Water for our Future

water
FOR OUR FUTURE

Barwon Water

Community Panel
Background Report

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With less rain and a hotter climate, it's time to think differently about how we use water and where it comes from.

How can we create a water future that balances all our needs?

Welcome

On behalf of Barwon Water, welcome to the *Water for our Future* Community Panel.

Thank you for investing your time and lending your community expertise to help shape the future of water in our region.

We have a challenge ahead of us. While we can design solutions to this challenge on our own, we know we get better outcomes when we work alongside our customers and community.

Your contribution as a member of the *Water for our Future* Community Panel will ensure those outcomes are inclusive and representative of our community.

Since August 2019, we have been talking to our community and regional partners about our long-term water security and the challenge we face. We have heard what our region values about water and what we need to keep in mind when planning for the next 50 years.

The *Water for our Future* Community Panel will now take that conversation to a deeper level and, through carefully considering research, evidence, expert opinion and your own experiences, make decisions and recommendations that will influence our next steps.

Your role as a panellist is important and will make a difference.

With your fellow panellists, you have an opportunity to think openly and creatively about how we can continue to provide water for our region as our climate becomes hotter and drier.

You will set a vision for our water future that will provide a lens for our decisions for years to come. Together, we not only want to ensure there is enough water to meet our needs, but also explore how we can harness the value of water to support a prosperous region, a thriving economy, liveable communities and a healthy environment.

Barwon Water is committed to understanding and listening to our community to ensure our decisions reflect the values of the people who live and do business in our region.

Through the *Water for our Future* program, we have elevated that commitment by partnering with our community to co-design our new water future.

On behalf of the Barwon Water board and executive team, we look forward to following your journey on the *Water for our Future* Community Panel and receiving your recommendations.

We wish you all the best with your deliberations.

Jo Plummer
Chair

Tracey Slatter
Managing Director

Acknowledgement

We recognise Aboriginal and Torres Strait Islander peoples as the First Peoples of this nation. We proudly acknowledge the Traditional Custodians of the land and water on which we rely, and pay respects to their Elders, past, present and emerging.

We value the continuing cultures and contributions of Aboriginal and Torres Strait Islander peoples to our communities and their ongoing connection to the land and water over thousands of years.

About us

Who we are

Our history dates back more than 110 years to the establishment of the Geelong Municipal Waterworks Trust in 1908. Barwon Water was constituted in February, 1994 and is a state-owned entity established under the Water Act 1989.

A major employer in the region, Barwon Water has more than 300 operational, engineering, strategic planning, financial and administrative staff.

We manage all aspects of water and wastewater supply for serviced customers in our region.

Our vision

is for an economically, socially and environmentally prosperous region.

Our mission

is to strengthen our region's economy, liveability and sustainability, through the delivery of high quality and affordable water and sewerage services.

Our customers

We are responsible for serving a population of more than 320,000 permanent residents over 8,100 square kilometres. During the holiday period, the serviced population can reach up to 545,000 people.

Domestic customers comprise 92 per cent of the customer base, with the industrial and commercial sectors accounting for the remaining 8 per cent. Approximately 30 per cent of metered consumption is attributed to non-domestic customers, such as businesses and industries.

Our community

We believe anyone who enjoys or feels connected to our region is part of our community, whether or not they pay a Barwon Water bill. This includes tourists and residents in our region who may not be connected to our water and sewerage infrastructure.

Our region

Our region includes the geographic areas where we provide our services and the catchment areas from which our water is sourced.

