Urban Water Strategy | Strategy in Brief

Final

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Acknowledgment of Country

We acknowledge Aboriginal and Torres Strait Islander peoples as the Traditional Owners of all lands throughout Australia on which we do business, and we pay our respects to Elders, past, present and emerging.

Contents

1. Introduction

1.1 About this report

The Strategy in Brief is a preliminary document to be used in the development of our Urban Water Strategy (UWS). The UWS aims to identify the best mix of actions to provide water and sewerage services in our towns and cities into the future. To do this the UWS is required to:

- Have a long-term outlook of 50 years
- Consider the total water cycle (consistent with the principles of integrated urban water management)
- Support the development of resilient and liveable communities
- Balance social, environmental and economic costs and benefits
- Take account of the consequences and uncertainty associated with population changes, climate change and variability and other risks.

The Strategy in Brief gives an overview of our region, discusses key challenges for the UWS and describes each of the supply systems. It also lists water supply options to meet the UWS objectives. It will provide information for the discussion and selection of options to upgrade infrastructure and improve operational performance. These options will be discussed and selected during the engagement phase of the UWS.

Actions are proposed for each system and key challenge area, with these broken into short (0-5 years), medium (5-20 years) and long term (20+ years) actions.

1.2 Our service area and overview

1.3 Our profile

Coliban Region Water Authority was established on 1 July 1992 under the Water Act 1989 (Vic) (the Act) as a Regional Urban Water Authority. The Authority became the Coliban Region Water Corporation on 1 July 2007 and operates as Coliban Water. The shareholder is the Victorian Government.

1.4 Our core business

We deliver drinking water, sewerage, trade waste and recycled water services to over 160,000 residents and close to 7,000 businesses, and rural water to around 1,300 farming and agricultural customers.

1.5 Our people

As a major employer in the region, we have more than 280 operational, engineering, strategic planning, financial and administrative employees.

1.6 Our region

Our service area covers 16,500 square kilometres in north-central Victoria. The service area covers 49 towns in nine separate supply systems, extending from Cohuna and Echuca in the north to Kyneton and Trentham in the south, and from Boort, Wedderburn, Bealiba and Dunolly in the west to Heathcote and Tooborac in the east. This is summarised in Figure 1.

The local government areas serviced include:

- City of Greater Bendigo
- Macedon Ranges Shire Council
- Hepburn Shire Council
- Loddon Shire Council

- Mitchell Shire Council
- Campaspe Shire Council
- Gannawarra Shire Council
- Central Goldfields Shire Council
- Mount Alexander Shire Council

Figure 1 *Coliban Water area*

1.7 Our assets

Our assets are summarised in Figure 2.

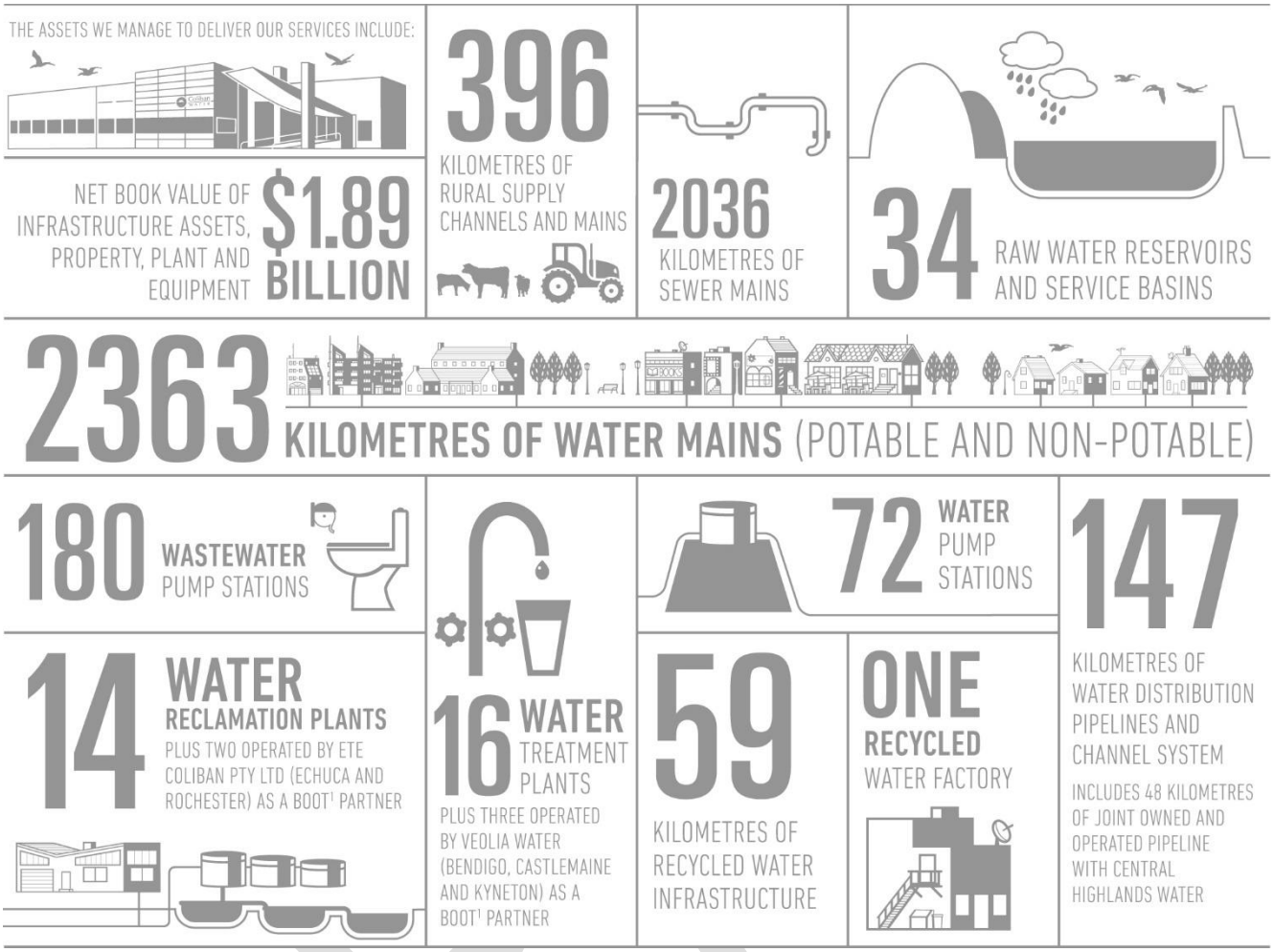

Figure 2 Our assets

1.8 Our customers

Domestic customers comprise 91 per cent of the customer base. Rural, industrial and commercial sectors account for the remaining 9 per cent. Approximately 32 per cent of metered consumption is attributed to non-domestic customers.

1.9 Scope and limitations

This report: has been prepared by GHD for Coliban Water and may only be used and relied on by for the purpose/s agreed between GHD and Coliban Water

GHD otherwise disclaims responsibility to any person other than Coliban Water arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.10 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.10 Assumptions

Data for this report has been sourced from our internal documents. GHD did not validate this data.

1.11 Our vision

Our vision is 'Water to Live, Grow and Enjoy' and is guided by four strategic directions that address future challenges and opportunities:

1. Water security and zero carbon
2. Healthy people and environment
3. Prosperous economies
4. Green and active communities

2. Key challenges

2.1 Impacts of climate change

2.1.1 Where we are now

Our resources depend on the climate which means that water demand, storages and sources need to be carefully managed to ensure supply. The impacts of climate change are expected to result in a drier, hotter climate that will reduce available water from traditional resources and affect the quality of that water.

Our future climate is projected to pose a significant risk to communities in the region. Coupled with population growth, the impacts of climate change need to be considered – we need to plan for a future with a much larger population and less water than we have today.

The Victorian Government, via the Minister for Water, has set clear expectations that water corporations need to respond to climate change through both mitigation (towards zero net emissions) and adaptation (continuing to provide water services in a changing climate).

Given the water sector is responsible for the largest proportion of government carbon emissions, we is in a position to provide leadership on climate change. We can support residential and commercial customers to reduce carbon emissions and water usage, and collaborate with other sectors for more effective mitigation and adaptation responses.

2.1.2 What we are doing

This strategy is underpinned by our climate change mitigation and adaptation strategies, as well as best-practice guidance from the Victorian Government. We have undertaken detailed scenario modelling of water availability and used this to inform the strategy. Data is reviewed annually using the latest climate science and scenario analysis in water resource modelling.

In addition, we continually monitor the quality of water drawn from reservoirs, waterways and groundwater, which can be affected by events such as blue algae outbreaks and bushfires – likely to exacerbated by climate change. We are implementing management measures to respond, including catchment protection measures, active operational management and ongoing upgrading of our treatment systems.

2.1.3 Actions

1. We will deliver initiatives within our Annual Carbon and Energy Plans to achieve the target of net zero carbon by 2030.
2. We will ensure that water treatment plants are resilient in managing raw water quality changes associated with changing climate conditions and continue to deliver safe and consistent water to customers.

2.2 Servicing a growing population

2.2.1 Where we are now

Water underpins social health and wellbeing and has a strong impact on the types and success of industries that can operate in the region. Population growth, driven by lifestyle, proximity to Melbourne and strong transport links, impacts on water demand and supply.

Many urban populations are growing quickly, with the City of Greater Bendigo forecast to grow from 116,568 in 2018 to 155,596 by 2036. There is similar growth in the towns to the south of the region. However, there is uneven distribution of population across the region, and smaller communities will also require quality water and sewerage services to enable their prosperity.

The challenge for us is to ensure all communities and industries are supported by sustainable services.

2.2.2 What we are doing

We undertake scenario modelling that considers the potential range of population growth that will influence future demand. We undertake regular reviews of population growth and work closely with Councils to understand how we can continue to service the growing region. This allows us to plan our services with residential growth in mind as well as any opportunities for commercial and industrial development, such as in the Bendigo Regional Employment Precinct.

Town Visions for major centres have been developed that examine how service to new customers over the next 50+ years will be delivered. This helps to give a better understanding of the complex factors contributing to future demand and aids planning.

Making the most of the resources that are available is also critical to managing demand and supporting a prosperous region.

2.2.3 Actions

1. We will plan for the replacement and upgrade of infrastructure as needed to accommodate a growing customer base.
2. We will continue to work with local councils and North Central Catchment Management Authority to sustainably manage growth in the region and protect the environmental value of our catchments.
3. We will support the development of employment opportunities in the region (such as the Bendigo Regional Employment Precinct).

2.3 Meeting community expectations

2.3.1 Where we are now

Communities in the region have made it clear that on top of high-quality water services, they expect us to support regional liveability, reduce the environmental footprint and be a more socially responsible organisation.

There is increasing acknowledgement that Traditional Owners have cultural, spiritual and economic connections to land and water. All water corporations need to consider Aboriginal values and objectives for water, and improve

access to water for Traditional Owners and Aboriginal Victorians in order to provide opportunities for economic development.

The community of this relatively dry region expects us to support recreational values of their water assets for activities including fishing, boating and swimming. We can work with other organisations to plan and manage access to water assets.

2.3.2 What we are doing

We strive to be recognised as customer-focused and community-minded. The feedback we have received from customers has been important in the development of the UWS, helping to inform the levels of service we provide our customers and when action is needed ensure demand is met. Each year we report in the Annual Water Outlook the water security position and progression on actions arising from the previous UWS.

2.3.3 Actions

1. We will continue to engage with customers on issues such as pricing and water security to inform our decision making.
2. We will work with partner organisations to plan and promote for recreational water use to enhance liveability.
3. We will update the community on our water security status and forecast each year by publishing the Annual Water Outlook.

2.4 Water innovation

2.4.1 Where we are now

Our communities and stakeholders have an interest in considering innovative ways to supply quality water and sewerage services.

The Water for Victoria plan also encourages technological, organisational and operational innovation focussed on improving supply of a resource facing increased future demand and reduced availability.

Innovation may take the form of investing in areas for public good where the private sector is reluctant to be involved, or it could involve a system wide review to find opportunities for improvement in a 'business as usual' operating environment, or it could involve conceptualising future infrastructure differently.

2.4.2 What we are doing

The digital metering program commenced in 2018 and is expected to take six years to complete. In this program water usage data is looked out to identify areas with high water usage and possible leaks. Significant savings have been identified since project inception.

We are pursuing innovative ways to maintain our water security position. This includes:

- Managed aquifer recharge
- Wastewater recycling
- Purchasing of additional water shares
- Water auditing and efficiency programs
- Reducing channel leakage through low cost means
- Optimise management of available resources, such as relaxing our reserve rule for the Coliban North system from 24 to 12 months

This has helped to provide flexibility in our water resource operations and to delay major infrastructure works.

2.4.3 Actions

1. We will continue to look for innovative water efficiency measures, such as through our digital meters and leak detection programs.
2. We will continue to consider projects that provide an additional water resource, energy saving or community benefit, such as managed aquifer recharge.

2.5 Recognising and supporting Aboriginal values

2.5.1 Where we are now

We respectfully acknowledge Aboriginal and Torres Strait Islander peoples as the Traditional Owners and custodians of the land and water on which all Australians rely. We pay our respects to Dja Dja Wurrung, Taungurung, Yorta Yorta, Barapa Barapa, their Elders past, present and future, as Traditional Owners and the custodians of the land and water on which we rely and operate.

We acknowledge and respect the continued cultural, social and spiritual connections of all Aboriginal Victorians. We also acknowledge the broader Aboriginal and Torres Strait Islander community and their connections with lands and waters and recognise and value their inherent responsibility to care for and protect them for thousands of generations. We acknowledge Aboriginal Victorians as Traditional Owners and, in the spirit of reconciliation, we remain committed to working in partnership with Traditional Owners to ensure meaningful, ongoing contributions to the future of land and water management.

