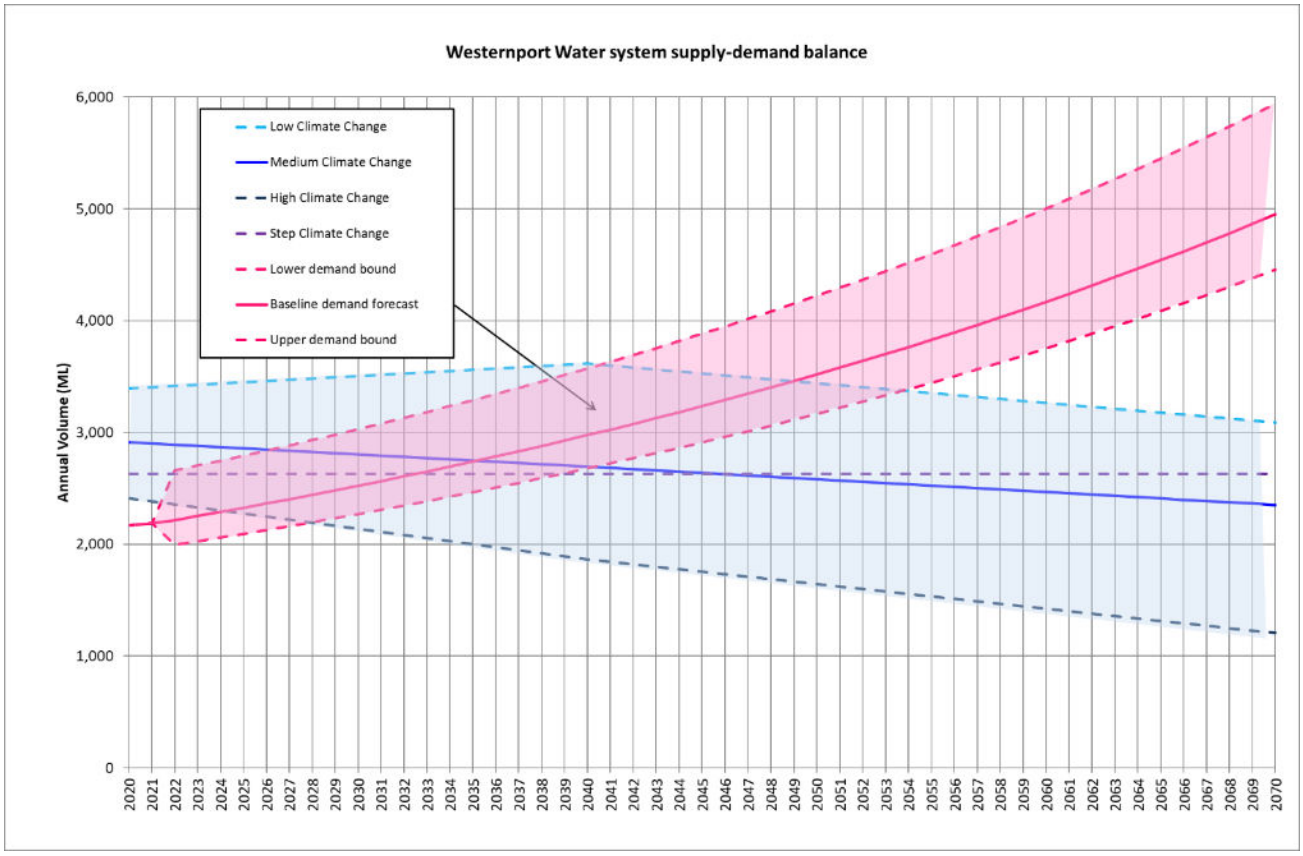


Figure 11 Baseline supply demand forecast

Table 4 Year of Augmentation for demand supply options

Scenario	Year	Demand Options	Supply Options
Incremental change (adopted base case)	2035	Provide education and public awareness of usage. Promoting water efficiency in and around the home, in industrial and commercial ventures.	Consider an increase entitlement from Melbourne water supply system. Increase the use of the current allocated Bass River entitlement through upgrading the pump capacity.
Low change (sensitivity scenario)	2054	Provide education and public awareness of usage. Promoting water efficiency in and around the home, in industrial and commercial ventures.	Consider an increase entitlement from Melbourne water supply system. Increase the use of the current allocated Bass River entitlement through upgrading the pump capacity.
High change (sensitivity scenario)	2022	Provide education and public awareness of usage. Promoting water efficiency in and around the home, in industrial and commercial ventures. Additional focus on recycled water options, through extension of Class A network and/or supply of Class B.	No capital investment required due to available resources including high carryover in Melbourne water supply system. Refer Table 5.

Table 5 Summary of Westernport Water's allocations and usage at January 2022.

	Annual Bulk Entitlement (ML)	YTD Allocation Issued (ML)	YTD Allocation Remaining (ML)	YTD Carryover (ML)
Tennent Creek	2,911	2,911	1,459	
Bass River	3,000	3,000	3,000	
Thomson-Yarra (Melbourne Pool)[1]	1,000	928	924	3,777

[1] As per monthly seasonal allocation determination from Melbourne Water (as of 1 January 2022).

	Average Monthly Consumption (ML)[2]	Total Available Resource (ML)[3]	Total Available Resource (months)
Supply Outlook	176	8,670	47

[2] Average annual consumption over four years (2016-17 to 2019-20) of 2,115ML/12

[3] Candowie Reservoir storage level + Thomson Yarra allocation remaining + Thomson Yarra carryover

Table 5 above provides a summary of Westernport Waters' allocations at January 2022. Total available resources in months is determined using an average monthly consumption figure. As can be seen Westernport Water is in a good position and is not experiencing impacts from the scenarios used particularly the high change scenario. The high change scenario reflects an unrealistic scenario whereby Westernport Water demand jumps significantly in the first year. This does not reflect the real demand forecast, rather the baseline is a more accurate reflection of Westernport Waters demand increase.

To date Westernport Water has only taken small volumes from the Melbourne System as part of the commissioning of the connection point with 253ML taken 2020-21 and 185ML in 2019-20. During 2020 Westernport Water has developed an operating protocol for the priority selection of source water. The daily model will enable Westernport Water to be more climate resilient and will take into account available supply, treatment costs and greenhouse gas emissions. This protocol will be further refined and enhanced during the period of this UWS.

System wastewater inflows forecast

Approach to inflow forecasting

As part of the development of this UWS, Westernport Water reviewed its wastewater demand forecast to 2070. The uncertainties are similar to the uncertainties with forecasting water demand. With variation due to weather conditions, changing population and water use behaviour. With the population forecasting particularly difficult due to the large peaks in (non-permanent) population in summer and large number of tourists that visit the region. Similar assumptions were made for the forecasting that was used for the water demand.

The peak wastewater flow was estimated through the analysis of daily flow data to each of the treatment plants, noting that peak dry weather flows typically occur in January in the peak tourist period. These peak flows were plotted with the capacity of each treatment plant to compare how much capacity the treatment plants have.

Initial sewerage inflow values adopted for the year 2020/21 were estimated using daily inflow data for the CWWTP and KRWWTP. An average dry weather peak inflow value was estimated by taking an average of the peak daily dry weather inflows in January over the years of 2018-2021. An average wet weather peak inflow value was also estimated to assess the impact of stormwater. By applying residential and non-residential proportions to the inflow values, the relative growth rates were also able to be applied and forecast sewerage inflows up until the year 2069/70.

The average dry weather peak inflows to the CWWTP and KRWWTP were estimated to be 6.8 ML/d and 0.86 ML/d, respectively. These values represent the sewerage inflows that are produced when population of each catchment is at its highest (peak season). The average wet weather peak inflow to CWWTP and KRWWTP were estimated to be 12.1 ML/d and 1.3 ML/day, respectively, and have been included in the results to demonstrate the effects of stormwater on wastewater flows.

Dry weather and wet weather projections have been compared against dry weather design flow capacities for each plant to highlight the need and urgency for treatment plant upgrades and/or EPA licence reviews in the future. The dry weather flow capacity for the CWWTP has been estimated as 7.5 ML/d, while the dry weather flow capacity for the KRWWTP has been estimated as 0.94 ML/d.

A plot of the dry weather and wet weather peak flow inflows to the CWWTP is presented in Figure 12, which also includes the estimated dry weather treatment plant capacity. It is noted that the Cowes WWTP has an EPA discharge licence with a maximum capacity of 8.6 ML/d. The forecasting shows that the capacity of the CWWTP can accommodate the inflows up to 2027. The CWWTP upgrade is underway with stage 2 construction of a 16ML clarifier completed in 2021-22 with further improvements programmed for 2023 and beyond. The $4.98 M project will provide additional treatment capacity to meet demand to 2036.