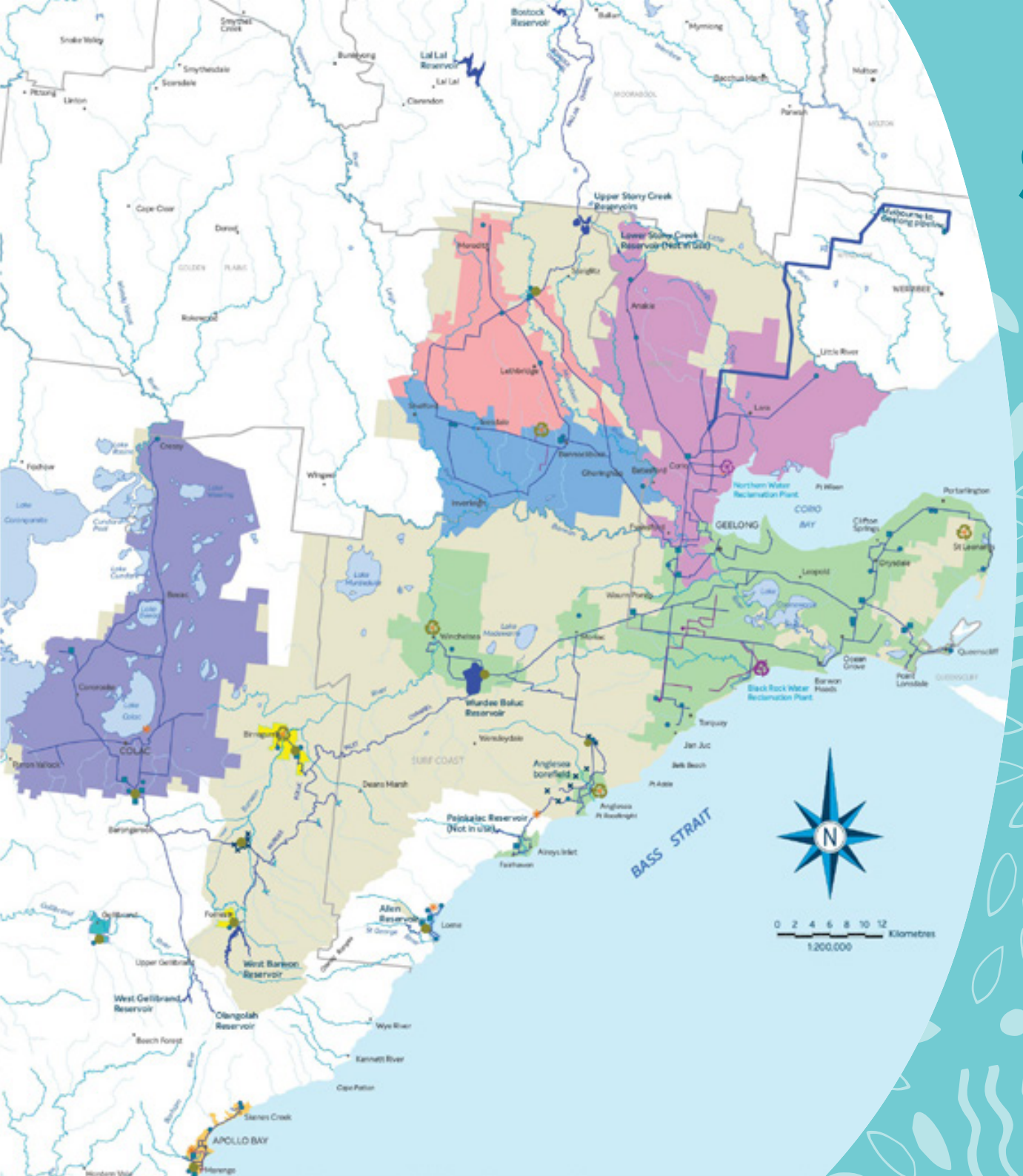
Our service area stretches from Little River and the Bellarine Peninsula in the east to Colac in the west, and from Meredith and Cressy in the north to Apollo Bay on Victoria's south-west coast.

The City of Greater Geelong, Borough of Queenscliffe, Surf Coast and Colac Otway shires and part of Golden Plains Shire are incorporated in our service area.

Our catchment areas stretch slightly beyond our service area, encompassing reservoirs east of Ballarat and south of Colac.

We service a population of more than 320,000 permanent residents over 8,100 square kilometres. Over the holiday period, the serviced population can reach up to 545,000 people

Service Area



Legend

- Serviced Areas
- Lakes, Rivers
- Barwon Water reservoir
- Water pipeline/ channel
- Water treatment plant (WTP)
- Groundwater production bore
- Water basin/ tank
- Class A recycled water plant
- Class A recycled water pipeline
- Class A recycled water tank
- Water reclamation plant with recycling
- Water reclamation plant (WRP)

Where your water comes from

- East & West Moorabool River
- Barwon River & Anglesea borefield (when in use)
- Barwon River, East & West Moorabool River & Anglesea borefield (when in use)
- Barwon River, East & West Moorabool River & Anglesea borefield/ Melbourne's Yarra & Thomson River (when in use)
- Gellibrand River and Barwon River (when operating)
- St George River
- Barham River
- Barwon River
- Lardners Creek

Our relationship to Country

Australia's Traditional Owners have an extensive, deep and sophisticated understanding of the Australian environment. Their comprehensive knowledge and personal connection to Country and the environment enabled them to live successfully in harmony with the natural environment for many thousands of years. During this time, they have adapted and thrived within periods of significant climate fluctuations.

Our service region includes parts of the traditional homelands of the Wadawurrung and Eastern Maar Traditional Owners.

Our Reconciliation Action Plan (2018) outlines how we strive for respectful and meaningful relationships with Traditional Owners and Aboriginal Torres Strait Islander communities, which support a shared commitment to Caring for Country. This includes the incorporation of Aboriginal and Torres Strait Islander values into everything we do and the services we provide.