2.5.2 What we are doing

We have developed a Reconciliation Action Plan (RAP) to further develop knowledge and understanding of Aboriginal and Torres Strait Islander people and to build relationships with local Aboriginal and Torres Strait Islander communities.

Our first RAP aims to provide a foundation for ongoing reconciliation efforts. The RAP will enable us to contribute to greater awareness and respect for the diversity of Aboriginal and Torres Strait Islander people, values, cultures and ideas. It is a guide for how we will work towards achieving outcomes including a more culturally respectful workforce. We are currently working on developing our second RAP.

We hold monthly meetings with Dja Dja Wurrung Clans Aboriginal Corporation to discuss projects, works and other current issues.

2.5.3 Actions

1. We will recognise Traditional Owner values and include these values in water planning. We will also work in partnership to generate economic opportunities through supporting their access to water.
2. We will have a second RAP endorsed by Reconciliation Australia and commence implementation (2-year lifespan) by June 2022.
3. We will through conversations, listening and understanding be able to translate tangible initiatives that support self-determination into Pricing Submissions, UWS and future Corporate Plans for engaged Traditional owner groups by 2022.

2.6 Delivering integrated solutions

2.6.1 Where we are now

There are clear benefits in working with the various stakeholders that have a role in delivering water cycle services. As our region grows and evolves, the integration of land and water planning is critical to ensure places are sustainable and liveable.

2.6.2 What we are doing

As part of an integrated water management (IWM) approach, we participate in forums and look for opportunities for integrated planning and alternative water resources that deliver wider benefits to the community. As a member of the Integrated Water Management forums, we are working on a number of projects, including studies of the Upper Coliban catchment and opportunities for managed aquifer recharge.

We make the most of available water resources, we focus on water efficiency, and we embrace the use of recycled water, stormwater and rainwater to underpin regional prosperity.

We will continue to implement demand management measures such as:

- Reduction of water losses from assets using tools such as pressure zones and addressing leaks
- Community education
- Continue with incentive schemes to improve domestic appliance efficiency, commercial and industrial water use, and capturing rainwater.

2.6.3 Actions

1. We will continue to partner with key stakeholders in the Integrated Water Management Forums.
2. We will continue to work with local government to identify priority community spaces for watering during severe drought.
3. We will partner with key stakeholders and major water users to reduce water demand where it is suitable to do so.
4. We will continue to implement demand management measures.
5. We will encourage fit-for-purpose alternative water sources, such as recycled water, to offset potable water demand wherever possible.
6. We will have a culture that embraces new technology and new ideas to achieve more with less.

2.7 Supporting environmental health

2.7.1 Where we are now

We are committed to the philosophy and practices of environmental stewardship and sustainability.

Water resource management must balance the needs of competing uses, including the needs of the environment. It is recognised that some waterways, such as the Coliban River, would benefit from additional environmental flows, particularly as the impacts of climate change potentially reduce stream flows across the region in the future.

2.7.2 What we are doing

We harvest water in accordance with the conditions of bulk entitlement agreements, which prioritise flows for the environment. We also work with stakeholders to co-ordinate releases from storages to provide the greatest benefit to the environment with the resources available. We work with local councils to ensure growth in the region is sustainable and the environmental health of the catchment is maintained.

Long-term resource assessments and Sustainable Water Strategies planned by the Victorian Government in coming years will identify priorities for environmental water. We are committed to exploring further opportunities to help meet those needs.

2.7.3 Actions

1. We will work with the North Central Catchment Management Authority, Victorian Environmental Water Holder and Aboriginal groups to explore further opportunities to operate our headworks systems so that environmental and Aboriginal values are supported.
2. We will further consider the impact of environmental water flows from headworks, particularly with respect to the Coliban River.

3. We will proactively monitor, operate and upgrade water reclamation plants to identify and address environmental risks.
4. We will commit to projects to resolve odour issues at our Bendigo and Castlemaine Water Reclamation Plants.
5. We will explore the environmental benefit of releases from our water reclamation plants and how this informs the volume of water available for recycling.

3. Engagement

3.1 Where we are now

Customer feedback was key in developing our UWS. We held sessions throughout our region asking for survey responses that helped develop the UWS.

Customers said water security was the single most important issue facing their town. When asked about water restrictions and the level of appropriate restrictions, over 90 per cent of customers indicated there was a place for stage 4 restrictions in the event of severe drought or low levels in our storages. This feedback has contributed to the chosen level of service for each of our systems and impacts the timing of our planning and proposed actions.

3.2 What we are doing

This document provides the list of options being considered in water supply systems where there is a gap between supply and demand now or into the future. Community feedback on these options will help to shape final recommendations.

Another lesson from the initial survey of customers was the range of responses to questions around where the town water supply comes from and where and how wastewater is beneficially re-used. This highlights the need for more information on our water and wastewater systems.

3.3 Actions

1. We will strive to improve water literacy among customers with an aim to increase knowledge of how water savings can be achieved in each household.
2. We will, when storages are low, utilise water restrictions as a method of reducing demand and conserving water.

4. The Murray System

The Murray System supplies the towns of Cohuna, Echuca, Gunbower and Leitchville. The system area is shown in the below Figure 3Figure 3. The population serviced by the Murray System is greater than 17,000 people.

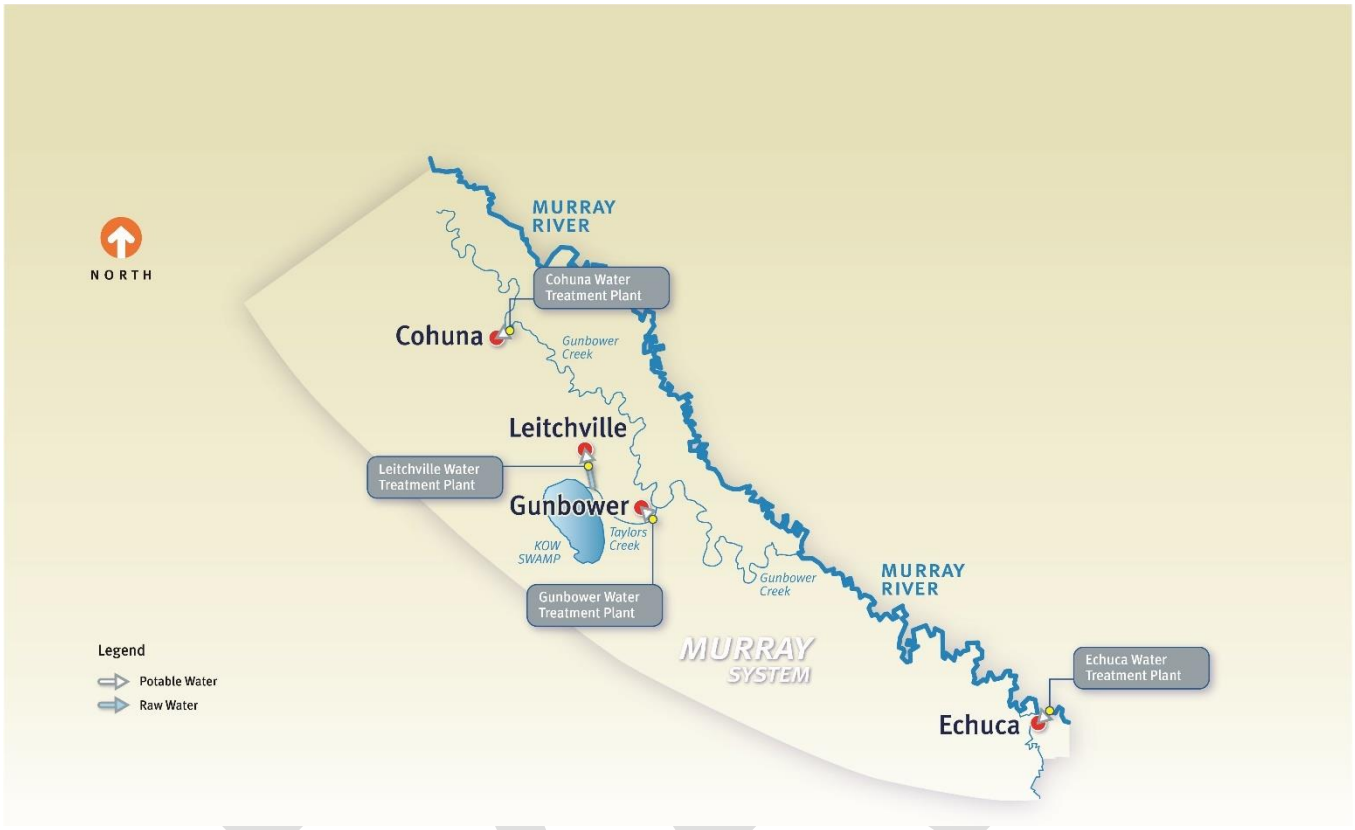

Figure 3 Murray system area.

4.1 Water resource

4.1.1 Demand

Total demand in the Murray System is currently 4,707 ML per year. Residential and commercial demands dominate the demand. Industrial demand is mostly confined to Echuca. The Cohuna, Leitchville and Gunbower Systems also supply water to the surrounding region for rural stock and domestic use under supply by agreement arrangements.

Table 1 - Murray System current and forecast water demand (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**4,707**	2,213	725	116	684	51	159	758
2070	**8,452**	4,591	1,121	176	965	73	237	1,290

4.1.2 Water entitlements

We have a bulk entitlement (River Murray-Coliban Water) as well as low and high reliability water shares in the regulated Murray System as shown in Table 2. The Bulk Entitlement has the same allocation characteristics as High Reliability Water SharesTable 2.

Table 2 Murray System entitlements

Entitlement type	Entitlement (ML/yr)
Bulk Entitlement	6,285
High reliability water shares	55
Low reliability water shares	722

4.1.3 Water sources

The current water sources for the Murray System are:

- Echuca draws water directly from the Murray River.
- Gunbower draws water from Taylors Creek.
- Leitchville draws water from the Cohuna Channel and Gunbower Creek (winter only).
- Cohuna draws water from Gunbower Creek.

4.1.4 Water storages

There are no raw water storages in this system.

4.1.5 Water supply system

All raw water supplied to the System is from the Murray River, either extracted directly or via tributary creeks and channels operated by Goulburn Murray Water.

4.2 Water treatment

Raw water is treated at water treatment plants in Cohuna, Echuca, Gunbower and Leitchville and supplied to customers through our water supply networks. A summary of the treatment plants and their indicative capacity is shown in Table 3. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Table 3 Murray System water treatment plants

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Gunbower	Gunbower	0.38	0.412	0.412
Cohuna	Cohuna	3.34	3.35	3.98
Leitchville	Leitchville	1.3	0.84	0.88
Echuca	Echuca	18.4	18.8	25.1

4.3 Wastewater management

4.3.1 Water reclamation plants

Wastewater is collected through our sewer networks and treated at water reclamation plants at Cohuna, Echuca and Gunbower. Wastewater from Leitchville is treated at the Gunbower WRP. Our plants also treat wastewater from commercial sites in accordance with trade waste agreements and consents. These businesses range from cafes to food processing and other large industries.

Wastewater is treated at three WRPs:

- Cohuna WRP treats wastewater from Cohuna. Treated water is evaporated in lagoons.

- Gunbower WRP treats wastewater from Gunbower and Leitchville, and has on-site reuse of Class C recycled water via irrigation.
- Echuca WRP treats wastewater from Echuca which produced Class B recycled water that is transferred approximately 15 km south to winter storages at Singer Rd for supply to recycled water customers who use it to supplement their irrigation water needs.
- The recycled water produced at our WRPs is supplied to local irrigators. Biosolids are reused for agricultural purposes.

4.4 Recent projects

Recent projects completed in the Murray system relevant to the UWS include:

- Purchase of an additional 620 ML/yr of water shares in the Murray system since 2017.
- Installed new treated water tanks at Echuca West and at the Cohuna and Gunbower WRPs.
- Fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.
- Commenced upgrade of the Echuca WRP.
- Completed the Echuca Town Vision project which reviews the long-term needs to service the town with water and sewer services with an integrated water focus.

4.5 Outlook

4.5.1 Water resource

Without further action, demand is expected to surpass yield in the Murray system by 2024. Work is needed within the next five years to ensure that we can continue to meet agreed levels of service to our customers in the event of drought. Our current strategy to manage this risk is to purchase additional water shares.