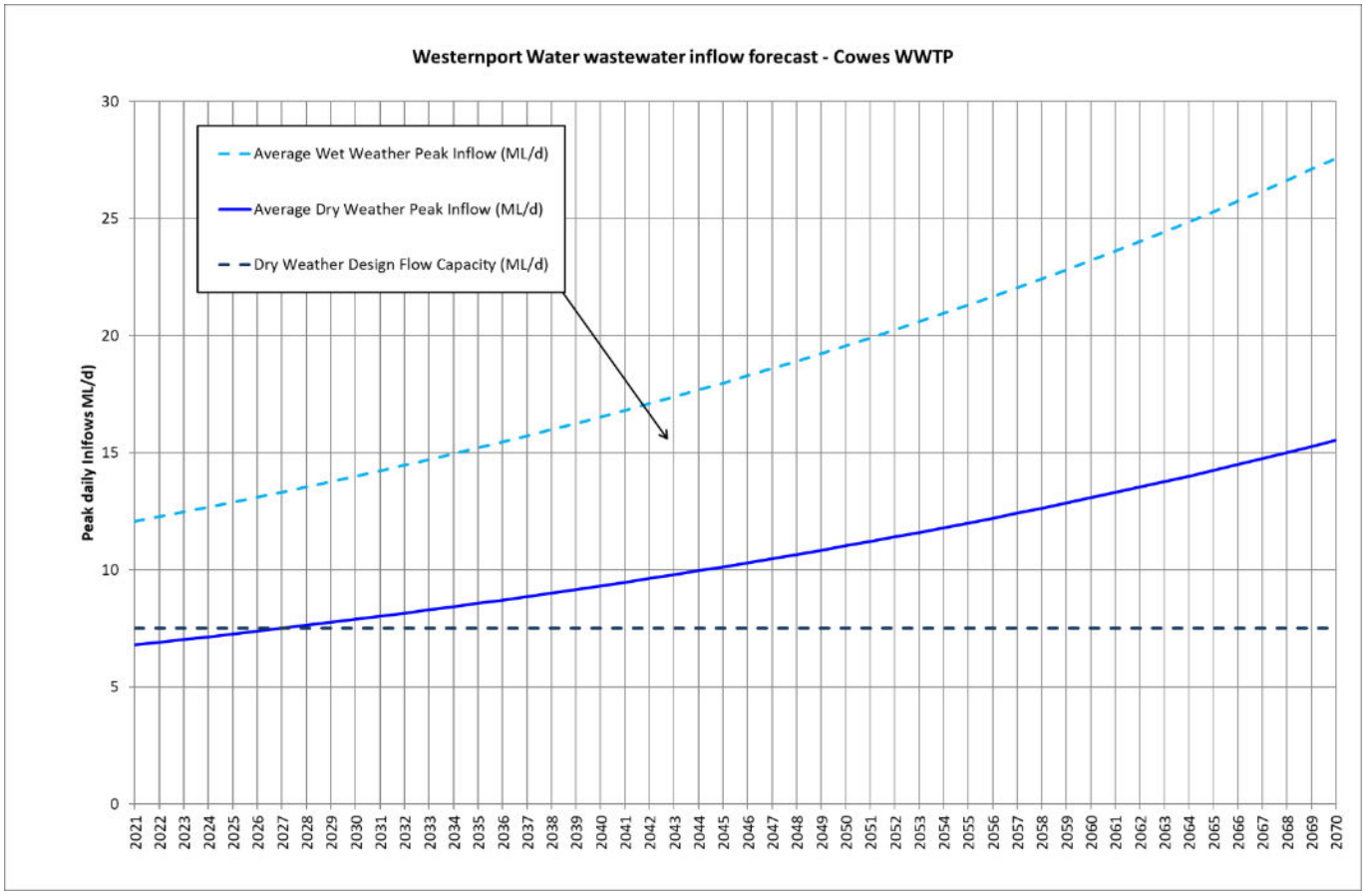


Figure 12 Wastewater inflows for Cowes WWTP

A plot of the dry weather and wet weather peak flow inflows to the KRWWTP is presented in Figure 13, which also includes the estimated dry weather treatment plant capacity. It is noted that the KRWWTP has land-based disposal of treated wastewater and can only discharge to a waterway under emergency conditions. The forecasting shows that the KRWWTP can accommodate inflows up to 2027.

The current Master Plan for KRWWTP was developed in 2015 and identified capital works to increase capacity. Future projects include a winter storage lagoon which will provide an additional 60 ML storage. Westernport Water were state winners of an industry award to investigate the potential carbon storage in a restored wetland filled with recycled water from KRWWTP. Westernport Water will progress the project to concept design and complete a business case comparing a wetland storage option with a traditional effluent lagoon, assessing cost and co-benefits for nature based solutions to increase treated effluent storage.

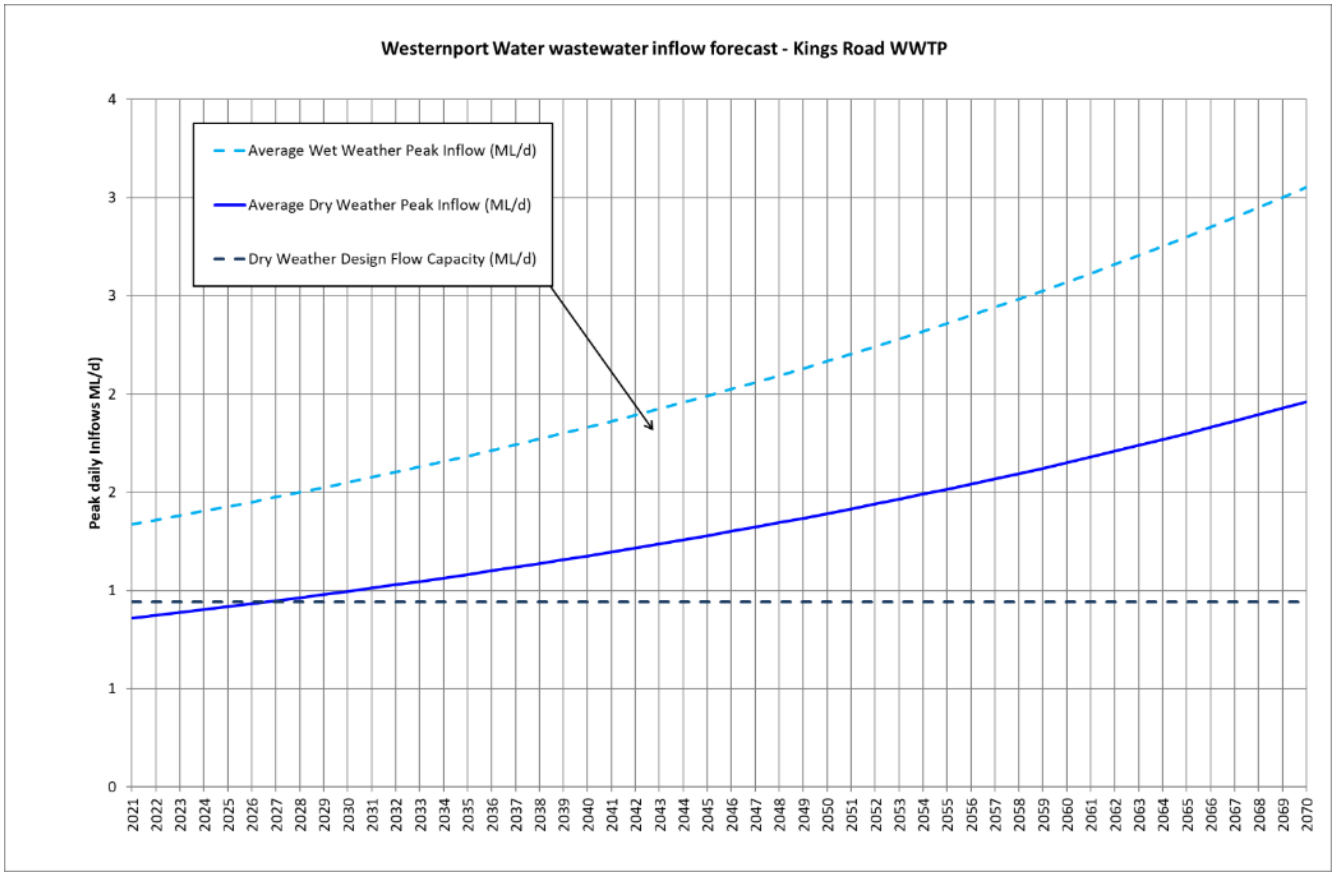


Figure 13 Wastewater inflows for King Road WWTP

Management of risk and uncertainty

Introduction

There are a number of risks associated with water service provision from the Westernport Water System (Candowie Reservoir), some of which are reflected in the supply-demand balance presented in the previous section, and some of which are shorter term in nature and associated with extreme events. It is important to recognise that some of these events, such as water quality problems caused by bushfire or blue green algal blooms, may result in a reduced level of service for the supply system, particularly where the operational management response to the events involves the introduction of water restrictions or other emergency supply measures. Westernport Water's supply source diversification means that water sourced from the Melbourne Water Supply System provides an alternative to supply from Candowie Reservoir.

This section identifies and assesses at a high level some of the key risks associated with the supply of water from the Westernport Water System.

Qualitative risk assessment

The key longer term risks and uncertainties associated with supply and demand in the Westernport Water system were incorporated in the baseline supply and demand forecasts presented in the previous section. The key uncertainty for supply (yield) is the potential impact of future climate change and variability, while the key uncertainties associated with demand are the rate of population growth in the region (particularly in relation to COVID-19) and long term water consumption trends. These uncertainties were addressed by presenting the forecasts as envelopes representing the plausible range of future supply and demand.

A high level qualitative risk assessment has been undertaken for the Westernport Water supply system, identifying the key risks that may affect supply security in the short to medium term. The results of this high level risk assessment are presented in Table 6.

An additional risk posed to water supply is reduced future access to supply sources. Water sources to the Westernport supply system are mostly accessed under Bulk Entitlements for Candowie and Bass River, and the Melbourne Water supply system (as a Primary Entitlement Holder). The groundwater supply is accessed under a licence, but this is only used as an emergency supply, so is not critical to long term reliability. While the Bulk Entitlement volumes are relatively secure, there is potential that the volumes could be reduced in the future to address imbalances between environmental and consumptive use identified in *Long Term Water Resource Assessments*. The 2019 *Long Term Water Resource Assessment for Southern Victoria* found there was no change in proportion of water available for the environment in the South Gippsland Basin, so at this stage it is considered that the risk of adjustments to entitlements in the short to medium term is low.