A recent outcome from this action plan was the development of principles for how 'Caring for Country' could be applied to the way we work. Traditional Owners were engaged in this process, with key themes being realised around two categories: **Care for Country** and **Connection to Country.**

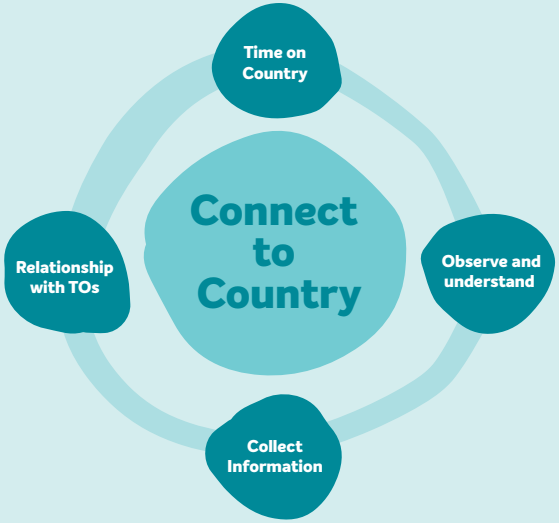
This work is ongoing and Barwon Water is committed to incorporating these values into the way we operate today and set ourselves to respond to the challenges of the future.

Care for Country

Four major themes emerged during discussions about Caring to Country. They provide principles for **how** to care for Country

Connect to Country

Four major themes emerged during discussions about Connection to Country. They provide guidance on **how** to build and maintain our connection.



Strategy 2030

Barwon Water is proud of its long history of delivering safe and reliable water and wastewater services. Our vision and mission have been strongly tied to the safe and environmentally responsible delivery of services.

But how we are doing it is changing - We are moving from a utility service provider to an enabler of regional prosperity.

Recognising the challenges of climate change, population growth, rapid technological advancement and economic transition, we know we need to be more than a just service delivery organisation to our customers so we can continue to be a relevant and valuable organisation to our community.

Building on our core business success, we are now entering a new phase in the organisation's history where we are shifting our mindset from water utility to being a leader of the region's prosperity.

What we do

We provide high quality, affordable and secure water, sewer and recycled water services and in doing so, deliver outstanding customer and community value.

Water

We provide world-standard, high-quality, safe drinking water for our customers by managing the entire water supply system from catchment to taps.

Greater Geelong

Greater Geelong's water is supplied from three major river systems – the Barwon River and its tributaries, the East Moorabool River and the West Moorabool River.

The Otway Ranges feed the Barwon system, which typically supplies 80 per cent of water for Geelong, the Bellarine Peninsula and Surf Coast. The balance is supplied from catchments that feed the Moorabool system. The Moorabool system also provides water to the smaller townships of Bannockburn, Gheringhap, Teesdale, Shelford, Meredith and Inverleigh.

Greater Geelong can also access water from other sources, including the Yarra and Thomson rivers in central Victoria via the Melbourne to Geelong Pipeline (MGP). Groundwater can also be accessed from the Lower Eastern View Aquifer at Anglesea via the Anglesea borefield.

Barwon Water no longer has a licence to access groundwater from the Barwon Downs borefield, which is located in the foothills of the Otway Ranges, approximately 70 kilometres south west of Geelong and 30 kilometres south east of Colac.

The Barwon Downs borefield supplied up to 70 per cent of Geelong's daily water needs at the peak of the Millennium Drought in 2007 and was last used in 2016. In 2019, we withdrew our application to renew the extraction licence for the Barwon Downs borefield. Instead, we are focusing on remediation of environmental impacts caused by the historic management of groundwater pumping.

Colac and the Otway region

Water supplied to Colac and the Otway region is drawn primarily from West Gellibrand and Olangolah reservoirs. The Colac system provides water to urban and rural districts extending as far north as Cressy. A new pipeline interconnecting the Colac system to the Geelong system was completed in 2017, meaning that if Colac's water supply is low, it can be boosted with water from the Barwon system that is being supplied to Geelong via the Wurdee Boluc Inlet Channel.

Gellibrand, Apollo Bay/Skenes Creek and Lorne all have their own water supply systems.

Sustainable Water Use

We currently supply around 35,000 million litres of water annually across our region.

Barwon Water helps customers save water and encourages water efficient behaviour by:

- offering residential customers a reliable plumbing service to repair or replace inefficient water fittings and fixtures such as tap washers and toilet cisterns
- supporting primary and secondary schools through the Schools Water Efficiency Program to identify leaks and support the repair through a rebate and grants program
- partnering with communities to help provide advice, education and support to reduce their water use
- providing customer support and data loggers for non-residential and agricultural customers to help identify leaks and opportunities for more efficient water use or drinking water substitution (such as recycled water)
- promoting the Permanent Water Saving Rules, which set out simple, common-sense rules that apply every day of the year to conserve water now and for the future
- providing customers educational materials, information, tips and advice on how to be more water efficient
- responding to general customer enquiries regarding water efficiency.