A summary of the outlook for the Murray system is shown in Table 4 and Figure 4 below. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).*

Table 4 Murray System current and forecast water demand (ML/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**4,707**	4,753	4,673
Current yield	**5,041**	4,724	4,854
Year that demand equals yield	**2024**	2020	2023
Demand at 2070	**8,547**	10,042	8,989
Yield at 2070	**3,563**	1,827	4,903
Additional yield required in 2070	**4,984**	8,215	4,086

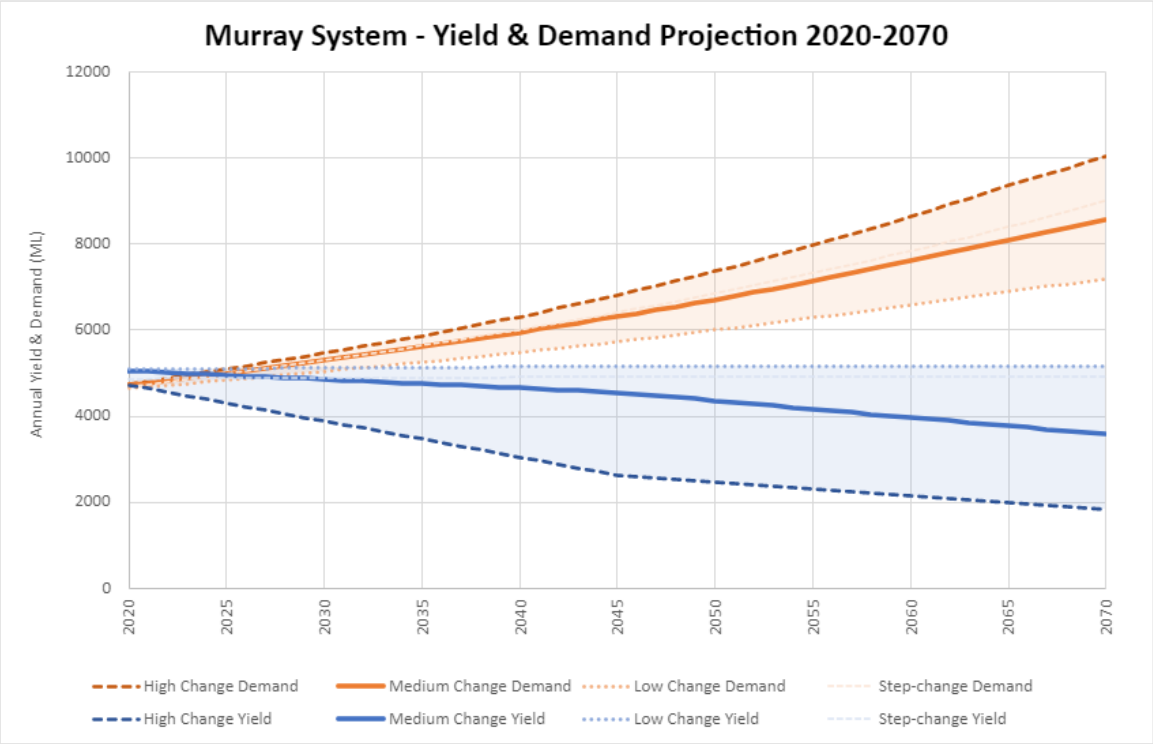

Figure 4 - Murray System yield and demand

The first step in our planning is to develop a long-list of options for how to address this shortfall between supply and demand. The long list of options for the Murray system is shown in Table 5 below.

Table 5 Murray System options for supply

Option	Supply	Cultural / social	Time to production	Relies on rain?	Description
Recycled water Echuca public open space	◐ ○ ○	High	Medium	No	Upgrade the treatment process at the Echuca WRP to produce recycled water for public open space.
Additional resource through water market	● ● ●	Low	Short	Yes	Purchase of additional water allocations.
Pipeline to Goulburn system	● ● ○	Low	Medium	No	Connection of Murray to Goulburn system via a pipeline to allow for the transfer of raw water.
Recycled water Echuca dual pipe residential	● ● ○	High	Long	No	Upgrade the treatment process at the Echuca WRP to produce recycled water to supply residential users through a third pipe system.
Additional groundwater source	● ○ ○	Low	Medium	No	Securing additional water resrource through groundwater bore to supplement existing supply.
Stormwater Harvesting (Echuca)	◐ ○ ○	Medium	Medium	Yes	Three stormwater harvesting schemes. One located in the growth area north of Echuca, and two from existing urban catchments in town.
Raw water supply for outdoor use (Echuca)	● ● ○	Medium	Long	No	Supply of raw water for public open space irrigation and for irrigation at residential properties.
Direct potable reuse	● ● ●	Medium	Long	No	Additional treatment of Class B water to a potable standard for direct supply back to the water network.
Water resource loss prevention	◐ ○ ○	Low	Long	No	Installation of covered stream storages for towns in the Murray System. Earthen storages with a depth of 4 m are proposed, with a plastic liner and a floating cover.
Rainwater tanks for new developments	◐ ○ ○	Medium	Long	Yes	Rainwater tanks to be installed on residential houses and connected to irrigation and toilets.

The above list is in addition to ongoing demand management programs and other actions outlined in Section 2.6 Delivering Integrated Solutions.

This list is then refined to a short-list based upon factors such as cost, environmental and social benefits and considering legislation, Government policy settings and regulations. For Murray, short-listed options are:

- Continued investment in the water market to purchase additional water resource
- Public open space recycled water for Echuca West.

4.5.2 Water treatment

Major works are in progress to provide capacity upgrades and performance improvements at the Echuca WTP. This will help to accommodate growing demand within the town and is planned to be completed in 2022. The Cohuna WTP is approaching capacity, with upgrades expected in the short to medium-term. We are investigating opportunities to consolidate the Cohuna, Gunbower and Leitchville WTPs, which will be timed to avoid major renewal works at each site.

Blue green algae blooms in the Murray system can impact on the palatability of drinking water. This requires further investigation and planning as this risk is likely to increase over time due to the changing climate.

We are also investigating the release of high-quality supernatant water, generated by the treatment process, to local waterways in Echuca and Cohuna, rather than to sewer. This will provide an environmental benefit as well as freeing up wastewater treatment capacity.

4.5.3 Wastewater management

Works to address capacity issues and seepage are required at the Cohuna WTP within the next 5 years. Gunbower and Echuca currently have no capacity concerns.

4.6 Actions

Murray system actions
Water resource actions
We will continue to invest in the water market to purchase additional water resource.
We will further investigate the options available to contribute to water supply security for the Murray system.
Water treatment actions
We will complete the upgrade of the Echuca WTP in 2022.
We will plan for capacity increases for the Cohuna WTP in the short to medium term and investigate opportunities to consolidate the treatment plants at Cohuna, Gunbower and Leitchville.
We will upgrade Echuca, Cohuna and Leitchville WTPs to reduce the impact of blue green algae blooms on treated water taste and odour in the short to medium term.
We will investigate the release of high-quality supernatant water from the Echuca and Cohuna WTPs to local waterways to provide environmental benefit rather than release this water to sewer and seek credit for returns to the Murray River.
Wastewater management actions
We will upgrade Cohuna WRP to increase capacity and address leaking lagoons in the short term.
We will investigate the feasibility of supplying recycled water to Echuca West in partnership with Campaspe Shire Council.

5. The Goulburn System

The Goulburn System supplies the towns of Rochester, Pyramid Hill, Boort, Lockington, Mitiamo, Serpentine, Dingee, Jarklin, Mysia and Macorna. The system area is shown in Figure 5. The existing population serviced by the Goulburn System is greater than 6,000 people.

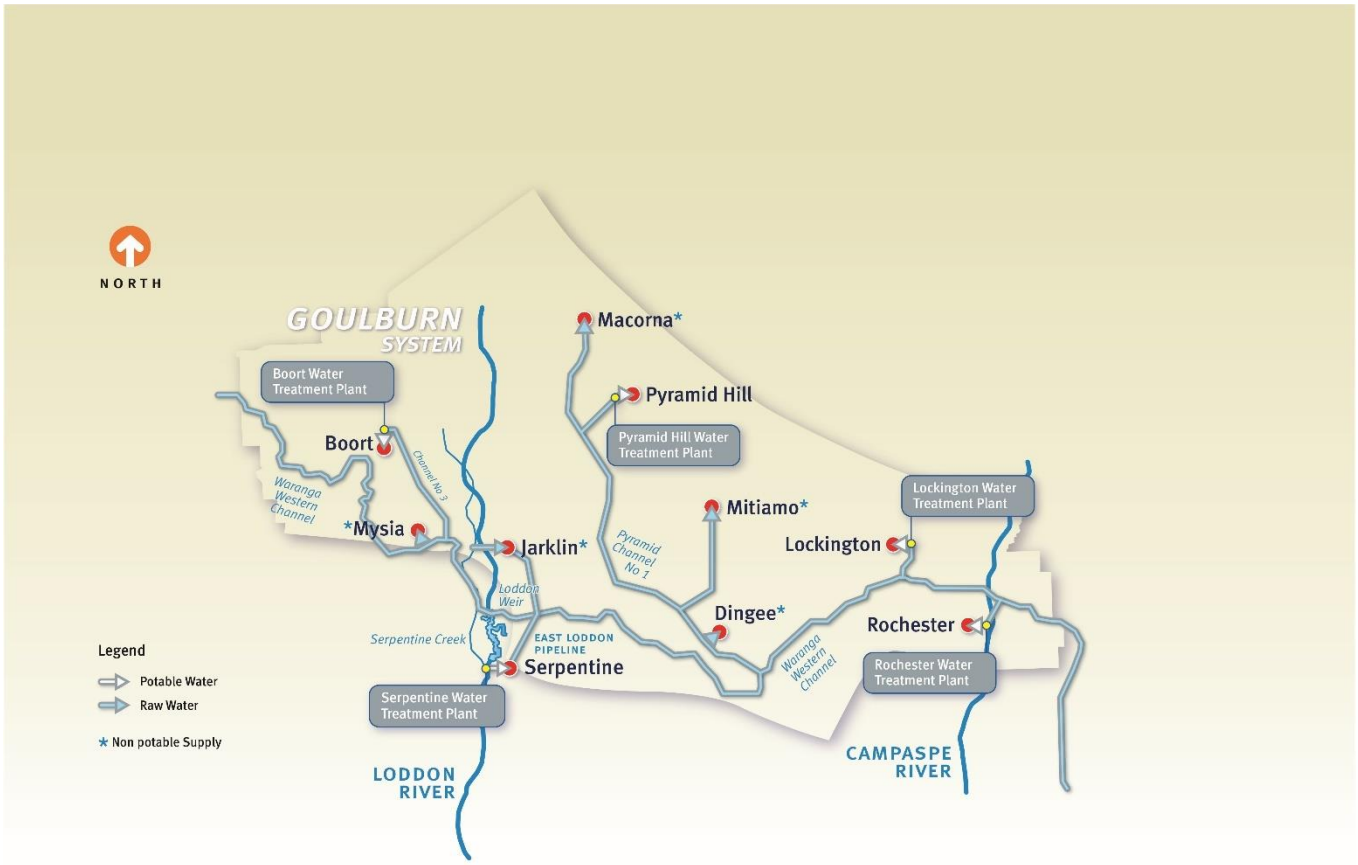

Figure 5 Goulburn system area

5.1 Water resource

5.1.1 Demand

Total demand in the Goulburn System is currently 1,158 ML per year. Residential demand contributes the vast majority to this total. The Goulburn System includes a mix of towns with a drinking water supply and others with an untreated non-drinking water supply. A summary of water demands for the Goulburn System is show in Table 6.

Table 6 Goulburn System current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	1,158	620	70	35	27	3	55	348
2070	1,465	806	81	40	33	4	63	438

5.1.2 Water entitlements

The Goulburn System has a Bulk Entitlement of 2,420 ML. The Goulburn System bulk entitlement supply has a Very High Reliable Water Share (VHRWS) and receives 100% allocation in most years.

5.1.3 Water sources

Water is sourced from the Goulburn River System via the Waranga Western Channel, which is managed by Goulburn-Murray Water.

5.1.4 Water storages

The Boort (84 ML), Lockington (17.7 ML) and Pyramid Hill (57 ML) WTPs have raw water basins upstream of the treatment process. The Serpentine network also has a smaller (600 kL) raw water storage tank. A number of the untreated raw-water networks in the Goulburn system also feature raw water basins and small tanks to receive tankered water if required during blue green algae incidents.

5.1.5 Water supply system

Towns are supplied directly from the Waranga Channel or via local gravity channels and pipelines. Serpentine and Jarklin are connected to the East Loddon Pipeline. Mitiamo is connected to the Mitiamo Pipeline. Water may also be drawn directly from the Campaspe River for Rochester.

5.2 Water treatment

Raw water is treated at water treatment plants in Boort, Lockington, Pyramid Hill, Rochester and Serpentine and supplied to customers through our water supply networks. A summary of the treatment plants and their indicative capacity is shown in Table 7. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Water supplied to Mitiamo, Dingee, Jarklin, Mysia and Macorna is untreated non-drinking water.

Significant blue green algae blooms in the Goulburn system in 2018 impacted on the capacity and function of the Rochester, Lockington and Pyramid Hill water treatment plants.

Table 7 Goulburn System water treatment plants

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Boort	Boort	1.38	1.16	1.25
Lockington	Lockington	0.54	0.36	0.36
Pyramid Hill	Pyramid Hill	1.0	0.94	0.98
Rochester	Rochester	4.5	3.85	4.9
Serpentine	Serpentine	0.56	0.26	0.26

5.3 Wastewater management

5.3.1 Water reclamation plants

Wastewater is collected through the sewer networks and treated at water reclamation plants at Boort, Lockington, Rochester and Pyramid Hill. Most systems feature a conventional gravity sewer system, but Lockington has a hybrid Septic Tank Effluent Drainage (STED) system, with liquids drained to sewer for subsequent treatment and solids collected in septic systems.

There are no sewerage systems for Serpentine, Mitiamo, Dingee, Jarklin, Mysia and Macorna. Townships without wastewater systems have septic tanks or other onsite wastewater systems. Local councils are responsible for developing and managing domestic wastewater programs and plans.

5.3.2 Recycled water

Rochester treats wastewater to Class B level, while Boort, Lockington and Pyramid Hill treat water to Class C level. The recycled water produced at water reclamation plants is supplied to local irrigators. Biosolids are reused for agricultural purposes.

5.4 Recent projects

Recent projects completed in the Goulburn system relevant to the UWS include:

- Upgraded capability to pump water from Campaspe River to the Rochester WTP.
- Installed tanks in our raw water towns to enable tankering of water during blue green algae incidents.
- Connection of Mitiamo to Goulburn Murray Water's new Mitiamo pipeline. Mitiamo was previously supplied by the channel network.
- Fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.

5.5 Outlook

5.5.1 Water resource

The Goulburn system is considered secure and able to meet demand to 2070.