Discussion of risk results

For each of the defined risks, a risk level was assessed based on the likelihood and consequence of a given risk occurring. The assessed risk level also took into account the reliance of the supply system on a particular water source, and was adjusted for secondary or emergency supply sources. The supply security category considered the risk of short term failure of key infrastructure assets within the Westernport Water supply system, with short term failure taken to be a failure that can be repaired within two months, and can be managed in the interim through supplementary supply such as water carting.

For most of the defined risks, the risk level was assessed as being 'low'. The supply security risks associated with the short term failure of Candowie Reservoir, the Ian Bartlett Water Purification Plant (IBWPP) and the Candowie

transfer pipeline, was reassessed following the successful commissioning of DP6 and was reduced from moderate to low with an alternate source to Candowie Reservoir and IBWPP now available.

WPW has considered multiple risks occurring at the same time and has determined that it doesn't change the risk profile for what is included in the UWS.

Table 6 Key risks associated with water supply system

Risk category	Risk description	Detailed description	Assessed risk[1][2]	Rationale / comment
Climate change and variability	Climate change and variability	Impact of climate change and variability on catchment yield	High	Assessed through modelled yield scenarios
Extreme events	Extreme dry period Water quality event Bushfire Extreme wet event	Short and longer term impact of extreme events on water availability	Moderate	Access to diversified water sources can be used to mitigate impacts of extreme events. Corporate emergency response plan and business continuity plans in place.
Changing catchment conditions on yield	Impact of bushfires	Impact of bushfires in Candowie Reservoir catchment on system yield.	Low	Catchment largely comprises farmland
	Land use change	Impact of land use change (eg. plantations) in catchment on system yield.	Low	Major land use change in catchment unlikely
	Farm dam impacts	Impact of farm dam development in catchment on system yield.	Low	New farm dams will require approval from WPW
Groundwater yield	Seawater intrusion (deep bore)	Impact of seawater intrusion on deep bore.	Moderate Adj: Low	Only used as emergency supply
	Aquifer characteristics (shallow bores)	Impact of aquifer characteristics (including from surrounding users) on shallow bores.	High Adj: Low	Only used as emergency supply
Major asset reliability and limits[3]	Candowie Reservoir	Supply security impact from short term failure of Candowie Reservoir.	Low Adj: Moderate	Although plant is primary water source the Melbourne Pool can supplement.
	Water purification plant	Supply security impact from short term failure of IBWPP.	Low Adj: Moderate	Although plant is primary water source the Melbourne Pool can supplement.

Risk category	Risk description	Detailed description	Assessed risk[1][2]	Rationale / comment
	Transfer pipeline	Supply security impact from short term failure of Candowie transfer pipeline.	Moderate	Reliant on pipeline for primary water source
	Bass River Pump Station	Supply security impact from short term failure of Bass River Pump Station.	Moderate Adj: Low	Short term as all components can be replaced
	Bass River Transfer Pipeline	Supply security impact from short term failure of Bass River transfer pipeline.	Low Adj: Low	Secondary supply source
	Melbourne system connection	Supply security impact from short term failure of Melbourne system connection.	Low Adj: Low	Secondary supply source
Water quality	Impact of bushfires	Impact of bushfires in Candowie Reservoir catchment on water quality.	Low	Catchment largely comprises farmland
	Blue Green Algae (BGA)	Impact of blue green algae in Candowie Reservoir on water quality.	Low	Previous BGA blooms managed through standard procedures. Powdered activated dosing system at IBWPP was upgraded in 2021 to assist in removal of BGA if blooms increase. The connection to the Melbourne System also provides a secondary source. Catchment management at Candowie reservoir including extensive tree plantation since the reservoir wall was increased is also assisting in reducing nutrient run off to improve water quality. Westernport Water has also installed ultrasonic units in the reservoir to reduce blooms and a vertical profiler in 2020 to provide early warning of potential blooms.

[1] Assessed risk is high level and is based on the likelihood and consequence of a given risk occurring.
[2] Assessed risk also takes into account reliance of the supply system on a particular water source, with the risk adjusted where the supply source is secondary or emergency.
[3] Short term failure is taken to be a failure that can be repaired within two months, and can be managed in the interim through supplementary supply such as water carting.

Actions to maintain the supply – demand balance

Why action is required

The demand and supply balance shown in the previous section shows that Westernport Water has sufficient water to meet demand for the short to medium term. However, the balance presented above is a forecast only, and the actual supply and demand balance will shift every year depending on climate, population growth and water consumption habits. Westernport Water will therefore need to ensure it is continually monitoring the supply and demand balance, and undertaking actions to help manage this balance.

Demand-side actions

Water conservation

Westernport Water actively pursues water conservation to encourage our customers to monitor and reduce the use of water and to seek alternative water when suitable to reduce the dependence on potable water. Demand management is continually pursued by Westernport Water through water conservation initiatives such as:

- Improved system efficiency through leakage detection;
- Education and public awareness;
- Initiatives that promote water efficiency at home such as promotion of water efficient appliances, exchange programs;
- Improved commercial and industrial water use initiatives.

To assist with the development of demand management initiatives, Westernport Water intends to improve the organisation's understanding of customer water use behaviour and the uptake of the initiatives that have been run by Westernport Water and the State Government in recent years.

Westernport Water will actively pursue water conservation measures, including leakage detection, education and community awareness, as well as implementing water efficiency programs.

Substitution of potable supply with recycled water

Westernport Water supplies a number of its residential, commercial and agricultural customers with Class A recycled water, as shown in Figure 14. Class A recycled water provides an alternative, reliable and fit-for-purpose water source that can be used for non-drinking purposes such as toilet flushing, garden use and irrigation. On Phillip Island, recycled water also provides commercial customers with a guaranteed water supply that is not subject to permanent water saving rules or any restriction on use due to rainfall. Increasing recycled water use has the added benefit of minimising nutrient loads on the receiving environment. The community assets that are currently irrigated include Phillip Island Golf Club, football ground, Newhaven College School grounds and Phillip Island Nature Park grounds.

The Recycled Water Strategy adopted in 2018 includes targets for increasing the reuse of wastewater (as a percentage of total wastewater received) from a baseline of 19 per cent to 35 per cent by 2025 and 50 per cent by 2050. The strategy sets out a range of initiatives to meet these targets, including the trial of Class B recycled water for irrigation on a neighbouring farm and expanding irrigation at Westernport Water's two wastewater treatment plants. The recycled water strategy will be updated in 2022 with the opportunity to review targets and to explore further options to increase recycled water use.

In June 2020, Westernport Water completed a two year trial to supply Class B recycled water from the CWWTP to a neighbouring farm. A total of 28.8 ML was supplied over the 2018-19 and 2019-20 summer irrigation periods. This supply will now be ongoing and 7ML was taken in 2020-21.

During 2019-20 Westernport Water purchased additional land adjacent to the KRWWTP and CWWTP, allowing for irrigation to be expanded across both sites in order to meet 2025 reuse targets.

Westernport Water will continue to seek new customers for its Class A and B recycled water supply, relieving pressure on the potable supply and reducing outfalls to the ocean.