We also play an active role in our community through our comprehensive education program which includes guided tours (on hold at present due to COVID-19), virtual education sessions and online resources to help schools and community groups learn about the water cycle, water conservation and awareness and the process of capturing and treating water and sewage.

Wastewater

Wastewater from our homes, business and industry is also known as sewage. It's 99.8 per cent water, so it can be recycled and reused in a number of ways.

We are responsible for collecting and treating wastewater in our service area – in total, around 50 million litres of wastewater enters our sewerage system daily.

Barwon Water has 11 water reclamation plants that treat our wastewater, 10 of which are governed by Environmental Protection Authority (EPA) Victoria licensing requirements.

Black Rock is our largest water reclamation plant, processing approximately 25,000 million litres of wastewater from Greater Geelong and surrounds in 2019–20. Other smaller plants dealt with a total of 5,100 million litres across the rest of our service area over the same period.

Black Rock, Anglesea, Apollo Bay and Lorne plants discharge treated wastewater through ocean outfalls. Plants at Aireys Inlet, Bannockburn, Portarlington, Birregurra and Winchelsea are land-based systems, meaning that treated wastewater is used to irrigate land.

Treated wastewater from the Colac plant is released into Lake Colac, topping up the lake with around 2,100 million litres in 2019–20.

All of our water reclamation plants produce treated wastewater that can be put to productive use – this is known as recycled water. Any water that cannot be recycled is either discharged to the ocean or other waterways or is used to irrigate land.

The Northern Water Plant is an advanced recycled water facility that supplies high quality recycled water for industrial use in Geelong's northern suburbs.

Recycled water

Maximising productive use of our main waste stream – recycled water – from our water reclamation plants is a key priority under Strategy 2030. Our aim is to optimise high value uses of this resource, with discharge being an option of last resort.

We supply recycled water to about 50 commercial customers in the Geelong region. Approximately half of the total volume is supplied to Viva Refinery in North Geelong from the Northern Water Plant, which produces Class A recycled water. The remainder is sourced from the Black Rock Recycled Water Plant and supplied to agricultural customers.

In 2019–20, we started using the Black Rock Recycled Water Plant to supply new residential developments at Armstrong Creek and Torquay North. 235 million litres of Class A recycled water was supplied via our dedicated "purple pipe" network to 6,138 residential customers for garden watering, car washing and toilet flushing.

We are working with interested customers to pursue opportunities to use recycled water from Bannockburn and Winchelsea water reclamation plants and on the Bellarine for more productive high value uses, including agricultural, horticultural and recreational applications.

Our 2018 Price Submission included a commitment to increase the volume of recycled water put to productive use by an extra 1,000 million litres over five years, from approximately 2,600 million litres in 2017–18 to 3,600 million litres by 2022–23. The extra 1,000 million litres will be a combination of an increase in Class A residential customers, growth from Class C customers and productive use on Barwon Water–owned land.

Barwon Water's long term vision for recycled water reflects the strong potential for recycled water to be a key part of our role as an enabler of regional prosperity. By 2030, our aim is to achieve 100 per cent water recycling from our wastewater treatment plants so that all water sources are put to their highest value and best use.

What we don't do

Barwon Water plays a significant role in the management of bulk water resources and the supply of water services in our region. We also work closely with a number of other organisations who are responsible for other aspects of the water cycle.

Organisation	Roles & responsibilities in relation to water management
Policy-makers & regulators	
Department of Environment, Land, Water and Planning (DELWP)	DELWP is responsible for the overarching management of Victoria's groundwater, catchments and waterways; infrastructure, water saving and re-use projects; flood management; governance and water legislation. DELWP works in partnership with a network of government agencies and authorities, some of which are described below.
Department of Health and Human Services (DHHS)	The Safe Drinking Water Act places obligations on water suppliers to supply safe, good quality drinking water in accordance with the Australian Drinking Water Quality Guidelines. DHHS safeguards Victoria's drinking water supplies to both protect and enhance public health and wellbeing in accordance with the Act and Guidelines by regulating water corporations such as Barwon Water
Environment Protection Authority (EPA)	The EPA's role is to be an effective environmental regulator and an influential authority on the impacts on the environment. The EPA has an important role in the regulation of discharge of wastewater. For systems discharging less than 5,000 litres per day, regulatory responsibilities are shared with local government authorities. Any system discharging greater than 5,000 litres per day, such as the 10 water reclamation plants managed by Barwon Water, requires an EPA licence.
Essential Services Commission (ESC)	The ESC regulates a number of services to meet the long term interest of Victorian consumers with respect to the price, quality and reliability. Water corporations are monopoly businesses, meaning customers do not have a choice of provider like they do for electricity or gas. The ESC protects the interests of water customers by assessing and approving water prices, developing customer codes and guidelines, monitoring performance of water corporations and conducting inquiries, studies and reviews.
Southern Rural Water (SRW)	SRW provides rural water services. It is the organisation responsible for the regulation of surface and groundwater licensing and storage dams across southern Victoria. While the role of SRW impacts a number of industries and developments, a large portion of its work is with the agricultural sector.