A summary of the outlook for the Goulburn system is shown in Table 8 and Figure 6. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).*

Table 8 Goulburn System current and forecast water demand (ML/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**1159**	1170	1152
Current yield	**2401**	2395	2395
Year that demand equals yield	**N/A**	N/A	N/A
Demand at 2070	**1470**	1584	1438
Yield at 2070	**2398**	2382	2395
Extra yield to meet demand in 2070	**0**	0	0

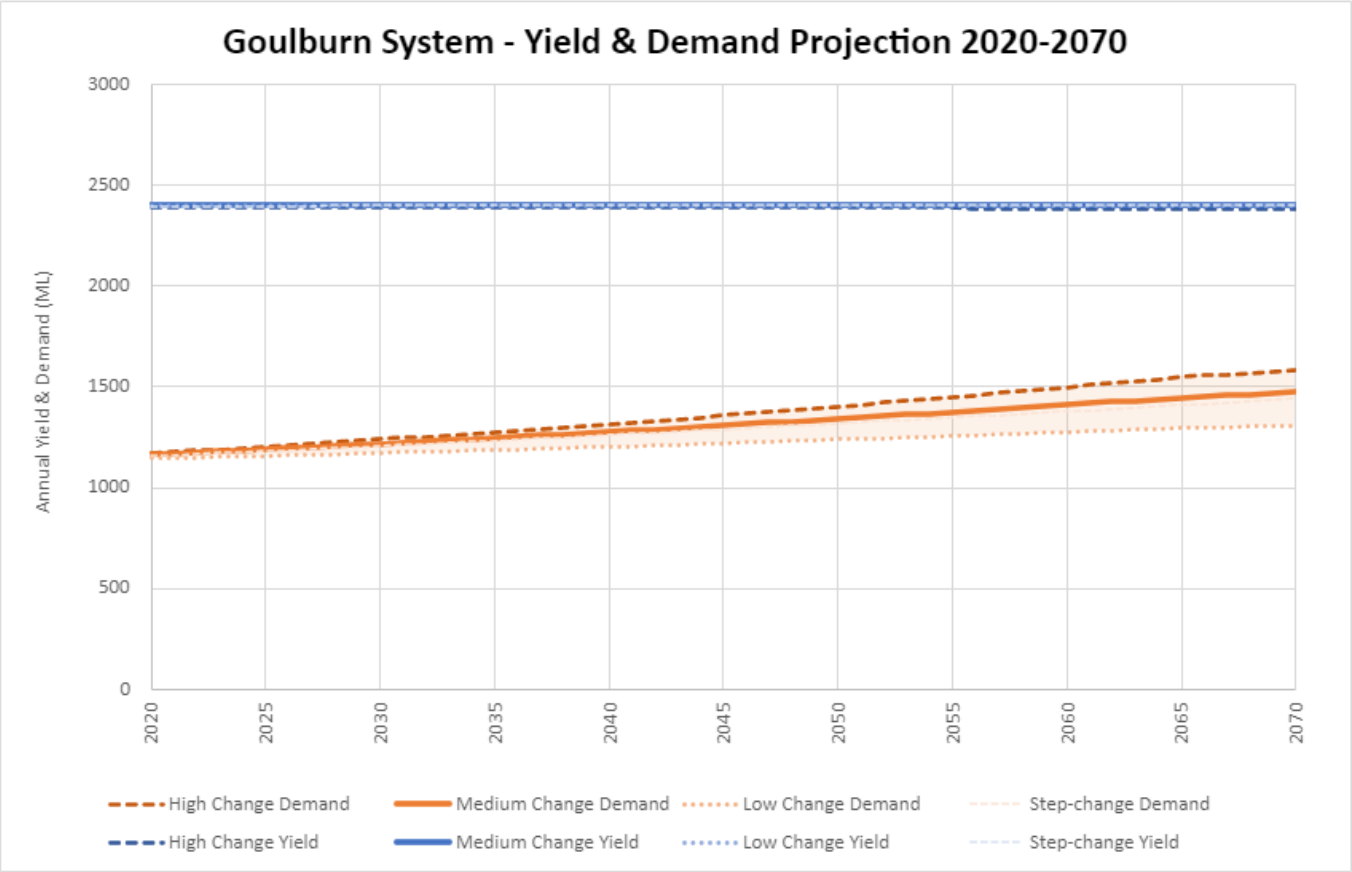

Figure 6 Goulburn System yield and demand

5.5.2 Water treatment

All water treatment plants in the Goulburn system have capacity to meet projected growth until at least 2038. A key focus for this system is around managing the risk of blue green algae and fluctuating raw water quality due to changing climatic conditions.

Recently we have connected Mitiamo to a raw water supply from the Mitiamo pipeline. To ensure a high quality supply from this pipeline and allow for operational flexibility we will be undertaking a project to install tanks at the current Mitiamo basin site to store this water before supplying to customers.

5.5.3 Wastewater management

There are no major wastewater system issues within the Goulburn System.

5.6 Actions

Goulburn system actions
We will review the capability of Goulburn system WTPs in the short term to handle blue green algae blooms similar to that experienced in 2018.
We will install tanks at the Mitiamo basin to store water obtained directly from the Mitiamo pipeline.

6. The Loddon Wimmera System

Korong Vale, Wedderburn, Bridgewater and Inglewood are supplied from the Wimmera Mallee Pipeline and Southwest Loddon Pipeline. Laanecoorie, Tarnagulla, Dunolly and Bealiba are currently supplied from the Loddon River. Borung and Wychitella are supplied from the Wimmera Mallee Pipeline. The Loddon Wimmera system area is shown in Figure 7. The population serviced by the Loddon Wimmera system is greater than 3,700 people.

Figure 7 Loddon Wimmera System area.

6.1 Water resource

6.1.1 Demand

Total demand in the Loddon Wimmera System is currently 654 ML per year. Residential demand contributes the vast majority to this total along with non-revenue water. Most towns in the system are supplied with a drinking water supply, with Borung and Wychitella having an untreated non-drinking water supply. A summary of water demands for the Loddon Wimmera System is show in Table 9.

Table 9 Loddon Wimmera System current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**654**	266	48	22	3	20	27	268
2070	**882**	352	73	32	4	28	40	353

6.1.2 Water entitlements

We have bulk entitlements to take water from the Loddon River and the Wimmera Mallee Pipeline for 820 ML/yr and 300 ML/yr respectively. We also have a 110 ML/yr off-peak water allowance from the South West Loddon Pipeline (SWLP).

6.1.3 Water sources

The current water sources for the Loddon Wimmera System are:

- Water for Korong Vale and Wedderburn is sourced from the Wimmera Mallee Pipeline or SWLP (which may also take water from the Waranga Western Channel).
- Water for Bridgewater is sourced from the SWLP.
- Water for the Laanecoorie potable system is sourced from the Loddon River.
- Non-potable water for Wychitella and Borung is supplied from the Wimmera Mallee Pipeline.

6.1.4 Water storages

The Bridgewater and Korong Vale WTPs have raw water storages upstream of the treatment process of 22 ML and 4 ML respectively. The two towns with an untreated non-drinking water supply, Borung and Wychitella also have small storages before supplying to customers in the network.

6.1.5 Water supply system

With the completion of the SWLP in late 2019, raw water supply to the Bridgewater, and Korong Vale systems is primarily from the pipeline, which accesses water from Waranga Western Channel or the Wimmera Mallee Pipeline. Access to the Loddon River will be retained for Bridgewater as a secondary source. Supply to Wychitella and Borung will remain from the Wimmera Mallee Pipeline.

The supply for Laanecoorie is the Loddon River. Laanecoorie will be connected to the SWLP in the short term after construction of a raw water storage. Like Bridgewater, access to the Loddon River will be retained for Laanecoorie as a secondary source.

6.2 Water treatment

Raw water is treated at water treatment plants in Korong Vale, Bridgewater and Laanecoorie and suppled to customers through our water supply networks. A summary of the treatment plants and their indicative capacity is shown in Table 10. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Water supplied to Borung and Wychitella is untreated non-drinking water.

Table 10 Loddon Wimmera System water treatment plants

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Bridgewater	Bridgewater Inglewood	1.73	1.61	1.83
Laanecoorie	Laanecoorie Tarnagulla Dunolly Bealiba	2.3	0.87	0.87
Korong Vale	Korong Vale Wedderburn	1.44	0.69	0.75

6.3 Wastewater management

Wastewater is collected through the sewer networks and treated at water reclamation plants at Bridgewater, Wedderburn and Dunolly. The Bridgewater WRP also treats sewage from Inglewood. Our plants also treat wastewater from commercial sites in accordance with trade waste agreements and consents. These businesses range from cafes to large industries.

The Class C recycled water produced at our water reclamation plants is reused for irrigation. Biosolids are reused for agricultural purposes.

There is no sewerage system in Korong Vale, Wychitella, Borung, Bealiba, Tarnagulla or Laanecoorie.

6.4 Recent projects

Recent projects completed in the Loddon Wimmera system relevant to the Urban Water Strategy include:

- Connected the Bridgewater and Korong Vale WTPs to the Southwest Loddon Pipeline and secured additional water entitlements.
- Commenced upgrade of the Korong Vale WTP.
- Upgraded the Bridgewater and Laanecoorie WTPs to ensure greater water security.
- Renewed the Bridgewater WTP groundwater bore, ensuring there is a backup supply of water.
- Planned new raw water storages and pump station for Laanecoorie WTP to take water from the South West Loddon Pipeline.
- Fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.

6.5 Outlook

6.5.1 Water resource

A summary of the outlook for the Loddon Wimmera system is shown in Table 11 and Figure 8 below. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).* Under this scenario, the Loddon Wimmera system is secure and able to meet demands out to 2070.

Non-revenue water in the Loddon Wimmera System is particularly high. Although the system is considered secure, we will look at demand management initiatives such as water efficiency and leak detection to maximise water available for other uses.

Table 11 Loddon Wimmera System forecast water supply upgrade requirements (ML/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**649**	654	643
Current yield	**892**	806	861
Year that demand equals yield	**N/A**	2040	N/A
Demand at 2070	**757**	885	833
Yield at 2070	**805**	588	862
Additional yield required in 2070	**0**	297	0

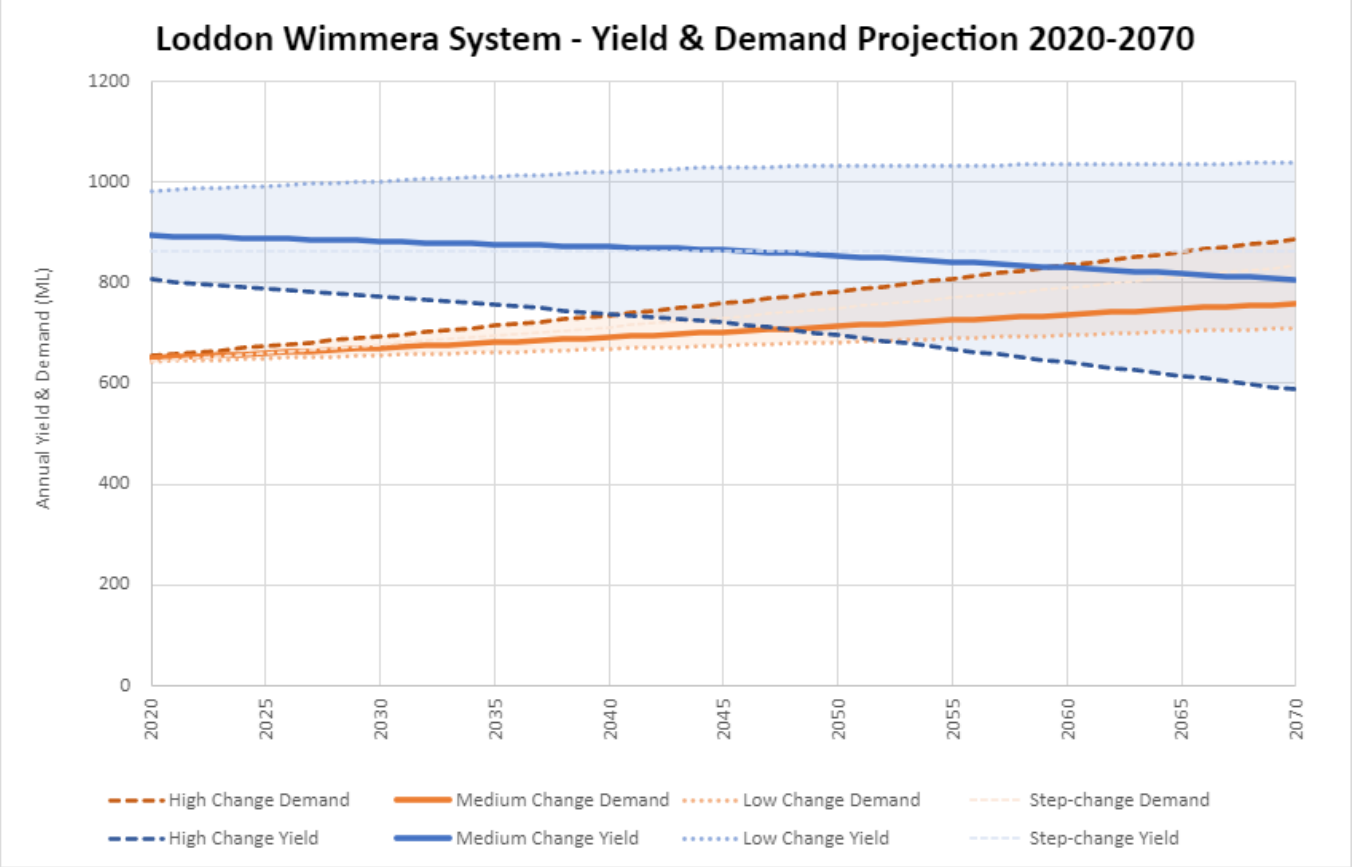

Figure 8 Loddon Wimmera System yield and demand

6.5.2 Water treatment

All water treatment plants in the Loddon Wimmera system have capacity to meet long-term demand without major upgrades.

Currently the Bridgewater and Korong Vale WTPs store water from the SWLP in raw water storages upstream of the treatment process. In order for Laanecoorie to connect to the SWLP, a raw water storage is needed to provide operation flexibility and to ensure a high quality of water.