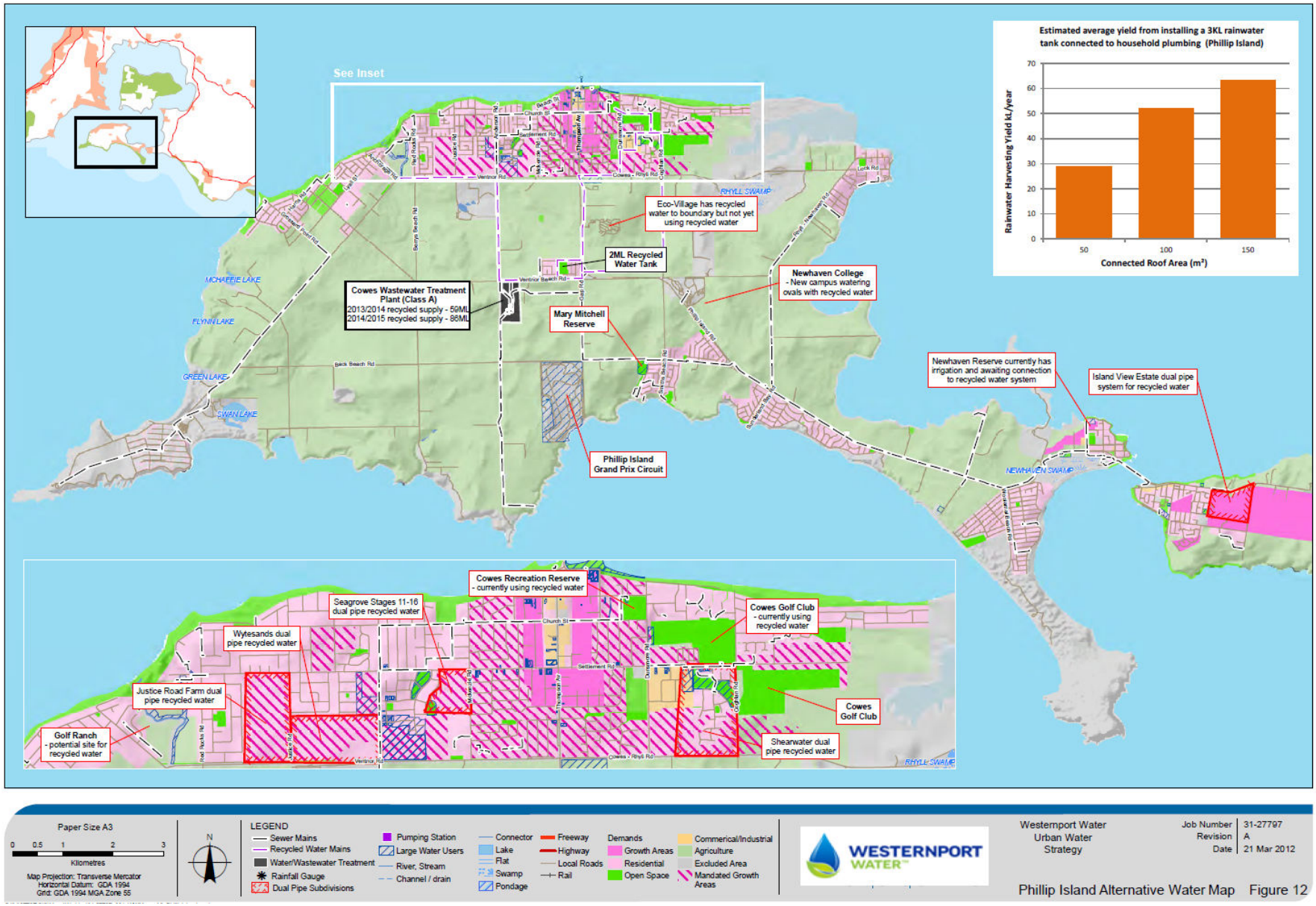


Figure 14 Phillip Island alternative water map

Supply-side actions

Since the severe drought conditions of 2006/07, Westernport Water has considered various supply augmentation and demand management options, with the major projects completed to date detailed in earlier sections. To improve the reliability of supply into the future, the following options could be considered for implementation when it is identified that augmentation is required:

Source additional supply from the Melbourne water supply system

Future imbalances in supply and demand could be managed through an increased entitlement from the Melbourne water supply system. Under the current Bulk Entitlement arrangements, Westernport Water would need to acquire an additional share from the system.

Westernport Water's current entitlement volume of 1,000 ML represents a share of an overall entitlement volume from the Melbourne water supply system of 624,310 ML. Westernport Water would need to acquire an additional share from one of the other Primary Entitlement Holders, either on a temporary or permanent basis. Any additional entitlement obtained via a trade of permanent water would require a change to the bulk entitlement to account for this.

Bass River pump station infrastructure improvements

The current Bass River diversion pump station and transfer pipeline do not have the capacity to harvest the maximum daily entitlement of 25 ML/d. The current capacity of the pump station is limited to 15.6 ML/d, and therefore Westernport Water cannot maximise the use of this resource. By increasing the transfer capacity, Westernport Water could potentially harvest additional water during higher flow events in Bass River and store it in Candowie Reservoir. This option is not planned for the UWS 2022. The operating costs and greenhouse gas emissions for this supply source are relatively high and the water quality can be of lesser quality then Tennent Creek. For these reasons this option is not planned.

The Bass River environment is not effected by the additional flows to Candowie Reservoir as the river produces peak flows up to 5,000 ML/d. The 25 ML/d flow extracted would have minimal effect as no outlet flows occur under 50 ML/d and the flow stops when the river flow falls below 40 ML/d. The procedure allows one day's bypass flow once 50 ML/d is exceeded.

Alternative water sources

The market for alternative sources of water is still being developed in the Westernport region, however it is expected to grow through the development of third pipe schemes, extension to new developments in the Cowes area, and new irrigation customers. In the immediate future, alternative water sources are most likely to reduce consumption by substituting current potable water demand. Community assets that are irrigated by the Class A recycled water include the Cowes Recreation Reserve, Phillip Island Golf Course, school ovals, community run garden for growing fruit and vegetables, nature parks and reserves in local neighbourhoods. This ensures that access to community assets is available even when the potable water supply is restricted during periods of drought.

In recent years, Westernport Water has also carried out a feasibility study utilising the principles of integrated water management to assess a range of options to service the new developments in San Remo and potential commercial sites in Newhaven. Considering the costs and benefits of all the schemes the recommendation was to utilise stormwater reuse. The study found that it was not financially viable to incorporate stormwater reuse into new developments, or retrofit stormwater reuse to existing residential areas. The ongoing assessment and uptake of alternative water supplies will continue to assist Westernport Water to manage peak demand of the potable water system by supplementing with a weather independent alternative water source where appropriate.

Option evaluation

Optimisation assessment modelling carried as part of the development of the 2022 UWS found that supply from the Melbourne water supply system is significantly more cost effective than supply from the Bass River diversion.

As such, additional supply from the Melbourne water supply system is currently considered the most cost efficient supply augmentation option, noting this may change over time. Given potential changes in the pricing of supply from the Melbourne system, both options should be assessed once the level of demand starts approaching the system yield.

There are two supply options that could be considered in the longer term to augment the system if required.

At present the preferred option would be to increase the water available from the Melbourne water supply system, either by a temporary allocation water trade or a permanent entitlement trade, which would increasing the current entitlement share and require an amendment to the bulk entitlement. This is currently the most cost-effective, lowest emission water source from the two options.

The second (non-preferred) option is to increase the usage of the Bass River entitlement up to 3,000 ML per year by upgrading the pump station and transfer pipeline to allow diversions of up to 25 ML/d when the water is available. The Bass River diversion is not a preferred supply due to its relatively high pumping costs and high greenhouse gas emissions. The pump and transfer upgrade option would be subject to environmental design considerations that would mitigate the increased emissions, as required in *Water for Victoria* Action 2.3 and the *Statement of Obligations (Emission Reduction)*.

If required to meet future demand increases, Westernport Water will consider seeking to acquire an additional share from the Melbourne water supply system, currently the most cost-effective water source. Should pricing of the supply from the Melbourne system increase significantly as a result of the current review, consideration will be given to the Bass River diversion option.

UWS monitoring and reporting

Westernport Water will actively monitor the supply demand balance as part of the implementation of this strategy. This monitoring will focus on comparing elements of supply and demand that may indicate if action is required to maintain the supply – demand balance, with measures summarised in Table 7.

The results of this report will be used to determine which, if any actions from the UWS or the Drought Preparedness Plans are required. This reporting will also form the basis of Westernport Water's Annual Water Security Outlook.

Table 7 Measures for monitoring the supply and demand balance

Measure	What this may indicate
Actual demand compared to forecast demand.	That demand is exceeding the forecast Demand tracking lower, baseline or upper.
Actual Candowie Reservoir inflows compared to modelled inflow scenario.	That available supply may be less than required.
Annual use of water from Melbourne Water Supply System and Bass River.	Increased use may indicate supply from Tennent Creek is not sufficient to meet demand.
Volume of water stored in Candowie Reservoir.	Indication of the volume currently available to meet supply in the short term (1 – 2 years).

Westernport Water will report against the assumptions that underpin the UWS annually to monitor deviation from the demand and supply balance forecasts.

Updating this strategy

As required Westernport Water under its Statement of Obligations, Westernport Water will update the 2022 UWS within five years of its submission.

Westernport Water will update the 2022 UWS within five years of the submission of the strategy.

Consolidated strategic actions

The actions that result from this UWS are highlighted in the boxes in the body of the report and are reproduced below in Table 8, for a consolidated list for easy reference over the life of the strategy. Adaptive Management will be used to update the actions from this strategy as required.

Table 8 Strategic actions for the UWS

Action	Description
Short-term actions (0 – 5 years)	
S1	Westernport Water's aim is to provide the lowest practical cost of water to its customers while ensuring a reliable water supply.
S2	Westernport Water has adopted a service level that water restrictions are not required in 95 years out of 100 to maintain a supply demand balance.
S3	Westernport Water will actively pursue water conservation measures, including leakage detection, education and public awareness and implementing water efficiency programs.
S4	Westernport Water will continue to seek new customers for its Class A and B recycled water supply, relieving pressure on the potable supply and reducing outfalls to the ocean.
S5	Westernport Water will report against the assumptions that underpin the UWS annually to monitor deviation from the demand and supply balance forecasts.
S6	Westernport Water will update this UWS within five years of the submission of the strategy.
Medium-term actions (5 – 20 years)	
M1	If required to meet future supply-demand shortfalls Westernport Water will seek an additional share from the Melbourne water supply system, currently the most cost-effective water source. Should pricing of the supply from the Melbourne system increase significantly as a result of the current review, consideration will be given to the Bass River diversion option.
M2	Westernport Water will actively pursue water conservation measures, including leakage detection, education and public awareness and implementing water efficiency programs.
M3	Westernport Water will continue to seek new customers for its Class A and B recycled water supply, relieving pressure on the potable supply and reducing outfalls to the ocean.
Long-term actions (20+ years)	
L1	If required to meet future supply-demand shortfalls Westernport Water will seek an additional share from the Melbourne water supply system, currently the most cost-effective water source. Should pricing of the supply from the Melbourne system increase significantly as a result of the current review, consideration will be given to the Bass River diversion option.
L2	Westernport Water will actively pursue water conservation measures, including leakage detection, education and public awareness and implementing water efficiency programs.
L3	Westernport Water will continue to seek new customers for its Class A and B recycled water supply, relieving pressure on the potable supply and reducing outfalls to the ocean.

Appendix A - Drought Preparedness Plan

Introduction

About this document

This is the 2022 update of Westernport Water's Drought Preparedness Plan (that includes the Drought Response Plan). It is included as an appendix to Westernport Water's 2022 Urban Water Strategy, with duplicate information removed. The Drought Preparedness Plan meets the requirements of the Statement of Obligations and the Water Restriction By-Law.