Organisation	Roles & responsibilities in relation to water management
Environment	
Victorian Environmental Water Holder (VEWH)	The VEWH is an independent body that was established to hold and manage Victoria's water for the environment.
Corangamite Catchment Management Authority (CCMA)	The CCMA is responsible for the integrated planning and coordination of land, water and biodiversity management in the region stretching from Geelong to Ballarat and along the Surf Coast to Peterborough. The CCMA prepares Regional River Health strategies to set out actions to improve environmental condition of our rivers.
Planning & stormwater	
Local Government Authorities: **City of Greater Geelong** **Borough of Queenscliffe** **Colac Otway Shire** **Golden Plains Shire** **Surf Coast Shire**	In addition to being planning authorities, Local Government Authorities are responsible for the management of stormwater in urban areas including curb, channel and stormwater treatment through constructed wetlands and lakes. Local government is also jointly responsible with the EPA for the approval of wastewater treatment systems discharging less than 5,000 litres per day. This includes septic tanks, greywater treatment systems and composting toilets.

How we are governed

Barwon Water and its operations are established under and governed by key pieces of Victorian Government legislation.

We have a nine-member Board of Directors, which includes the Managing Director, as well as a six-person Executive Leadership Team.

Barwon Water is established under the Water Act 1989. Barwon Water operates under a Statement of Obligations issued by the Minister for Water under the Water Industry Act 1994, which provides specific guidance on how Barwon Water is to perform its functions under the Water Act 1989.

Legal framework

Water entitlements

The Water Act 1989 provides the legal framework for allocating surface water and groundwater throughout Victoria. Under the Act, responsibility for managing water (use, flow and control) is vested in the Crown through the Minister for Water. It is the most powerful piece of legislation impacting rivers, streams and groundwater in Victoria.

The Act governs entitlements to water from all rivers, streams and groundwater systems in Victoria. It allows authorities such as water corporations and individuals to use water under entitlements, which set out how much water can be harvested and under what conditions. Water can also be traded.

Water corporations

Under the Act, Victoria's water and wastewater services are provided by 19 state-owned corporations.

The water corporations provide a range of water services to customers within their areas consisting of water supply, wastewater disposal and treatment, water delivery for irrigation, drainage and salinity mitigation services. The water corporations are funded by fees and charges they collect from their customers.

Water corporations may hold water entitlements such as bulk entitlements, water shares and take and use licences to supply or support the supply of water to their customers. Copies of our entitlements can be found on the Victorian Water Register website at: *https://waterregister.vic.gov.au/water-entitlements/bulk-entitlements*

Statutory obligations

Water corporations are responsible for meeting their customers' water needs and are required to carry out short and long-term planning. They are also required to have emergency management plans to minimise service disruptions.

Since July 28, 2004, Barwon Water has operated under a Statement of Obligations issued by the Minister for Water under Section 41 of the Water Industry Act 1994. The statement can be found on the Department of Environment, Land, Water and Planning (DELWP) website at: *https://www.water.vic.gov.au/__data/assets/pdf_file/0015/54330/Statement-of-Obligations-General.pdf*

The statement imposes obligations on Barwon Water regarding the performance of its functions and exercise of powers. Barwon Water is required to monitor compliance with the obligations set out in the statement, report on non-compliance and take remedial action in relation to non-compliance.

The statement requires the development of urban water strategies by water corporations providing urban services, in accordance with guidelines issued by DELWP on behalf of the Minister.

Water resources planning framework

The Water Act 1989 sets out a framework that governs the planning and management of water resources across Victoria.

Statewide

In 2016, the Victorian Government set its long-term policy direction for managing Victoria's precious water resources, namely Water for Victoria.

Two key planning tools under the Water Act 1989 are Long-Term Water Resource Assessments and Sustainable Water Strategies, both of which are prepared by DELWP (see table to the right).

Long-Term Water Resource Assessments are required to be carried out every 15 years. The assessment looks at whether long-term water availability has declined in each river basin and aquifer and, importantly, if the decline has been shared equally between consumptive uses (e.g. agriculture, industry, cities and towns) and the environment.