6.5.3 Wastewater management

The Wedderburn WRP requires upgrades in the short to medium term to the aeration and irrigation processes in order to continue to effectively treat wastewater for reuse.

The Bridgewater and Dunolly WRPs have capacity to meet long-term expected inflows.

6.6 Actions

Loddon Wimmera system actions
We will construct a raw water storage at Laanecoorie and connect to the South West Loddon Pipeline in the short term .
We will upgrade aeration and irrigation capacities at Wedderburn WRP in the short to medium term.
We will investigate demand initiatives such as water efficiency measures and leak detection in order to reduce the high amount of non-revenue water generated within the Loddon Wimmera system.

7. The Coliban North System

The Coliban North System supplies the towns of Bendigo, Axedale, Huntly, Raywood, Sebastian, Heathcote and Tooborac. The towns can be supplied by our storages, Lake Eppalock, or the Waranga Western Channel via the Goldfields Superpipe. The Coliban North system also includes an extensive rural network for supply of raw water

The system area is shown in Figure 9. The population serviced by the Coliban North System is greater than 124,000 people.

Bendigo and part of the rural system are also serviced by a recycled water network suppled from the Bendigo WRP.

Figure 9 Coliban North System area

7.1 Water resource

7.1.1 Demand

Total demand in the Coliban North System is currently 14,104 ML per year, with the majority made up of residential demand. A summary of water demands for the Coliban North System is show in Table 12. Note that the table below does not include rural water use – please refer to the Rural system section 7.1.4.

Table 12 Coliban North System current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**14,104**	9,296	873	570	1,021	355	654	1,335

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
2070	**35,589**	27,042	1,248	817	1,471	494	938	3,579

7.1.2 Water entitlements

Our bulk entitlement from the Campaspe River allows an average annual take of 50,260 ML over three consecutive years. This includes our share of Lake Eppalock, which must not exceed an average annual take of 17,440 ML over any consecutive three years.

We can draw all the storage capacity from the Upper Coliban, Lauriston and Malmsbury Reservoirs; and 18% share of the capacity of Lake Eppalock.

This bulk entitlement from the Campaspe River accounts for the supply of all urban commitments and rural entitlement, as well as water losses within the distribution system and passing flows.

In addition, we hold water shares in the regulated Campaspe and Goulburn systems as noted in Table 13 below.

Table 13 Coliban North System water shares

System	High Reliability Water shares (ML/yr)	Low Reliability Water Shares (ML/yr)
Goulburn	22,790	2,861
Campaspe	2591	646

7.1.3 Water sources

Raw water for the Coliban North System is supplied from our major storages including Upper Coliban, Lauriston and Malmsbury Reservoirs and Lake Eppalock or Waranga Western Channel via the Goldfields Superpipe.

Recycled water is also supplied from the Bendigo WRP.

7.1.4 Rural system

The Coliban North system supplies raw or recycled water to over 720 customers across seven rural systems around Bendigo. These range from smaller stock and domestic type users to much larger farming operations. Over the last three years, these customers have used between 2600 to 3100 ML/yr of their current total annual entitlement of 5749 ML/yr.

7.2 Water treatment

The system is serviced by the Bendigo and Heathcote WTPs. A summary of the treatment plants and their indicative capacity is shown in Table 14. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Table 14 Coliban North System water treatment plants

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Bendigo	Bendigo Axedale Marong Huntly Strathfieldsaye Raywood Sebastian	110.4	75	115

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Heathcote	Heathcote Tooborac	3.8	2.28	2.86

7.3 Wastewater management

7.3.1 Water reclamation plants

Wastewater is collected through our sewer networks and treated at water reclamation plants at Bendigo, Axedale and Heathcote. Our plants also treat wastewater from commercial sites in accordance with trade waste agreements and consents. These businesses range from cafes to food processing and other large industries.

Wastewater is treated at three WRPs:

- Bendigo WRP treats wastewater to Class B to supply the gold mine at Fosterville, the local livestock exchange and environmental releases to Bendigo Creek consistent with our EPA licence for the site. The plant also treats water to Class A to supply the Class A recycled water network. Class C recycled water produced through the lagoon system supplies local irrigators and is used for on-site irrigation.
- Axedale WRP treats wastewater to Class B for reuse by the local golf course.
- Heathcote WRP treats wastewater to Class C for reuse by the local gold course.

There is no wastewater network for the townships of Sebastian, Raywood or Tooborac. Townships without wastewater systems generally have septic tanks or other onsite wastewater systems, which are managed by their local council.

7.3.2 Recycled water

The recycled water produced at Bendigo WRP is supplied to a range of uses. Bendigo has a Class A recycled water scheme that includes residential, industrial and public open space usage. Biosolids are reused for agricultural purposes.

7.4 Recent projects

Recent projects completed in the Coliban North system relevant to the UWS include:

- Decommissioned Jackass Flat rural system to reduce rural system water losses.
- Commenced investigation of Managed Aquifer Recharge in the Campaspe Deep Lead as a means to store and supply water to the Coliban North system.
- Replaced a section of Emu Valley (Eppalock) no 2 channel with a pipeline direct from the Eppalock pipeline to reduce water losses.
- Completed upgrade of the Heathcote WTP.
- Completed upgrade of Bendigo WTP sludge drying beds.
- Upgraded the Bendigo WRP Class A production process to meet updated Department of Health treatment requirements.
- Re-commenced cropping of farmland at the Bendigo WRP, enabling reuse of recycled water and improve the quality of the site soils.
- Upgraded recycled water reuse system at the Heathcote Golf Course.
- Completed the Bendigo Town Vision and Water and Resource Recovery Plan (WARRP), which considers long term needs of the town.
- Completed Bendigo Groundwater Project on behalf of DELWP and commenced groundwater dewatering and treatment.
- Reduced the reserve volume from 24 months to 12 months to align with other systems that can access allocation from the water market.

7.5 Outlook

7.5.1 Water resource

Without further action, demand is expected to surpass yield in the Coliban North system by 2037. Work is needed in the medium term to ensure that we can continue to meet agreed levels of service to our customers in the event of drought. Due to the large amount of growth in the region, a range of projects will need to be delivered to keep up with demand.

A summary of the outlook for the Coliban North System is shown in Table 15 and Figure 10 below. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).*

Table 15 - Coliban North System current and forecast water demand (GL/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**18**	18	18
Current yield	**26**	21	18
Year that demand equals yield	**2037**	2024	2021
Demand at 2070	**40**	45	42
Yield at 2070	**17**	8	16
Additional yield required in 2070	**23**	37	25

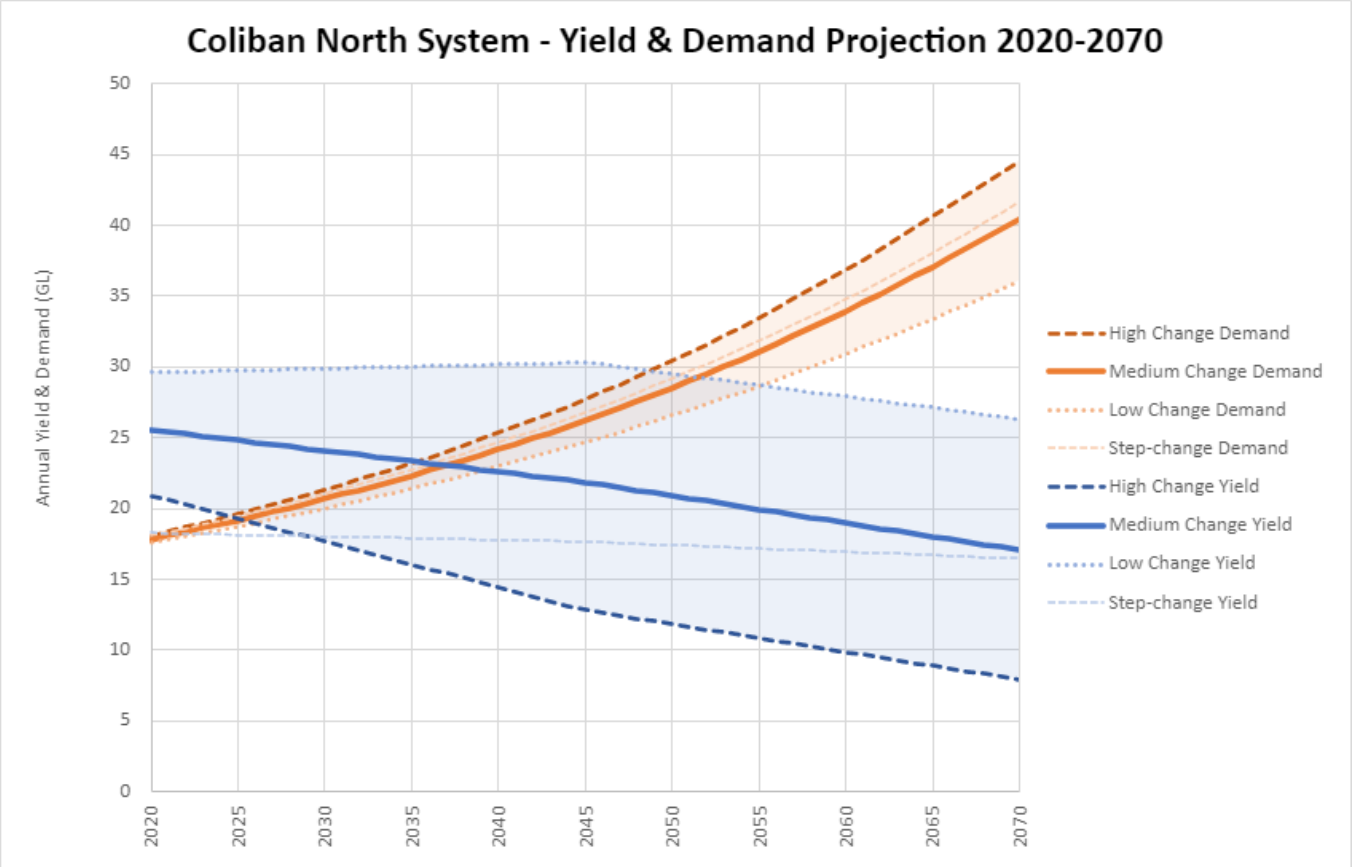

Figure 10 - Coliban North System yield and demand

The first step in our planning is to develop a long-list of options for how to address this shortfall between supply and demand. The long list of options for the Coliban North system is shown in Table 16 below.

Table 16 Coliban North System options for supply

Option	Supply	Cultural / social	Time to production	Relies on rain?	Description
Expansion of class B recycled water network	◐ ○ ○	Medium	Medium	No	There are two parts to this project: * Expanding Class B around Epsom WRP * Expand Class B network to include irrigation demand at Huntly
Managed aquifer recharge	● ● ○	Low	Long	No	The Campaspe Deep Lead downstream of Lake Eppalock is a proposed as a case study in the Coliban Region to develop information and provide a template for further application.
Expansion of Class A recycled water production capacity at Bendigo WRP	● ● ○	High	Long	No	Expansion of current Class A recycled water scheme.
Rural modernisation (6 systems)	● ● ○	High	Long	No	Potential modernisation of Ascot, Axe Creek, Cockatoo Hill, Emu Valley North, Lockwood and/or Specimen Hill rural channel systems to reduce water losses.
Additional resource through water market	● ● ●	Low	Short	Yes	Purchase of additional water allocations.
Decentralised WRP public open space	◐ ○ ○	Medium	Medium	No	Decentralised WRP treatment plants in the growth areas west of Bendigo and water to be reused in open space and residential areas.
Indirect potable reuse	● ● ○	Medium	Long	No	Treating Class A water from Epsom WRP and supplying to Sandhurst Reservoir.
Water Loss Reduction (Sandhurst)	◐ ○ ○	Low	Medium	No	Water loss reduction includes a suite of options, including reuse of backwash water in Bendigo and Heathcote WTPs and evaporation reduction measures for storages
Rainwater tanks for new developments	● ● ○	High	Long	Yes	Rainwater tanks to be installed on residential houses and connected to irrigation and toilets.

The above list is in addition to ongoing demand management programs and other actions outlined in Section 2.6 Delivering Integrated Solutions.

This list is then refined to a short-list based upon factors such as cost, environmental and social benefits and considering legislation, Government policy settings and regulations. For Coliban North, short-listed options are:

- Expansion of Class B recycled water network in Epsom/Huntly for public open space.
- Managed aquifer recharge opportunity to Campaspe Deep Lead.
- Expansion of Class A recycled water production capacity at Bendigo WRP.
- Modernisation of rural channel systems to reduce water losses.
- Purchase additional entitlement from the water market

7.5.2 Water treatment

Work is needed in the medium term to ensure that the Bendigo WTP has enough capacity to continue to meet the demands of a growing population. This will be completed progressively over time. The Heathcote WTP has sufficient capacity to meet long term demand.

7.5.3 Wastewater management

The Bendigo WRP is close to capacity. Works are needed to increase capacity in the short term, as well as to reduce odour at the site. This will be accomplished by an upgrade of the sludge treatment systems. Additional treatment capacity for Bendigo will be needed in the medium term. Planning of this work is well underway,

including discussions with key stakeholders. A focus area for the plant is consistent production of Class A recycled water and exploring opportunities for additional recycled water customers.

A project is underway to reconfigure the Class A recycled water network in Bendigo. The project will see a tank installed at Spring Gully Reservoir in order to improve quality and pressures delivered to customers in the network.

A key objective of the recent Heathcote WTP upgrade was to reduce the volumes of wastewater discharged to sewer. The impact of these will be assessed to determine future upgrade requirements of the Heathcote WRP.