Context

Westernport Water was constituted on 22 December 1994 under the Water Act 1989. Westernport Water operates under the Statement of Obligations issued under Section 4(i) of the Water Industry Act 1994. The purpose of the Statement of Obligations is to clarify the obligations of Westernport Water, including the requirement in item 6-4 (Drought Response Plans for Urban Systems):

- To develop and implement a drought response plan for each water supply system operated.
- Make its drought response plans available to the public, and
- Review and if necessary amend the drought response plans at an interval of no more than five years or within 12 months of lifting water restrictions or any major change to water supply arrangements.

Drought Preparedness Plan scope

This DPP has been developed in parallel to Westernport Water's 2022 Urban Water Strategy. It is intended to be used by Westernport Water to guide the organisation in making decisions about appropriate actions to manage potential water shortages. As all water shortage situations are different, this DPP should be used as a guide only, and adjustments should be made based on the specifics of each water shortage event.

The DPP has been developed based on the current Westernport Water supply system using the information available at the time of its development. This DPP should be reviewed and updated following any significant changes to the Westernport Water supply system or demand and supply information, with no system augmentations planned in the short to medium term.

Westernport Water's Drought Response Plan (DRP) was developed in 2012 and revised in 2017. The 2022 DPP has incorporated the objectives of the previous DRP and includes the new DRP, as well as any actions that are still relevant to the current Westernport system.

Drought Preparedness Plan purpose and objectives

The purpose of a DPP is to detail management actions to meet critical human needs during the following events:

- An extreme dry period; or
- A water quality event of an intensity, magnitude and duration that is sufficient to render water acutely toxic or unusable for established local uses and values.

A set of objectives is required for a DPP to enable it to have purpose and direction, and to allow for measurement of its effectiveness, with the strategic objective of this DPP to:

"Ensure timely warning of any water shortages which might occur as a result of future drought or water quality events and to be prepared to deal with such shortages when they occur".

This strategic objective will be met whilst also meeting specific planning and operational objectives, as detailed in Table 1Table .

Table 1 Planning and operational objectives

Planning objectives
Identify all necessary steps that need to be taken throughout a drought or water quality event, including clear triggers that instigate certain actions.
Create a framework for regular review, as the supply system alters or as more information becomes available, both prior to and following a drought or water quality event.
Establish methods for reviewing the plan both during and following the implementation of drought preparedness plan actions, and making adjustments where required.
Operational objectives
Ensure that a minimum supply of at least 60 litres/person/day (around 0.8 ML/d) is provided.
Ensure the most efficient use is made of water resources during periods of water shortage.
Ensure minimum flows are maintained to meet any downstream operational commitments or environmental requirements or community assets.
Provide clear indicators to ensure a reliable assessment of drought status can be made by Westernport Water.

Lessons learnt from managing previous droughts

The 1982/83 drought had major impacts throughout Victoria and it was necessary for Westernport Water to impose water restrictions. These restrictions were partially due to capacity constraints in the main supply pipeline, which has since been upgraded.

Through the early stage of the Millennium Drought (1997 – 2009), Westernport Water was able to avoid prolonged implementation of water restrictions, with storage levels in Candowie Reservoir dropping in summer but recovering each winter. There were two periods where Stage 1 water restrictions were introduced:

- December 1997 for five months; and
- August 2003 for two months.

The severe period of low inflows in 2006/07 required Westernport Water to impose Stage 4 water restrictions and bring forward long term system augmentations. These augmentations included:

- Diverting water from Bass River to Candowie Reservoir; and
- Establishment of a groundwater supply from Corinella Aquifer.

The water restrictions that were implemented during this period were lifted in August 2008. During this time, Westernport Water staff resources were stretched trying to enforce restrictions.

Westernport Water also ran a campaign to educate the public regarding water restrictions,

Historically, Westernport Water had an agreement with South Gippsland Water to receive a supply from Lance Creek Reservoir. As this reservoir is also impacted by low inflows, Westernport Water no longer has access to this as a supply source.

Legal and institutional context

Water Entitlements

Westernport Water supplies water from its various sources under the provisions of the Water Act 1989. The quantity of water harvested, and the rate at which it may be taken, are governed by:

- Bulk entitlements governing surface water resources, and
- Groundwater licences governing groundwater resources.

The details of the bulk entitlements and groundwater licences held by Westernport Water are contained in the Urban Water Strategy 2022.

Permanent Water Savings Rules

Westernport Water introduced new Permanent Water Savings Rules (PWSR) in its Permanent Water Savings Plan in December 2011. PWSR were legislated under the Water Act 1989. The revised PWSR consist of five simple and easy-to remember rules, which ensure the efficient use of water and avoid water wastage on a permanent, ongoing basis. A summary of the PWSR is presented in Table 2.

As Westernport Water has already implemented PWSR, they are not an option for further demand management as part of this DPP.

Table 2 Permanent Water Savings Rules summary

	Hand held hoses - A hand held hose MUST be fitted with a trigger nozzle and be leak free. It can be used to wash your car and water your gardens and lawns at any time
	Residential or Commercial gardens and lawns – A residential or commercial garden or lawn can be watered with a hand held hose at any time, or by means of a watering system between the hours of 6pm and 10am on any day.
	Public gardens, lawns and playing surfaces – A public garden or lawn area or a playing surface can be watered with a hand held hose at any time, or by means of a watering system (fitted with a rain/soil moisture sensor) between the hours of 6pm and 10am on any day. Public gardens, lawns and playing surfaces can also be watered in accordance with an approved Water Use Plan.
	Fountains and water features – Water cannot be used in a fountain or water feature unless the fountain or water feature recirculates the water.
	Cleaning 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 a hazard or accident, or in the course of construction/renovation. Hard surfaces can be washed if staining to the surface has developed, but only once per season.

Water Restriction By-Laws

Mandatory water restrictions are an effective tool to manage water demand during periods of water shortages. Westernport Water currently has a four stage water restriction policy that is designed to restrict non-essential water uses such as garden watering and car washing. This policy is given legal effect under Model Water Restriction By-law No. 105, issued by the Minister for Water on 22 February 2012 under the Water Act 1989. This By-law is available on Westernport Water's website.

The current restriction policy defines four stages of water use restrictions with increasing severity. Under each stage of water restrictions, various non-essential uses of water are restricted or banned. As the water restrictions levels increases so do the limits on non-essential water use. The limitations that Westernport Water may implement under each stage of water restrictions are detailed in Model Water Restriction By-law No. 105.

Drought response options

Introduction

Drought response options can be classified into two broad categories of demand management and supply enhancement. In this section of the DPP, short term demand management and supply enhancement options will be considered.

Demand management

Demand management involves reducing the demand for water in the system and can be undertaken during general operations and more intensively during periods of water shortage.

Voluntary water conservation measures

Voluntary water conservation measures could be the first step in demand management. These consist of media releases to encourage users to conserve water and written approaches to the major water consumers to reduce water usage. The importance of public awareness, understanding and involvement is crucial to achieving voluntary water conservation.

As part of the update of its UWS 2022 and DPP, Westernport Water has updated its Annual Water Outlook to communicate the current water supply situation with customers, and educate them of the need for action.

The effectiveness of voluntary water restrictions is uncertain; while customer water use behaviour is believed to have altered significantly as a result of the Millennium Drought, it is not clear whether or how long this will continue.

Mandatory restrictions

Water restrictions are the next step in demand management during periods of water shortages. Westernport Water currently has a four stage restriction policy, and a set of drought response triggers to guide the timing of their implementation.

The implementation of water restrictions is based on Drought Response Levels (refer Section 7) that relate to the volume of water stored in Candowie Reservoir. When the storage volume falls below the drought response trigger points, Westernport Water may choose to implement water restrictions.

While future use under restrictions is difficult to estimate, the demand reduction detailed in Table 3 provides some guidance of potential savings, with estimates based on recorded demand data. The effectiveness of water restrictions can be increased through active and well publicised enforcement of restrictions. Westernport Water could direct additional resources to monitoring and enforcing water restrictions to improve their effectiveness during periods of extended implementation.

Table 3 Water restriction demand reduction estimate

Water restriction level	Annual demand reduction (%)	Estimation basis
Stage 1	3%	Interpolated between unrestricted demand and Stage 2
Stage 2	6%	Based on Sept 2007/Aug 2008 recorded consumption (12 months of Stage 2 restrictions), as a proportion of Sept 2008/Aug 2009 recorded consumption.
Stage 3	15%	Interpolated between Stage 2 and Stage 4
Stage 4	24%	Based on Sept 2006/Aug 2007 recorded consumption (10 months of Stage 4 restrictions), as a proportion of Sept 2008/ Aug 2009 recorded consumption.

Community education programs

Westernport Water can increase public awareness of the scope for reducing water use through the implementation of a community education program that links in with water efficiency initiatives being run by the state government. Westernport Water currently publicises government rebate programs and publications that assist customers in reducing residential water use. Increased publicity of these programs and publications can be used during a drought to help reduce water demand.

Supply enhancement

The purpose of supply enhancement options is to supplement existing headworks capacity during a drought situation when demand management options have proven to be inadequate. The supply enhancement options considered in this DPP are aimed at short term supply augmentation to compensate for low inflows, rather than permanent supply augmentations required to redress an imbalance between supply and demand. In past droughts additional groundwater bores (aquifers other than Corinella) have been used and additional water from South Gippsland Water storages via a connected pipeline.