The first assessment for southern Victoria was recently completed and can be found on the DELWP website at: *https://www.water.vic.gov.au/planning/long-term-assessments-and-strategies/ltwra*

Sustainable Water Strategies are used to manage threats to the supply and quality of water resources to protect environmental, economic, cultural and recreational values. Each strategy has a 50-year outlook and focusses on one region of Victoria. These strategies set out a range of short, medium and long-term actions to improve river health and address water shortfalls due to the challenges of climate change and population growth.

The Central Region Sustainable Water Strategy was prepared in 2006. The Water Act requires sustainable water strategies to be reviewed every 10 years. Both the Central Region Sustainable Water Strategy and the review of this strategy can be found on the DELWP website at: *https://www.water.vic.gov.au/planning-and-entitlements/long-term-assessments-and-strategies/sws/central*

The Central Region Sustainable Water Strategy will be replaced by the upcoming Central and Gippsland Region Sustainable Water Strategy. More information on the strategy can be found on the DELWP website at: *https://www.water.vic.gov.au/planning-and-entitlements/long-term-assessments-and-strategies/sws/central-gipps-sws*

Barwon Water

Water corporations develop urban water strategies every five years to consider changes in population, demand, climate and other shocks and stressors to balance supply and demand across their service regions.

Barwon Water's last Urban Water Strategy was prepared in 2017 and can be found on the Barwon Water website at: *https://www.barwonwater.vic.gov.au/water-and-waste/urban-water-strategy*

However, some of the key assumptions underpinning this strategy are no longer current. For example, Barwon Water is no longer able to access water from the Barwon Downs borefield to supply Geelong and Colac.

We are partnering with our community and regional leaders to design a new water future for our region, through the *Water for our Future* program. This program will inform development of our next Urban Water Strategy, which is due to be finalised in March 2022.

Each year, water corporations publish an Annual Water Outlook that provides a concise overview of each water corporation's resource position for the coming year and any actions necessary for maintaining adequate supply. Barwon Water's 2019 Annual Water Outlook can be found on the Barwon Water website at: *https://www.barwonwater.vic.gov.au/water-and-waste/urban-water-strategy*

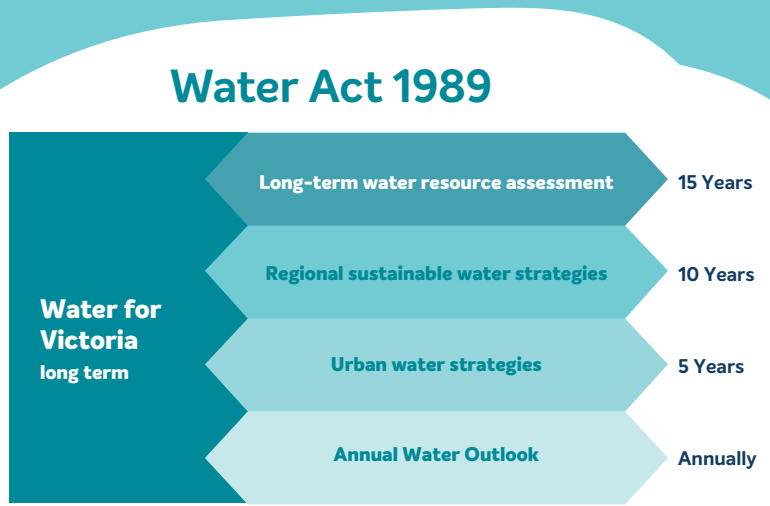


Figure 1. Water resources planning framework

Pricing

Unlike energy and telecommunications, customers do not have a choice who provides their water and sewerage services, rather it is determined by geographical location. Because of this, the services we offer and the prices we charge in return are independently regulated by the ESC (see table on page 11).

To continue to deliver high quality, affordable, secure water services for customer and community value, we require ongoing investment. Given the size of our asset base (estimated worth of $2.8 billion) and the long term nature of many assets, we have to consider how we will service growth, comply with all of our statutory obligations and replace assets over a 50-year time horizon.

These planned investments come at a cost. The size and timing of future investments, along with our tariff structure, impacts how much our customers will pay into the future.

Every five years Barwon Water prepares a plan that proposes:

- the service standards we will provide to our customers (water, wastewater and recycled water)
- capital and operating spending to deliver these services and meet regulatory obligations
- the prices that customers will pay in return.

This plan – known as a Price Submission – is submitted to the ESC for review and determination.

Prices are set in a way that ensures Barwon Water can collect sufficient revenue to cover operational expenses (to break even) over those five years.