7.6 Actions

Coliban North system actions
Water resource actions
We will investigate options to address future water demand/supply imbalance. This includes considering a managed aquifer recharge and securing additional entitlement from the water market.
We will investigate further modernisation of the rural channel network to reduce water losses over the short term.
We will review the process of determining rural system allocations to equitably share the available resource or optimise available water resources.
We will fit digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.
We will implement other water resource and catchment protection initiatives as per the Coliban South system.
Water treatment actions
We will implement progressive upgrades of the Bendigo WTP to maintain capacity over the medium term.
Wastewater management actions
We will implement the Bendigo WRP sludge treatment project in the short term to increase capacity of the WRP, reduce odour emissions, reduce risk of wet weather releases to Bendigo Creek and to enable consistent production of Class A recycled water.
We will implement further progressive sewage treatment capacity upgrades for Bendigo over the medium term. This may include development of a second WRP for Bendigo.
We will upgrade the Bendigo Class A recycled water network over the short term.
We will assess current performance of the Heathcote WRP to determine future upgrade requirements in the short term.
We will increase Class A recycled water production to 1.5 GL/year in Bendigo and seek additional recycled water customers to offset potable and raw water use.
We will explore the environmental benefit of releases from Bendigo WRP to Bendigo Creek to inform the volume of water available for recycling.

8. The Coliban South System

The Coliban System Southern supplies the towns of Castlemaine, Kyneton, Maldon, Newstead, Malmsbury, Harcourt, Elphinstone, Tylden and Taradale. The system area is shown in Figure 11. The existing population serviced by the Coliban South System is greater than 21,000 people. The Coliban South system also includes an extensive rural network for supply of raw water including the modernised Harcourt rural system.

Figure 11 Coliban South System area

8.1 Water resource

8.1.1 Demand

Total demand in the Coliban South System is currently 3,761 ML per year, with the majority made up of residential demand in Kyneton and Castlemaine. A summary of water demands for the Coliban South System is show in Table 17. Note that the table below does not include rural water use – please refer to the Rural system section 8.1.4.

Table 17 Coliban South System Current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**3,761**	1,843	192	194	834	79	91	528
2070	**6,537**	3,671	260	257	1,117	103	120	1,009

8.1.2 Water entitlements

We are entitled to all the storage capacity of the Upper Coliban, Lauriston and Malmsbury Reservoirs under the bulk entitlement for the Campaspe River, with an average annual take of up to 50,260 ML (which includes an average annual take of 17,440 ML from Lake Eppalock).

The bulk entitlement from the Campaspe system accounts for the supply of all urban commitments and rural entitlement, as well as water losses within the distribution system and passing flows.

8.1.3 Water sources

Raw water for the Coliban South System is supplied from the Upper Coliban, Lauriston and Malmsbury reservoirs.

8.1.4 Rural system

The Coliban South system supplies raw water to over 600 customers across five rural systems. These range from smaller stock and domestic type users to much larger agricultural operations. Over the last three years, these customers have used between 1800 to 2400 ML of their current total annual entitlement of 10.1 GL.

8.2 Water treatment

Raw water is treated at water treatment plants in Castlemaine and Kyneton and supplied to customers through the water supply network. A summary of the treatment plants and their indicative capacity is shown in Table 18. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Table 18 Coliban South System water treatment plants

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Castlemaine	Castlemaine Elphinstone Taradale Maldon Newstead Harcourt Guildford Fryerstown	14.6	13	19
Kyneton	Kyneton Malmsbury Tylden	5.8	5	7.3

8.3 Wastewater management

8.3.1 Water reclamation plants

Wastewater is collected through our sewer networks and treated at water reclamation plants at Kyneton and Castlemaine. Our plants also treat wastewater from commercial sites in accordance with trade waste agreements and consents. These businesses range from cafes to food processing and other large industries.

Wastewater is treated at two WRPs:

Castlemaine WRP treats wastewater from Castlemaine, Harcourt, Maldon and Newstead for reuse at the Castlemaine Golf Course and environmental releases to Campbells Creek consistent with our EPA licence.

Kyneton WRP treats wastewater via two process streams:

- Domestic treatment plant for treatment of largely residential wastewater from Kyneton, Trentham, Tylden and Malmsbury. Treated water is reused through the Kyneton Class B recycled water network for irrigation or environmental releases to the Campaspe River consistent with our EPA licence.
- Trade waste treatment plant for trade waste customers in Kyneton. Treated wastewater is reused for irrigation.

8.3.2 Recycled water

The recycled water produced at our water reclamation plants is supplied to a range of local uses. Biosolids are reused for agricultural purposes. Kyneton has a Class B recycled water network which supplies customers in the local area for watering of public open space or agricultural irrigation.

8.4 Recent projects

Recent projects completed in the Coliban South system relevant to the UWS include:

- Commenced groundwater investigations in the Kyneton area to identify alternative raw water sources.
- Implemented "A Healthy Coliban Catchment" project. We are working together with the North Central CMA and Traditional Owners the Dja Dja Wurrung, to implement a 20 year plan, 'A Healthy Coliban Catchment' project, to protect the upper section of the Coliban River and its long-term water supply, while boosting habitat connectivity, sustainable land use practices, and building cultural and lifestyle value across the region.
- Improved visitor facilities and land management at reservoirs.
- Full commissioning of the Harcourt rural modernisation project.
- Decommissioned Poverty Gully rural system to reduce water losses.
- Implemented the Kyneton WRP Solutions Project to increase capacity of the trade waste treatment, storage and reuse systems.
- Implement Kyneton Offsets Project which aims to have a positive impact on water quality and catchment health in the Coliban River.
- Completed the Castlemaine and Kyneton Town Visions and Water and Resource Recovery Plans, which consider long term needs of the towns.
- Fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.

8.5 Outlook

8.5.1 Water resource

Without further action, demand is expected to surpass yield in the Coliban South system by 2037. Work is needed in the medium term to ensure that we can continue to meet agreed levels of service to our customers in the event of drought. Due to the large amount of growth in the region, a range of projects will need to be delivered to keep up with demand.

A summary of the outlook for the Coliban South system is shown in Table 19 and Figure 12 below. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).*

Table 19 Coliban South current and forecast water demand (GL/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**6.5**	6.6	6.5
Current yield	**8**	6.6	7
Year that demand equals yield	**2037**	2020	2028

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand at 2070	**9.4**	10.4	9.7
Yield at 2070	**5.7**	3	6.5
Additional yield required in 2070	**3.7**	7.4	3.2

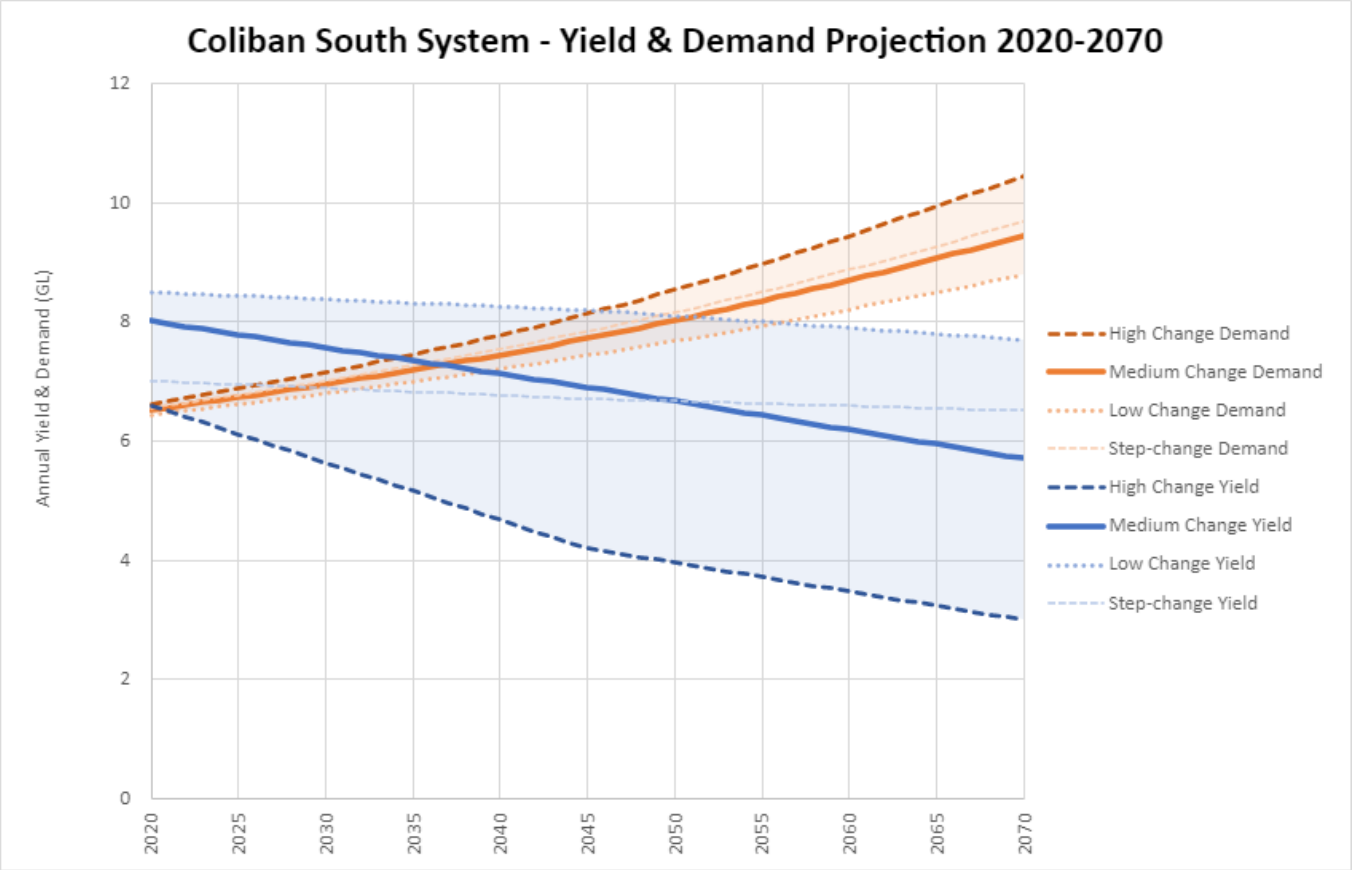

Figure 12 Coliban South System yield and demand

The first step in our planning is to develop a long-list of options for how to address this shortfall between supply and demand. The long list of options for the Coliban South system is shown in Table 20 below.

Table 20 Coliban South System options for supply

Option	Supply	Cultural / social	Time to production	Relies on rain?	Description
Kyneton Groundwater	●●○	Low	Short	No	Option to access groundwater (Central Victorian Mineral Springs, Coliban Zone) for Kyneton, and/or purchase existing groundwater license entitlements
Emu Valley South Rural Modernisation	●●●	High	Short	No	Modernisation of Emu Valley South rural channel system to reduce water losses.
Spring Gully Channel Rural Modernisation	◐○○	High	Short	No	Modernisation of Spring Gully rural channel system to reduce water losses.
Malmsbury Dam Wall	●●○	Low	Short	Yes	Raising height of Malmsbury dam wall to allow for increased operational flexibility and storage at Malmsbury reservoir.
Castlemaine Link	●●●	Low	Long	No	Connection of a pipeline between Bendigo and Castlemaine to provide alternative water source to Coliban South system.
Expand class B network Castlemaine	◐○○	High	Medium	No	Expansion of Class B network for open space and botanical gardens.
Expand class B network Kyneton	●○○	High	Medium	No	Expansion of Class B recycled water network in Kyneton for irrigation.
Sewer Mining at Tylden	◐○○	High	Medium	No	Sewer mining for reuse in equine industry.
Rainwater tanks for new developments	●●○	High	Long	Yes	Rainwater tanks to be installed on residential houses and connected to irrigation and toilets.
Indirect potable reuse	●●●	High	Long	No	Additional treatment of treated wastewater to an appropriate level before release for indirect potable uses into Coliban Main Channel.

The above list is in addition to ongoing demand management programs and other actions outlined in Section 2.6 Delivering Integrated Solutions.

This list is then refined to a short-list based upon factors such as cost, environmental and social benefits and considering legislation, Government policy settings and regulations. For Coliban South, short-listed options are:

- Additional groundwater supply for Kyneton.
- Modernisation for Emu Valley South and Spring Gully rural channel systems to reduce water losses.
- Raising the height of the Malmsbury dam wall to provide operational flexibility and additional storage.
- Castlemaine link - a pipeline between Bendigo and Castlemaine.
- Expansion of Class B recycled water networks in Castlemaine and Kyneton.

8.5.2 Water treatment

The Kyneton and Castlemaine Water Treatment Plants are both close to capacity limits, with upgrades expected to be needed in the short to medium term in order to keep pace with growth in both towns.

8.5.3 Wastewater system planning

We are currently delivering the Kyneton Solutions Project to provide additional capacity at our Kyneton WRP.

Work is needed to upgrade the sludge treatment process at the Castlemaine WRP to reduce odour at the site and improve the quality of recycled water. This will help to facilitate additional recycled water customers in the future. This project is needed in the short-term, with further upgrades likely to occur at the site over time.

Current water use at our Castlemaine WRP is high. By installing a recycled water system at the site, we will be able to greatly reduce the water used at the site, freeing up supply for other uses.