Leakage prevention and reduction

Unaccounted for water has averaged around 6 per cent in the recent three year period. There are a number of factors involved: an example of which is mains flushing or illegal use of water, which would not generally be measured. There may be properties that are not metered or have illegal connections and others where the meters are not operating correctly. Westernport Water's ongoing meter replacement program is expected to reduce the metering component of unaccounted for water.

Leakage from pipes would only account for a proportion of the unaccounted for water volume. However, given the substantial volume, an investigation of leakage losses in the system does have the potential to increase supply security. An efficient response to burst mains can also minimise water losses and suitable procedures should be in place to respond to burst mains, especially during droughts.

Temporary trading from Melbourne Water Supply System

The Westernport Water system is now connected to the Melbourne Water Supply System at delivery point six on the Desalination pipeline. As a Primary Entitlement Holder of the system, Westernport Water receives a monthly allocation against its entitlement share (1,000 ML). During times of drought, it may be possible for Westernport Water to purchase additional allocation (short term measure) or entitlement (long term measure) from the Melbourne system on a temporary basis from other Primary Entitlement Holders. It is noted that this option is likely to be relatively expensive, as the other Primary Entitlement Holders would most likely be experiencing supply shortfalls themselves.

Increase pumping capacity from Bass River

Westernport Water is entitled to divert up to 25 ML/day of water from the Bass River. The existing pump station and transfer pipeline limit the daily diversion capacity to approximately 15 ML/d. Increasing the capacity of the Bass River transfer infrastructure would allow Westernport Water to harvest more water on the days where greater than 15 ML/d is available to be diverted. The benefit of this option is dependent on available streamflow, which will be reduced during a drought. The benefit will be realised during short high flow events that may occur during the drought and be a temporary short term augmentation.

This augmentation could be bought forward in the event of an extended drought period. This option is considered in Westernport Water's 2022 Urban Water Strategy as a potential future system augmentation to accommodate future demand growth.

Use of Corinella Aquifer groundwater resource

Westernport Water holds a licence to extract 491 ML/yr from the Corinella Aquifer, located within the Corinella Groundwater Management Area. In the event of a water shortage, Westernport Water could use groundwater from the deep production bore in the short term, subject to ongoing assessment of seawater intrusion. Should the supply of water from the deep production bore prove insufficient or the quality decline, upgrade works could be undertaken on the three shallow bores to enable their use. The three shallow bores are impacted by private bores in the surrounding area, so Westernport Water will need to work closely with Southern Rural Water to implement this supply action.

Emergency supply measures

In the event that Westernport Water cannot obtain sufficient water to meet demand during a drought, emergency supply measures will be required. This would include water carting or bottled water to some areas of the system and the distribution of potable water supplies to the community from a source outside of the Westernport Water system.

Comparison of drought response options

Each drought response option has different benefits and impacts associated with it. Table 4 provides a high level evaluation of each option; noting that Westernport Water should evaluate each option prior to its implementation to assess whether the impact associated with the option is appropriate for the level of benefit that can be expected.

Table 4 Comparison of drought response options

Option	Available supply / demand saving	Infrastr-ucture requiremen ts	Cost to Western-port Water	Social Impact	Environ-mental Impact	Comment
Voluntary water conservation	✓	✓✓	✓	-	✓	Volume of demand reduction unknown. Low cost option.
Mandatory water restrictions	✓✓	✓✓	✗	✗✗	✓✓	Impact to community will vary with restriction level.
Community education	✓	✓✓	✓	✓	✓	Volume of demand reduction unknown. Low cost option.
Leakage prevention and reduction	?	✓	✗	✓✓	✓✓	Volume of water savings unknown. May be insignificant.
Use of groundwater resource	✓	✓	✗	-	✗	Requires monitoring of seawater intrusion.
Temporary trading from Melbourne supply system	✓	✓✓	✗	✓	-	Infrastructure in place. Cost may be high.
Increased Bass River pump capacity	✓	✗	✗	-	✗	Requires upgraded infrastructure Environmental impact on Bass R.
Emergency measures	✓	✓✓	✗✗	✗	-	Not suitable for supplying large volumes of water.

Key: ✓✓ Positive impact / requires no additional investment
✓ Slight positive impact / requires minimal additional investment
- Neutral
× Slight negative impact / requires additional investment
×× Negative impact / requires significant additional investment
? Unknown impact

Pre-drought management actions

Westernport Water will consult with their customers and the Bass Coast Shire Council to reduce the demand for water and designate what community assets are important to the community at this time to allow exemptions to any water restrictions. These would be community not currently identified and not currently serviced by alternative water supplies.

Communication strategy will be implemented to reinforce the PWSR and to reduce demand to a targeted use in litres per person. Water conservation officers activated to advise customers how they can reduce their water use or use alternative water, where appropriate, where reuse water is available or to extend the reuse water system to the end user.

Drought response plan

Drought response action implementation

The drought response plan outlines actions that Westernport Water will take to monitor and respond to potential water shortages. The action plan is split into two operating modes:

Mode 1: Normal Operation, and

Mode 2: Drought Response.

The implementation of these modes is guided by the storage level in Candowie Reservoir. When the storage volume in Candowie Reservoir falls below Drought Response Level A, Westernport Water will commence the actions outlined in the Drought Response phase. When the volume stored in Candowie Reservoir is above this level, Westernport Water will implement actions under the Normal Operation mode.

Drought Response Level A is based on Westernport Water's current system operations, and represents the storage volume that Westernport Water aims to maintain Candowie Reservoir at or above. The Drought Response levels are detailed in Table 5 and shown in Figure 1.

Table 5 Drought response levels based on Candowie Reservoir level (ML)

Trigger	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Full Supply Level	4,463	4,463	4,463	4,463	4,463	4,463	4,463	4,463	4,463	4,463	4,463	4,463
Drought Response Level A	2,900	2,750	2,550	2,400	2,300	2,100	2,200	2,400	2,650	2,800	2,900	3,000
Drought Response Level B	2,650	2,500	2,300	2,150	2,050	2,000	2,100	2,300	2,550	2,700	2,800	2,750
Drought Response Level C	2,150	2,000	1,800	1,650	1,550	1,500	1,600	1,800	2,050	2,200	2,300	2,250

Drought Response Level D	1,650	1,500	1,300	1,150	1,050	1,000	1,100	1,300	1,550	1,700	1,800	1,750
Drought Response Level E	1,150	1,000	800	650	550	500	600	800	1,050	1,200	1,300	1,250

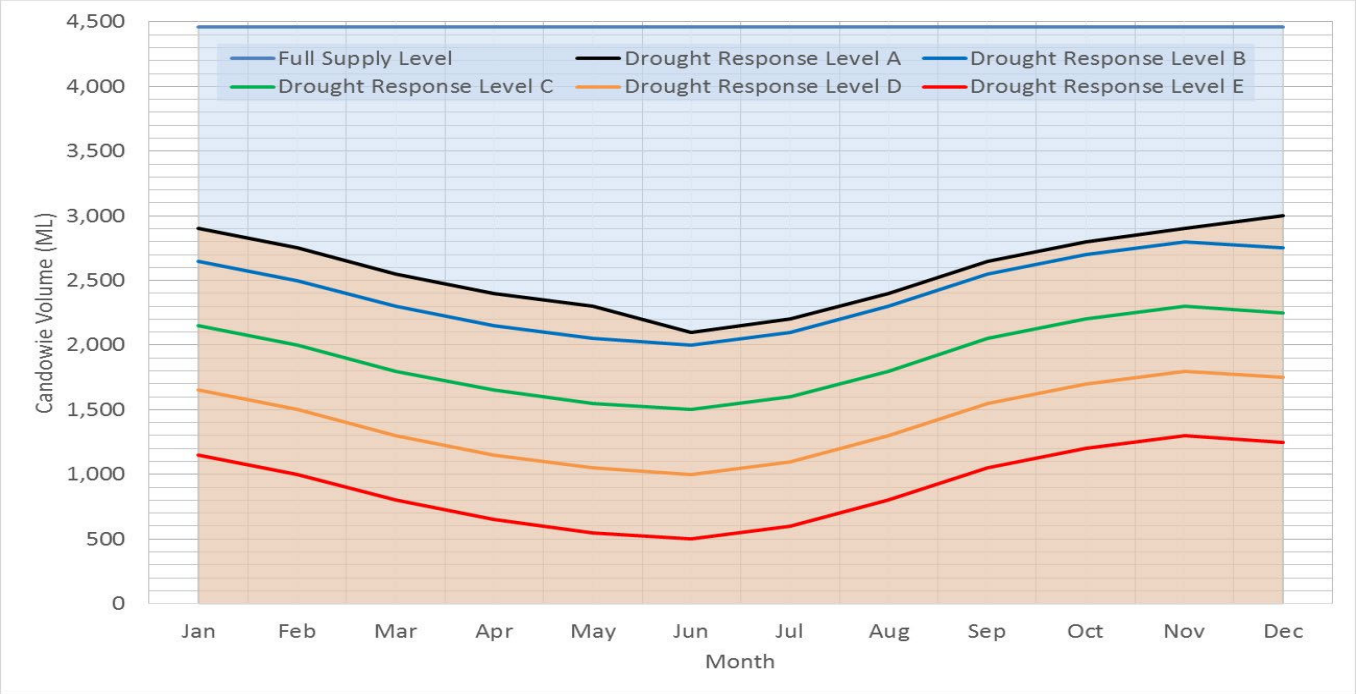


Figure 1 Drought response levels based on Candowie Reservoir level

Mode 1: Normal Operation

Implementation of Mode 1 (Normal Operation), when the storage volume is above Drought Response Trigger A, indicates that Westernport Water is not anticipating a drought event in the short term that will threaten the security of the region's water supply. In this mode Westernport Water will continue to monitor the following aspects of system security:

- Storage volume in Candowie Reservoir
- Inflows to Candowie Reservoir
- Climatic trends and seasonal outlooks published by the Bureau of Meteorology, and
- Water consumption and trends in water consumption behaviour.