Any water supply or demand management options proposed in our next Urban Water Strategy will need to be costed and included as part of our next Price Submission due in late 2022, for new prices to take effect from 1 July 2023.

Our challenge

Climate

Our priority is to ensure we plan and deliver a secure water future for our region. However, our water supply systems currently rely on a variable source – rainfall.

Over recent decades, Victoria's climate has become drier and warmer and the rain that falls in our catchments is not as plentiful as it once was. Greater fluctuations in seasonal conditions present real challenges for managing water supply security.

Traditionally, our major storages fill with water over winter and spring due to seasonal rainfall generating 'runoff' across our catchments.

Runoff occurs when rainfall generates more water than the ground can absorb. This extra water flows across the ground to nearby creeks and rivers.

Steady and regular rainfall is needed to soak our catchments and get runoff flowing into our storages. This water is stored in our major storages and then drawn down over summer when demand is higher due to hot, dry weather.

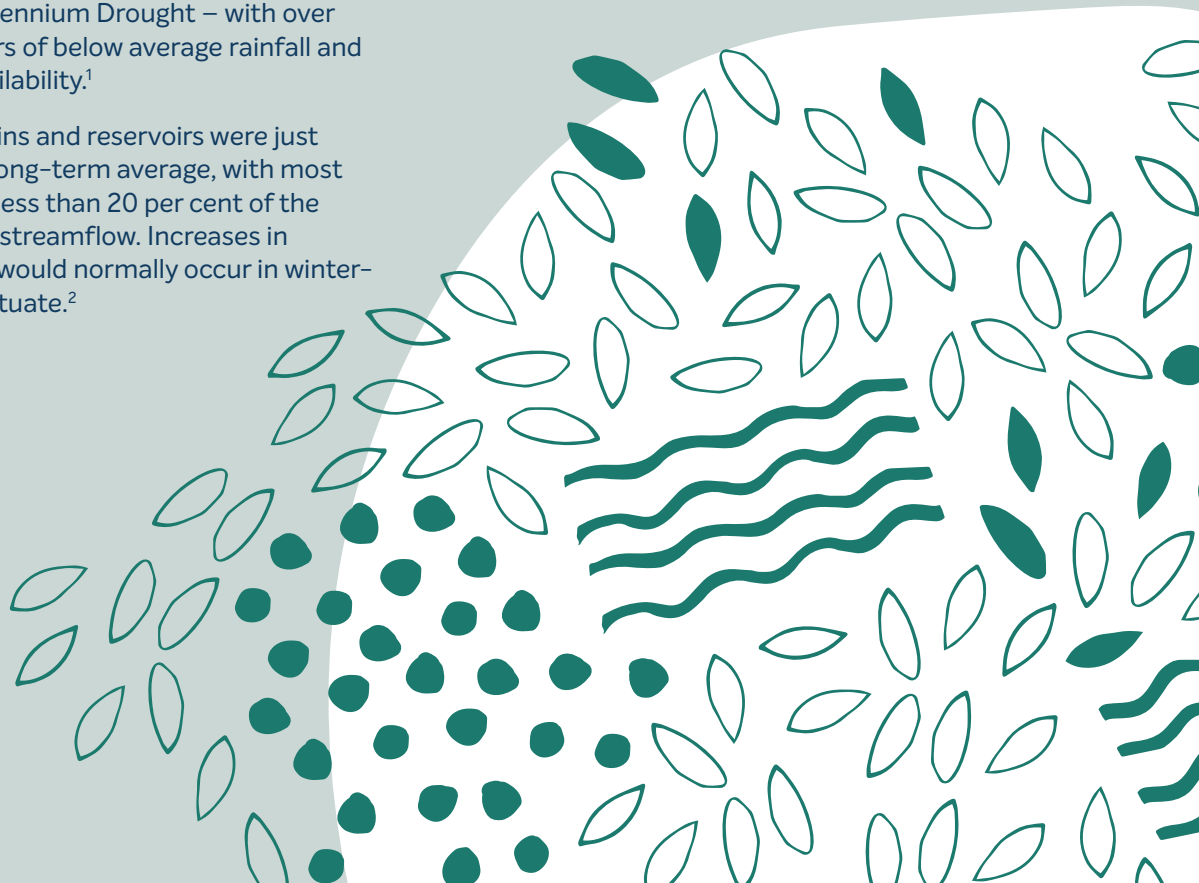
What we have already observed

Between late 1996 and early 2010, south-east Australia experienced the worst drought on record – known as the Millennium Drought – with over 10 consecutive years of below average rainfall and declining water availability.[1]

Inflows to river basins and reservoirs were just 26 per cent of the long-term average, with most systems recording less than 20 per cent of the long-term average streamflow. Increases in storage levels that would normally occur in winter-spring did not eventuate.[2]

A reduction in autumn rainfall meant that catchments were drier going into winter and spring, so less runoff was generated from the little winter and spring rainfall that did occur. In addition, there were no significant wet years during that period to help the ground retain moisture.