8.6 Actions

Coliban South system actions
Water resource actions
We will further investigate other options to address a demand/supply imbalance over the short to medium term such as Kyneton groundwater and supply of water to Castlemaine from Lake Eppalock and the Waranga Western Channel via the Goldfields Superpipe.
Work with Dja Dja Wurriung, North Central Catchment Management Authority and Victorian Environmental Water Holder to optimise environmental flow releases from the Coliban storages for maximum cultural and environmental benefit. This includes increasing environmental flows to enable hydroelectricity generation at Lake Eppalock.
We will investigate further modernisation of the rural channel network to reduce water losses over the short term .
We will review the process of determining rural system allocations to equitably share the available resource or optimise available water resources.
Water treatment actions
We will implement progressive upgrades of the Castlemaine and Kyneton WTPs to maintain capacity over the short to medium term.
Wastewater management actions
We will continue to implement "A Healthy Coliban Catchment" and Kyneton Offsets projects.
We will implement Castlemaine WRP sludge treatment project in the short term to improve recycled water quality and reduce odour emissions.
We will implement further progressive sewage treatment upgrades for Castlemaine over the short to medium term to improve capacity and the quality of recycled water to enable further reuse.
We will install on-site recycled water system at Castlemaine WRP to reduce potable water usage over the short to medium term.
We will explore the environmental benefit of releases from Castlemaine WRP to Campbells Creek to inform the volume of water available for recycling.
We will build a new recycled water pipeline north of the Kyneton WRP to increase reuse of recycled water from Kyneton WRP.
We will explore the environmental benefit of releases from Kyneton WRP to the Campaspe River to inform the volume of water available for recycling.

9. The Campaspe System

The Campaspe System supplies the town of Goornong. The system area is shown in Figure 13. The population serviced by the Campaspe System is approximately 650 people.

Figure 13 Campaspe System area

9.1 Water resource

9.1.1 Demand

Total demand in the Campaspe System is currently 96 ML per year. This is predominantly residential demand and non-revenue water. A summary of water demands for the Campaspe System is show in Table 21.

Table 21 Campaspe System current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**96**	35	2	1	4	2	3	49
2070	**125**	48	2	1	4	2	3	65

9.1.2 Water entitlements

The bulk entitlement (Campaspe – Coliban Water) Conversion Order 1999 allows us to take up to an annual volume of 349 ML from the Campaspe River, subject to Campaspe system water allocations, with a minimum allocation of 174.5 ML (50%).

9.1.3 Water sources

Raw water for the township of Goornong is sourced from the Campaspe River..

9.1.4 Water storages

There is a 6 ML raw water storage basin upstream of the Goornong WTP.

9.2 Water treatment

Raw water is treated at the Goornong WTP. A summary of the treatment plants and their indicative capacity is shown in Table 22. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Table 22 Campaspe System water treatment plants

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Goornong	Goornong	0.43	0.23	0.27

9.3 Wastewater management

9.3.1 Water reclamation plants

There is no wastewater network for the township of Goornong. Townships without wastewater systems generally have septic tanks or other onsite wastewater systems. Local councils are responsible for the developing and managing domestic wastewater programs and plans.

9.4 Recent projects

We have fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.

9.5 Outlook

9.5.1 Water resource

The Campaspe system is considered secure and able to meet demand to 2070.

A summary of the outlook for water supply and demands for the Campaspe system is shown in Table 23 and Figure 14. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).*

Non-revenue water in the Campaspe System is particularly high. Although the system is considered secure, demand management initiatives such as water efficiency and leak detection are a focus to maximise water available for other uses.

Table 23 Campaspe System current and forecast water demand (ML/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**95**	96	94.8
Current yield	**214.2**	210.2	203
Year that demand equals yield	**N/A**	N/A	N/A
Demand at 2070	**125**	152.5	142.4
Yield at 2070	**212.4**	206.4	207.5
Additional yield required in 2070	**0**	0	0

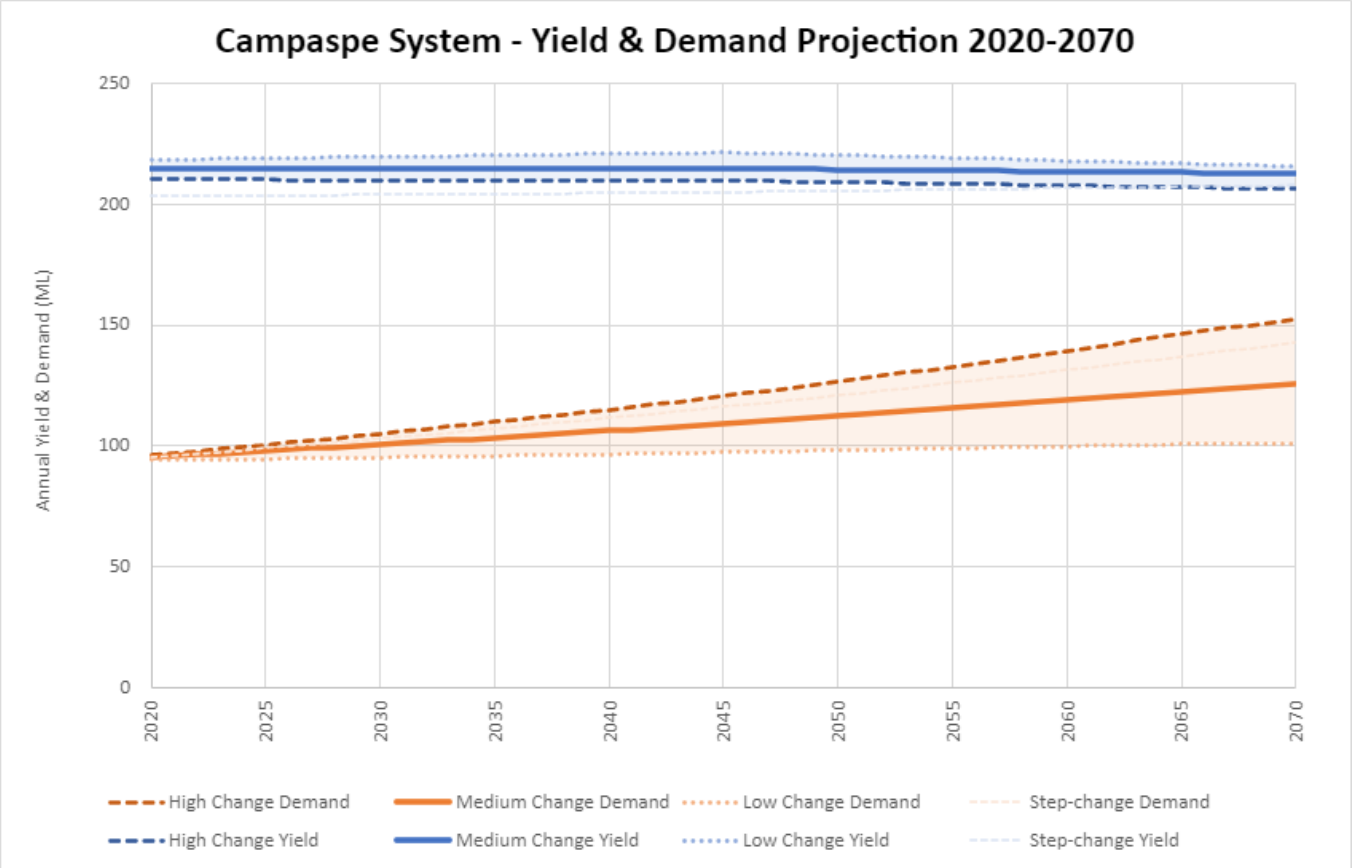

Figure 14 Campaspe System yield and demand

9.5.2 Water treatment

Upgrade works are planned at the Goornong WTP in the short to medium term to improve treated water quality and address a range of asset issues. This project may also involve using water form a different source such as groundwater.

9.6 Actions

Campaspe system actions
We will investigate groundwater as a source of water for Goornong WTP in the short to medium term.
We will upgrade Goornong WTP in the short to medium term.
We will investigate demand initiatives such as water efficiency measures and leak detection in order to reduce the high amount of non-revenue water generated within the Campaspe system.

10. The Trentham System

The Trentham System only supplies the town of Trentham. The system area is shown in Figure 15Figure 5. The existing population serviced by the Trentham System is 1,180 people.

Figure 15 Trentham System area

10.1 Water supply

10.1.1 Demand

Total demand in the Trentham System is currently 149 ML per year. This is predominantly made up of residential demand. The Trentham system is currently experiencing the highest rate of growth of any system within the our region. A summary of water demands for the Trentham System is show in Table 24.

Table 24 Trentham System current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**149**	85	5	4	1	1	10	43
2070	**656**	420	9	7	1	1	17	201

10.1.2 Water entitlements

The Bulk Entitlement (Trentham) Conversion Order 2012 allows us to take up to 360 ML over 3 three years (averaged to 120 ML/y) from two reservoirs. We have a licence to take and use up to 103 ML/yr of groundwater from 3 bores. This is summarised in Table 25.

Table 25 Trentham System bulk entitlements

Town	Water Source	Entitlement (ML/yr)
Trentham	Reservoirs	120
Trentham	Groundwater bores	103

10.1.3 Water sources

All water supplied to Trentham is sourced from a natural spring at the WTP site or from nearby groundwater bores.

10.1.4 Water storages

All raw water is stored in two open reservoirs of 32 ML and 57 ML respectively at the Trentham WTP.

10.2 Water treatment

Water is treated at the Trentham WTP, and supplied to town via gravity. A summary of the treatment plants and their indicative capacity is shown in Table 26. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Table 26 Trentham System water treatment plant

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Trentham	Trentham	0.7	0.64	1.36

10.3 Wastewater management

10.3.1 Water reclamation plants

All wastewater from Trentham is collected in the local sewer reticulation, and pumped to the Kyneton WRP.

10.3.2 Recycled water plants

Treated wastewater from Kyneton WRP is reused within the Class B recycled water network, irrigated onsite or released to the Campaspe River in conditions consistent with our EPA licence.

10.4 Recent projects

Recent projects completed in the Trentham system relevant to the UWS include:

- Secured additional groundwater for Trentham (55 ML/year) and continuing groundwater investigations.
- Increased water treatment plant capacity.
- Installed facilities to enable tankering of water to the WTP if required.
- Completed the Trentham Town Vision and WARRP which looks at the long term needs of the town.
- Undertaken works to reduce network losses including leak detection and remediation, renewal of the Trentham Water Main and installation of pressure sensors.
- Fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.

10.5 Outlook

10.5.1 Water resource

Without further action, demand is expected to surpass yield in the Trentham system by 2027. Work is needed within the next five years to ensure that we can continue to meet agreed levels of service to our customers in the event of drought. Our current strategy to manage this risk is to investigate and secure an additional resource from groundwater bores in the area.

A summary of the outlook for the Trentham system is shown in Table 27 below and Figure 16. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).*

Table 27 Trentham System current and forecast water demand (ML/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**148**	150	148
Current yield	**185**	179	181
Year that demand equals yield	**2027**	2027	2027
Demand at 2070	**676**	808	725
Yield at 2070	**182**	152	175
Additional yield required in 2070	**494**	656	550

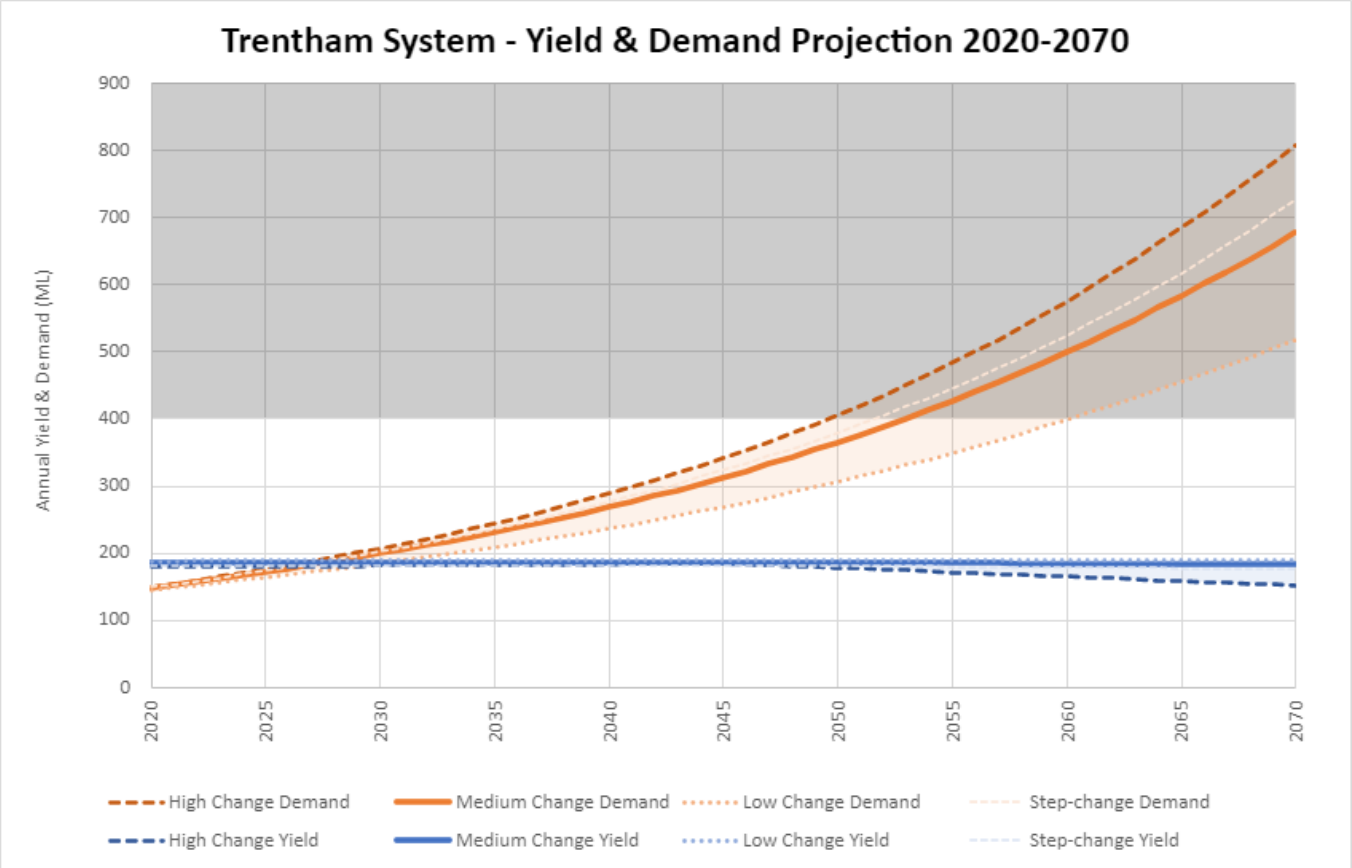

Figure 16 Trentham System yield and demand

The first step in our planning is to develop a long-list of options for how to address this shortfall between supply and demand. The long list of options for the Trentham system is shown in Table 28 below.