Under this mode, the system status is updated on a monthly basis, and a report supplied to the General Manager – Assets and Operations.

Monitoring of the system status will also occur on an annual basis (in November) using Westernport Water's Annual Water Security Outlook. The Annual Water Security Outlook comprises a short term forecast and monitoring of supply and demand measures to identify departures from longer term supply and demand forecasts included in the Corporation's 2022 Urban Water Strategy.

Mode 2: Drought Response

Implementation of Mode 2 (Drought Response) indicates that Westernport Water considers it possible that a drought event may occur that could lead to a water shortage. The purpose of this mode is to allow Westernport Water adequate time to prepare for supply enhancement options and commence demand management actions in order to avoid further action.

Westernport Water will continue to monitor system security as detailed in Mode 1, however system status reports will be updated and provided to the General Manager – Assets and Operations on a weekly basis. Actions to be undertaken during Mode 2 are listed in Table 6. Any implementation or change of restrictions will consider the time of year, the expected weather and any reduction in demand. (In winter/spring no demand reductions for stage 1 or 2).

Table 6 Drought Preparedness Plan actions: Mode 2

Action	Trigger	Response
1	Candowie Reservoir storage volume at or below *Drought Response Level A*	• Convene drought response team comprising Westernport Water management and staff. • Provide weekly updates of system status to General Manager – Assets and Operations. • Commence community education campaign. • Promote voluntary water conservation measures. • Increase surveillance of water leaks and pipe burst within the system.
2	Candowie Reservoir storage volume at or below *Drought Response Level A* and supplementary water supply (Melbourne system and Bass River) increasing	• Promote voluntary water conservation measures and alert public to potential need for mandatory water restrictions. • Preliminary discussions with Melbourne Water and DELWP for potential temporary trade from Melbourne water supply system.
3	Candowie Reservoir storage volume at or below *Drought Response Level B*	• Consider implementation of Stage 1 water restrictions. • Increase community education programs. • Open water restriction advisory hotline. • Commence monthly storage level forecasting. • Weekly monitoring of Candowie Reservoir storage level. • Monitor water quality at Candowie Reservoir to ensure safety of the water supply during drought periods or low water level. • Commence monitoring of social, economic and environmental impacts of drought response measures. • Commence monitoring of effectiveness of water restrictions.

Action	Trigger	Response
4	Candowie Reservoir storage volume at or below *Drought Response Level C*	• Consider implementation of Stage 2 water restrictions. • Increase resourcing of water restriction enforcement. • Discussions with Melbourne Water and DELWP to implement temporary trade from Melbourne water supply system. • Commence planning for Bass River pump station and pipeline capacity upgrade. • Continue community education programs. • Continue monthly storage level forecasting. • Weekly monitoring of Candowie Reservoir storage level.
5	Candowie Reservoir storage volume at or below *Drought Response Level D*	• Consider implementation of Stage 3 water restrictions. • Commence use of groundwater from deep production bore, with assessment of water quality should this proceed. • If feasible, complete temporary trade from Melbourne supply system. • If feasible, commence upgrade of Bass River pump station and pipeline capacity. • Identify and plan upgrades for shallow groundwater bores. • Identify and plan for implementation of emergency measures. • Increase community education programs. • Continued enforcement of water restrictions. • Continue monthly storage level forecasting. • Daily monitoring of Candowie Reservoir storage level.
6	Candowie Reservoir storage volume at or below *Drought Response Level E*	• Consider implementation of Stage 4 water restrictions. • Consider use of shallow groundwater bores if supply of water from the deep production bore proves insufficient or the quality declines. • Increase community education programs. • Daily monitoring of Candowie Reservoir storage level. • Plan for emergency management measures.
7	Emergency supply required	• Commence emergency management measures.

Post drought assessment

Drought Preparedness Plan evaluation

Following the cessation of Drought Response operation, it is important to review the effectiveness of this DPP. The first part of the review should be to assess the suitability of the plan's objectives. Review each objective to

determine whether they were appropriate and achievable. If they were not, new objectives should be set and the strategy reviewed to align with them.

Document the results of all monitoring undertaken during the drought, actions taken and the results of these actions. Comments from staff members, consumers and key stakeholders should be sought to help inform the review of the strategy.

Specific items that should be considered are detailed in Table 7.

Table 7 Post drought evaluation items to be reviewed

Implemented actions
Were actions effective?
Were actions implemented in a timely manner?
Was appropriate time to make decisions regarding actions allowed in the plan?
Were there any water quality problems associate with the drought response actions?
Restrictions
Were the drought water response plans adequate?
Did consumers respond to requests for voluntary water conservation?
Were the target water consumption levels achieved for each level of response implemented?
What problems were experienced with drought response policies?
Was the enforcement of drought responses satisfactory?
What were the impacts on consumers, the corporation and the environment of these responses?
Monitoring
Was the information available adequate to plan an effective response?
What additional information would have assisted in refining the drought response actions?

Drought Preparedness Plan review

DPPs are dynamic in nature and will only be appropriate for a particular system for a short period of time. Increased demand for water or a significant system augmentation will make this existing plan obsolete. DPPs need constant revision to keep them up to date. At a minimum the DPP will be reviewed:

- Following the implementation of the plan
- Following a significant change in the supply system
- Following a significant change in the supply or demand forecast for the system, or
- At a minimum every five years.

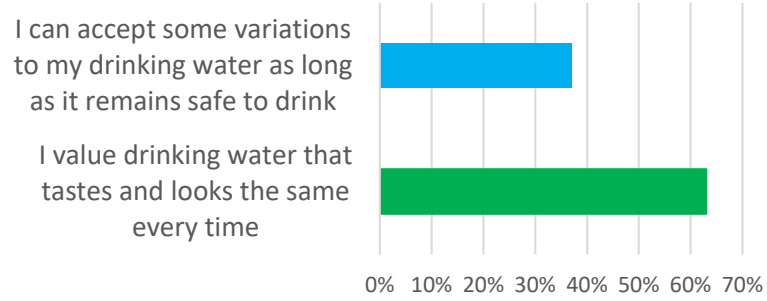
Appendix B - Customer Engagement Report

Customer Engagement Approach

Throughout the second-half of 2021, Westernport Water engaged with customers regarding their perceptions, priorities and needs. We've engaged with customers about their preferences for our water supply and expectations for managing demand and supply. This has included 1,183 customer surveys (approximately 5% of our customer base) and two face-to-face events. Key findings that are applicable to the development of our Urban Water Strategy are detailed below.

Affordability Trade Offs

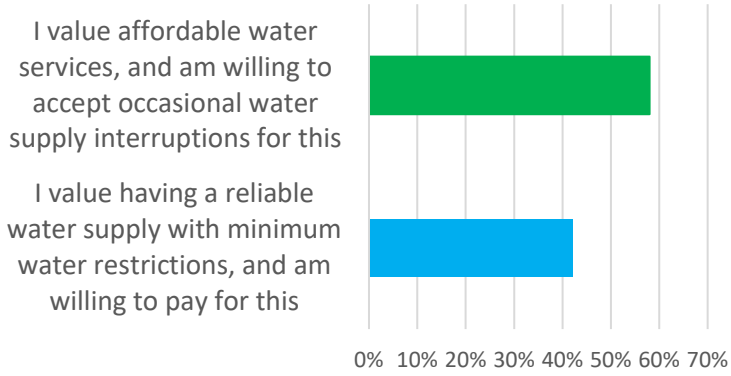
Water Quality



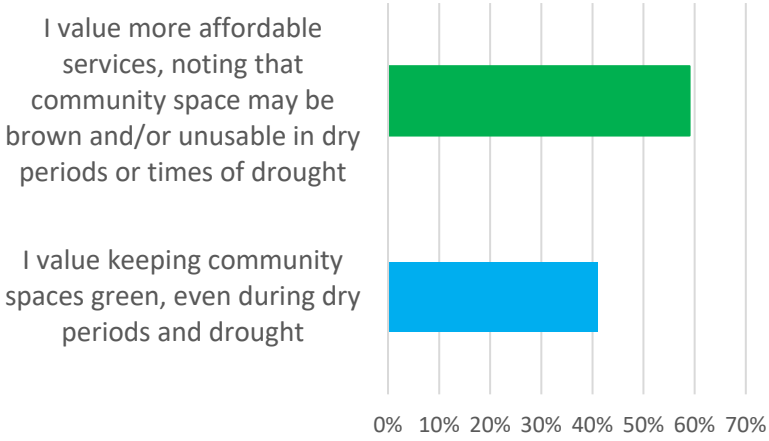
Customers overwhelmingly supported decisions that prioritise consistent tasting drinking water, as opposed to choices that favour efficiency and cost control.

Water Reliability

Customers supported decisions that prioritise affordability if it only means occasional water supply interruptions.