Table 28 Trentham System options for supply

Option	Supply	Cultural / social	Time to production	Relies on rain?	Description
Additional groundwater source	●●○	Low	Short	No	Additional water resource provided by additional groundwater bores
Pipeline from Kyneton to Trentham	●●○	Medium	Medium	No	Connection of a pipeline between the Kyneton water treatment plant and the Trentham network to supplement current supply.
Recycled water (sewer mining)	◐○○	High	Long	No	A treatment plant at Trentham to supply a recycled water scheme.
Water resource loss prevention	●○○	Low	Long	No	Reduction in water lost from the Trentham Reservoirs as evaporation and seepage.
Rainwater tanks for new developments	●○○	Medium	Long	Yes	Rainwater tanks to be installed on residential houses and connected to irrigation and toilets.

The above list is in addition to ongoing demand management programs and other actions outlined in Section 2.6 Delivering Integrated Solutions.

This list is then refined to a short-list based upon factors such as cost, environmental and social benefits and considering legislation, Government policy settings and regulations. For Trentham, short-listed options are:

- Further investigation of additional groundwater supplies in the area
- A pipeline connection between Kyneton and Trentham to supplement the existing demand

10.5.2 Water treatment

Trentham is subject to high levels of growth. The current WTP requires capacity upgrades to keep pace with this growth which will be delivered in the medium term. There is also a short-term need for additional storage at the Trentham WTP to allow for sufficient security of supply to customers and operational flexibility on high demand days.

10.5.3 Wastewater management

We are currently delivering the Kyneton Solutions Project to provide additional capacity at our Kyneton water reclamation plant.

10.6 Actions

Trentham system actions
We will continue to explore opportunities for additional groundwater in Trentham in the short term.
We will install additional treated water storage at Trentham WTP in the short term.
We will upgrade Trentham WTP to meet additional capacity requirements in the medium term. This may include connecting Trentham to the Coliban South system to provide additional water to supplement the current resource.
We will review the capability of the Trentham WTPs in the short to medium term to handle blue green algae blooms.

11. The Elmore System

The Elmore System only supplies the town of Elmore. The system area is shown in Figure 17. The existing population serviced by the Elmore System is greater than 770 people.

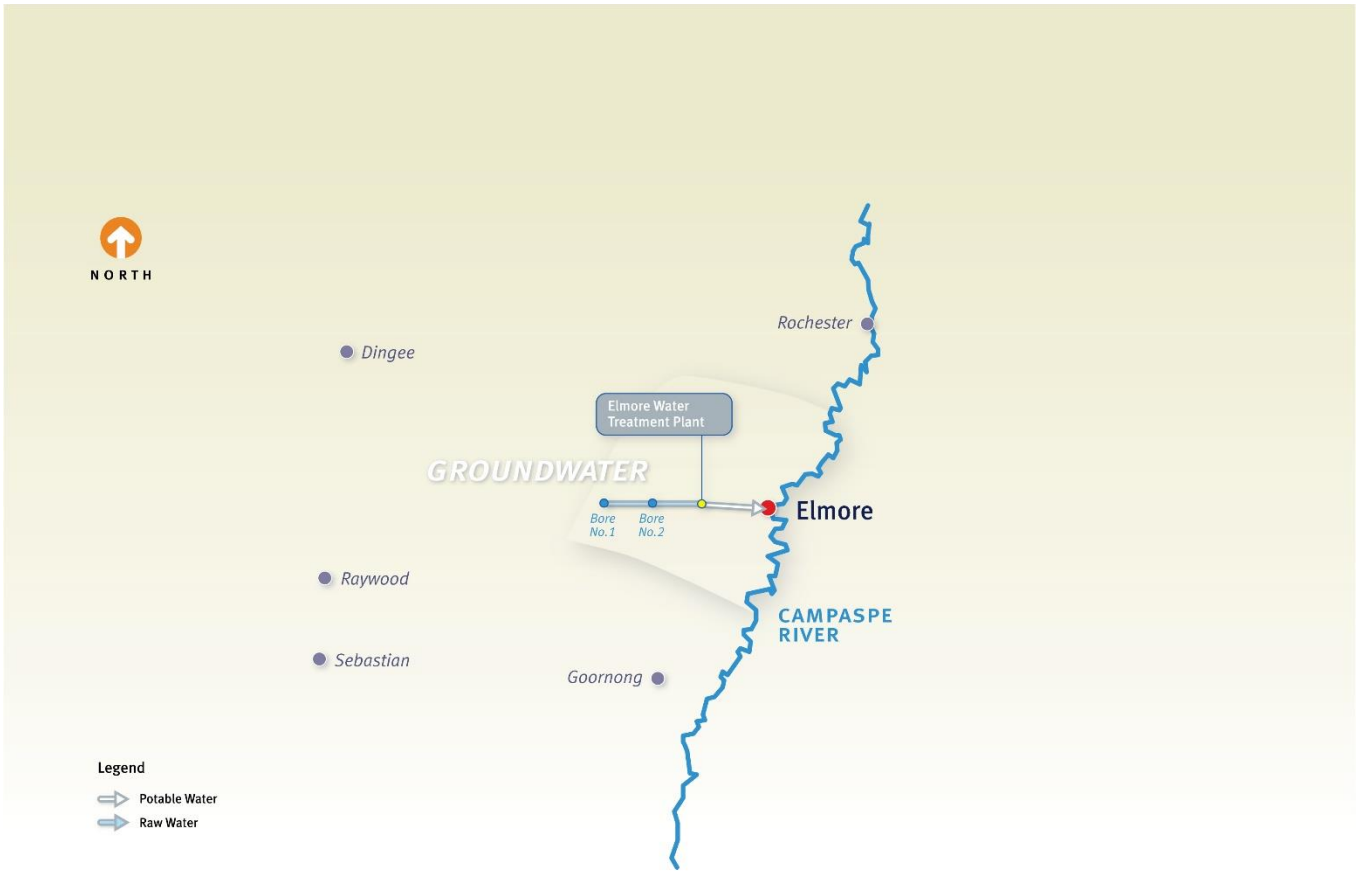

Figure 17 Elmore system area

11.1 Water supply

11.1.1 Demand

Total demand in the Elmore System is currently 142 ML per year. This is predominantly residential demand. A summary of water demands for the Elmore System is show in Table 29.

Table 29 Elmore System current and forecast water demands (ML/year)

Demand ML/year	TOTAL	Residential	Commercial	Community	Industrial	Non-Res Other	Public Space	Non-Revenue
Current	**142**	72	8	6	0	11	21	24
2070	**185**	103	9	6	0	12	22	33

11.1.2 Water entitlements

Elmore water entitlements are summarised in Table 30.

Table 30 Elmore System bulk water entitlements

Town	Water Source	Licence Volume (ML/yr)
Elmore	Groundwater	284

11.1.3 Water sources

Water for Elmore is sourced from two groundwater bores. Groundwater Resources are managed by Goulburn-Murray Water under the Lower Campaspe Valley Water Supply Protection Area Groundwater Management Plan.

11.1.4 Water storages

There is no raw water storage within the Elmore system.

11.2 Water treatment

Raw water is treated at the water treatment plant in Elmore and supplied to customers through the water supply network. A summary of the treatment plants and their indicative capacity is shown in Table 31. Demand is represented as average day of the peak month, typical of demands seen in the height of summer, while capacity is noted as typical 16-hour plant operation. It is possible to operate plants for longer than this to provide additional capacity on a short-term basis.

Table 31 Elmore water treatment plant

Treatment Plant	Towns Serviced	Current Capacity (ML/day)	Current Demand (ML/day)	2045 Demand (ML/day)
Elmore	Elmore	2.5	1.58	1.7

11.3 Wastewater management

11.3.1 Water reclamation plants

Wastewater is collected through our sewer networks and treated at the water reclamation plant near Elmore. Our plants also treat wastewater from commercial sites in accordance with trade waste agreements and consents. These businesses range from cafes to food processing and other large industries.

11.3.2 Recycled water plants

Recycled water is reused onsite for irrigation. Biosolids are periodically removed from the lagoons and reused in accordance with EPA requirements.

Since the last UWS in 2017 we have established a new biosolids processing facility at the Elmore WRP to enable future local reuse of this valuable material.

11.4 Recent projects

We have recently fitted digital data loggers to customer meters to assist in determining leaks in customers' homes, saving on water and reducing costs to customers.

11.5 Outlook

11.5.1 Water resource

A summary of the outlook for the Elmore system is shown in Table 32 below and Figure 18. Our base case scenario for planning is based upon the medium climate change scenario developed by CSIRO, as is

recommended by the *Guidelines for Assessing Impact of Climate Change on Water Availability in Victoria, DELWP (2020).* Under this scenario, the Elmore system is secure and able to meet demands out to 2070.

Table 32 Elmore System current and forecast water demand (ML/year)

Climate change and population growth scenario	Medium (base case)	High	Step-change
Demand	**142**	144	142
Current yield	**202**	169	203
Year that demand equals yield	**N/A**	2030	N/A
Demand at 2070	**185**	210	190
Yield at 2070	**203**	135	203
Additional yield required in 2070	**0**	75	0

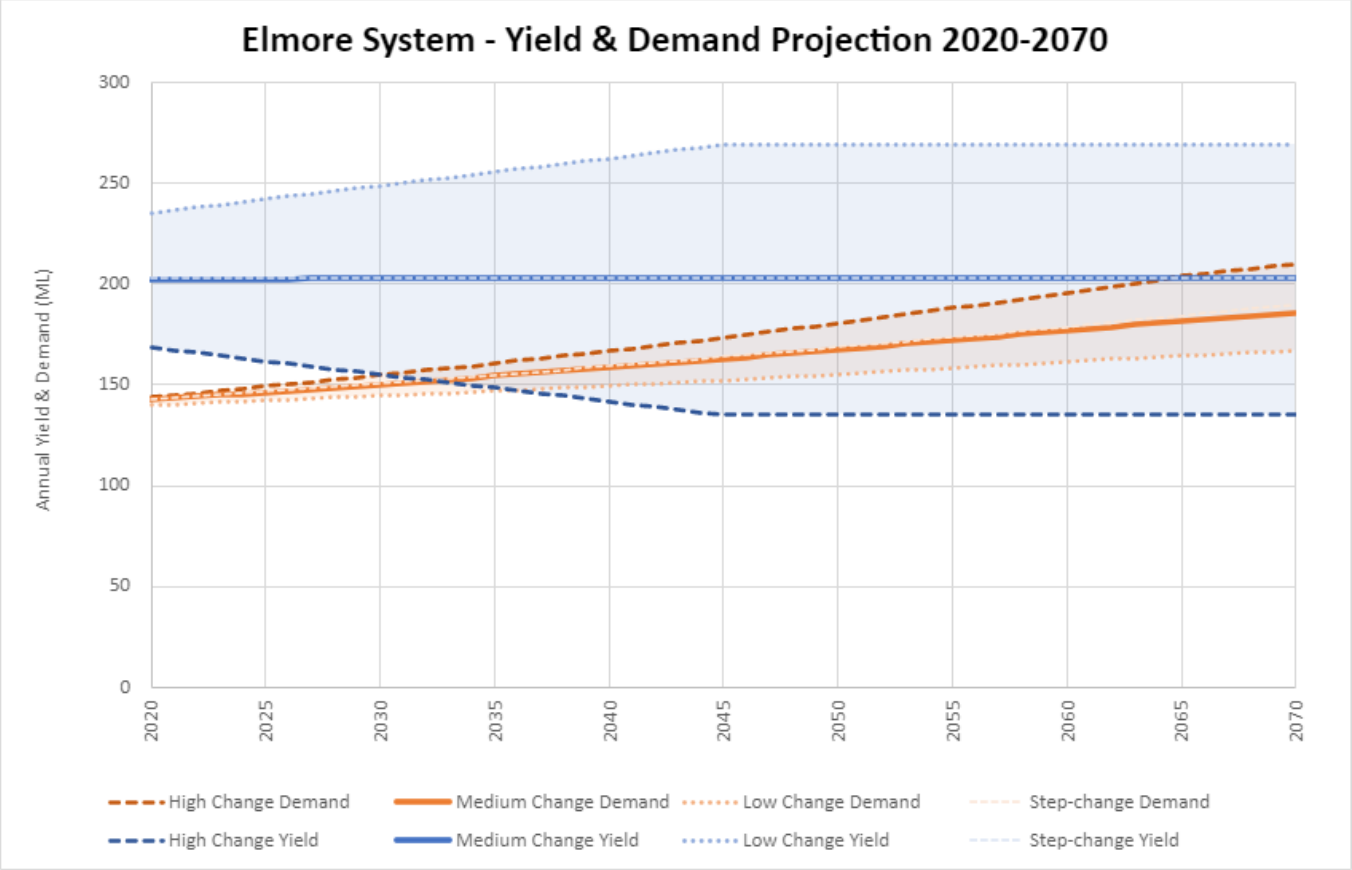

Figure 18 Elmore System yield and demand

11.5.2 Water treatment

The Elmore WTP has capacity to meet long-term demand in the town without major upgrade works.

11.5.3 Wastewater management

The Elmore WRP has capacity to meet long-term expected inflows.

11.6 Actions

As the current water resource position for the Elmore system is considered secure and Elmore's treatment plants have capacity to meet growth in the area, there are no immediate actions proposed for the Elmore system.

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