Community Green Spaces

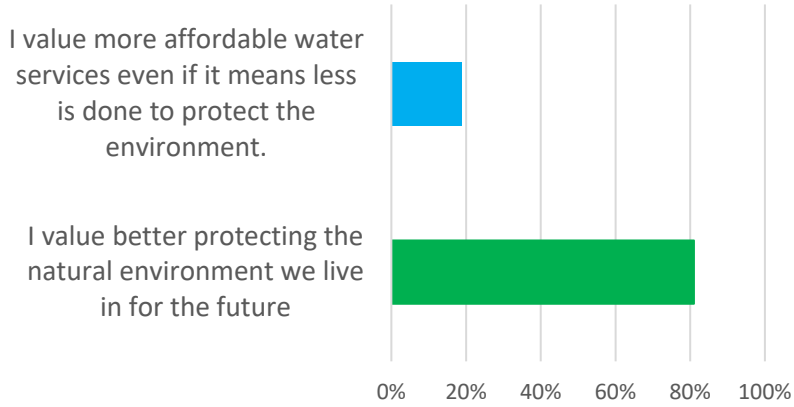


Customers supported affordability over maintaining community green spaces in dry periods or times of drought, even if they turn brown.

WESTERNPORT WATER™

Protecting the Natural Environment

Customers overwhelmingly support protecting the natural environment for the future, despite the costs that may be associated.



Water Use Outcomes

Supporting healthy waterways, environment and urban amenity outcomes	84
Ensuring there's enough water to support agriculture and food production	82
Ensuring there's enough water to support our existing way of life	81
Supporting Bass Coast's growing population well into the future	79
Ensuring there's enough water to support business and industry	73
Encouraging greater access to water for Traditional Owners	67

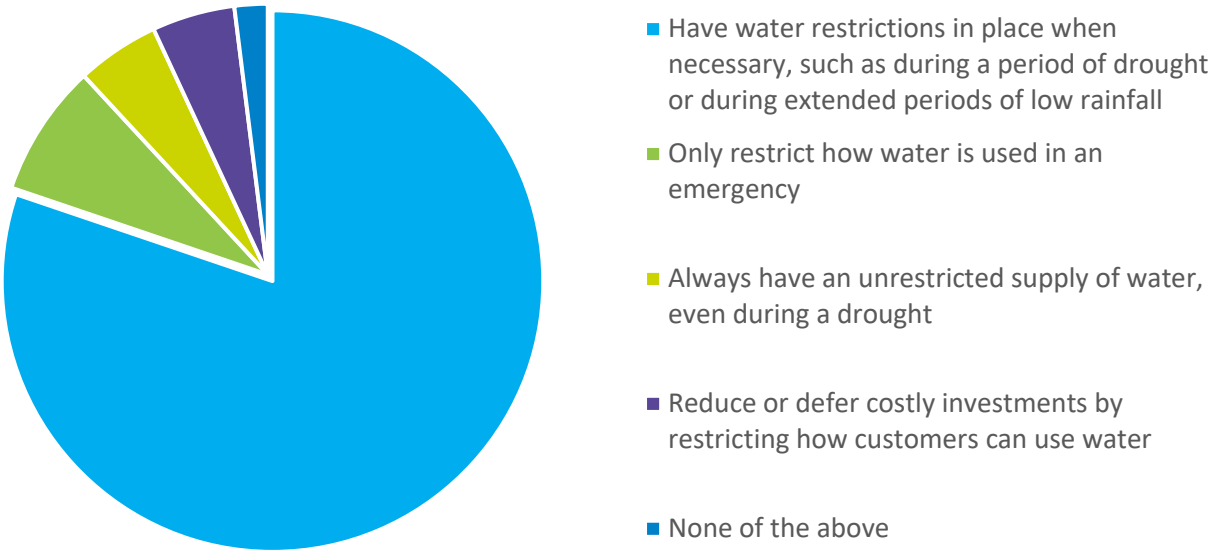
Customers were asked to prioritise water use outcomes by rating each priority from (0-100) for importance. Healthy waterways, environment and urban amenity outcomes were rated the highest, along with support for agriculture and food production.

Water Source Management

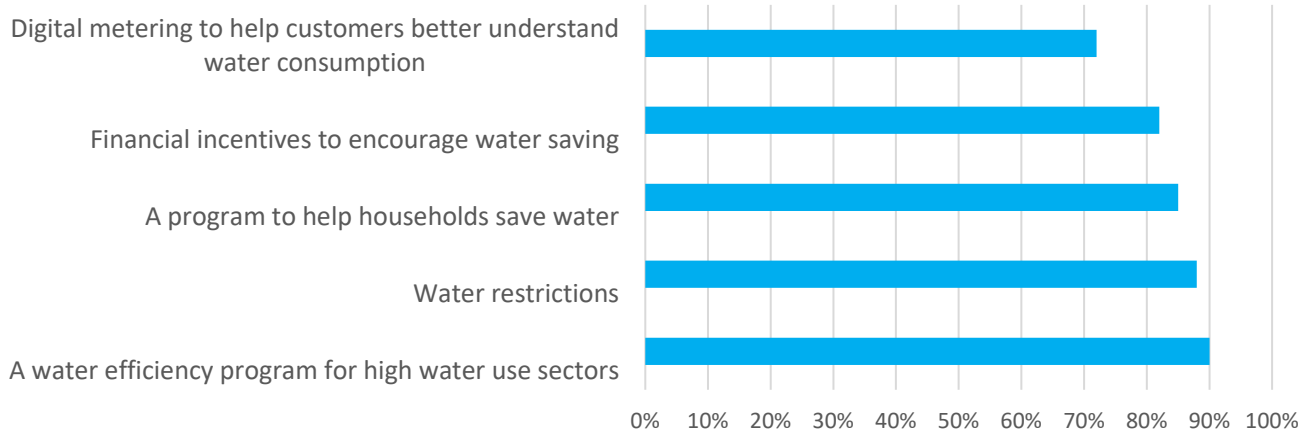
Use the water source that has the least impact on climate change	3.03
Use locally sourced water most of the time	2.88
Use whichever water source is the most affordable	2.40
Use the Melbourne water supply system (even if it costs a bit more than local sources)	1.68

Customers were asked to rank in order of preference how they would decide what water source to use. Based on the weighted average, customers favoured choosing the water source that has the least impact on climate change – followed by local source.

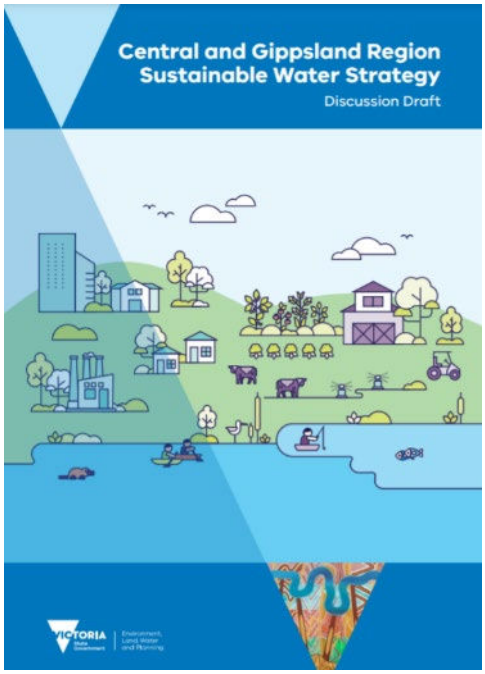
Managing Customer Demand



The majority of customers continue to support the use of water restrictions when necessary, particularly during periods of drought or extended periods of low rainfall – 64% of customers were in favour of enforced water restrictions, while 36% of customers supported voluntary water restrictions.



Westernport Water customers support a range of means through which consumption can be managed, including: water efficiency programs for high water use sectors, water restrictions, programs for improved water efficiency in the home and potential financial incentives to encourage water saving.



Traditional Owner Voice

"Bunurong people belong to Country, as a part of Country water is integral to this belonging. Bunurong people belong to the water of a place. Caring for Country also has a flow-on effect for Bunurong people. By keeping Country healthy and in balance, Country would then also care for the people. As Country is not passive it is able to provide everything required to survive and thrive."

"However, if Country is not cared for it can also cause harm to the spiritual and cultural health and mental wellbeing of Bunurong people."

"As Traditional Owners, we never considered our right to water until that right was taken away. Australia has one of the biggest water markets in the world, worth billions, yet for a long time it seemed Aboriginal water entitlements continued to shrink. While we make up around 3% of the population, we retain rights to a much smaller percentage of available water. If we want to live on our own Country, we must buy land back from those who benefited from its theft. If we want water, we must pay companies that have impacted our land and cultural sites by piping water here and there, for the convenience of their customers. The Government's overall management of that water has led to diminished volumes, higher prices, lower quality of life for people in many areas and a biodiversity imbalance. Aboriginal people deserve to also be able to enjoy the benefits of water rights as not only a basic human right, but as part of their obligation as Traditional Owners, or custodians of Country."

"Our custodianship is a human right, but it's also an inherited obligation we have as Aboriginal people. For us to have water rights within Bunurong Country, means that once again we can continue to care for Country in ways we were not able to before; bringing cultural flows back to dry creeks and tributaries and assisting with the biodiversity issues caused by bad planning and decision making in the past. It also allows us to take part in the broader water economy, which is long overdue. We can't live without water and Country cannot function without water. For Bunurong people to have water rights, is a turning point; a marker in time that shows us that our role on Country is respected, and important, and as one part of the oldest continued culture on this planet."

- Bunurong Land Council Aboriginal Corporation, Central and Gippsland Region Sustainable Water Strategy Discussion Draft, <www.water.vic.gov.au>.

Draft Strategic Actions (Central and Gippsland Region Sustainable Water Strategy)

- *increase Traditional Owner access to water entitlements*
- *remove barriers to Traditional Owners' use of water*
- *support partnerships between Traditional Owners and water managers*
- *establish longer term goals for place-based, integrated land and water management.*