The overall effect was that soils and vegetation became dry, meaning that rainfall was, in the first instance, used by plants, leaving less water to runoff into creeks and rivers or recharge underground aquifers when rainfall did occur.



1 – 2 DELWP, 2016 The State of Victoria Department of Environment, Land, Water and Planning (2016), Managing extreme water shortage in Victoria – lessons from the Millennium Drought

The decline in annual rainfall, loss of high rainfall years, change in rainfall seasonality and increasing temperatures resulted in a major reduction in streamflows and inflows into major reservoirs during the Millennium Drought.

In our region, sustained low inflows in our catchments led to precariously low storage levels. Our major storages, such as the West Barwon and Wurdee Boluc reservoirs, which were designed to hold reserves to manage through dry years, were continuously drawn down without any 'top ups'.

Geelong's storages fell to 14 per cent by 2007, and we relied heavily on the Barwon Downs borefield to provide up to 70 per cent of Geelong's daily water needs . Without use of the Barwon Downs borefield, Geelong would have almost certainly run out of water.

For further reading about the Millennium Drought, visit the DELWP website:

https://www.water.vic.gov.au/planning/victorias-entitlement-framework/millennium-drought-report

Water restrictions were also required during the Millennium Drought so the demand for water could be met from the limited available supplies. Water restrictions saved close to 34,000 million litres of water, but during the worst of the drought, we had to impose Stage 4 water restrictions on our customers. Stage 4 water restrictions prohibit the watering of any outdoor space, amongst other restrictions, which had profound impacts on our community's liveability. For example, water restrictions in 2007 were so severe that only one in four sporting fields and public sporting facilities were allowed to be watered, meaning that grass did not survive and playing surfaces became unsafe.

In 2010, the Millennium Drought broke with major flooding resulting in the two wettest years on record for Australia (CSIRO, 2012). The Millennium Drought certainly challenged fundamental assumptions in how we manage and plan for water security.[3]

What might happen in the future

Our reliance on rainfall to fill our water storages means that climate variability has always been a feature of our water supply systems. We have dry years and wet years – the "droughts and flooding rains" of Dorothea McKellar's iconic poem.

For example, inflows to West Barwon Reservoir exceeded 70,000 million litres in 1978, but four years later we experienced our driest year on record, with just 5,000 million litres of inflows in 1982.

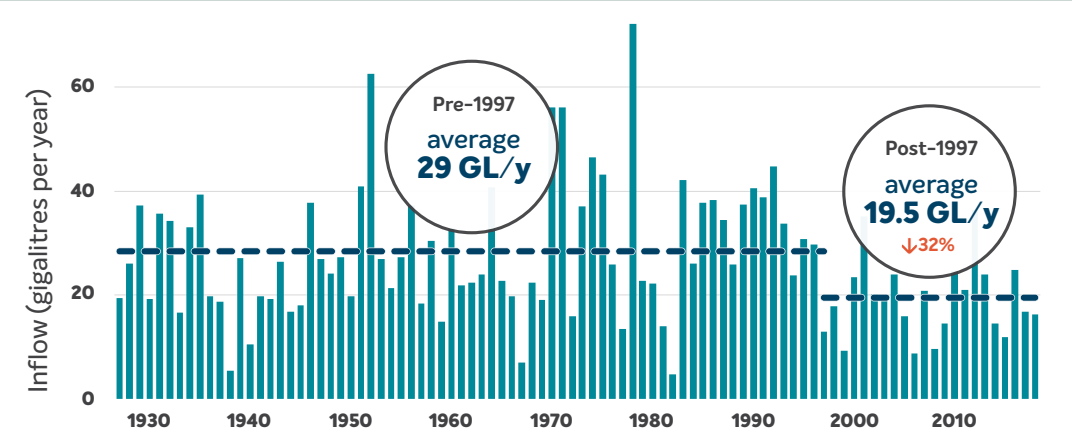
3. *DELWP, 2016 The State of Victoria Department of Environment, Land, Water and Planning (2016), Managing extreme water shortage in Victoria – lessons from the Millennium Drought*

However, since the onset of the Millennium Drought, we have seen a permanent reduction in inflows to our storages – a "step change" in average inflows over the past 30 years compared to the long-term average.

For example, West Barwon Reservoir in the Otways, one of our biggest catchments, has seen a 32 per cent reduction in annual inflows since 1997 compared to the long-term average. This equates to a quarter of the Greater Geelong region's annual water use. (Figure 2 on the next page.)

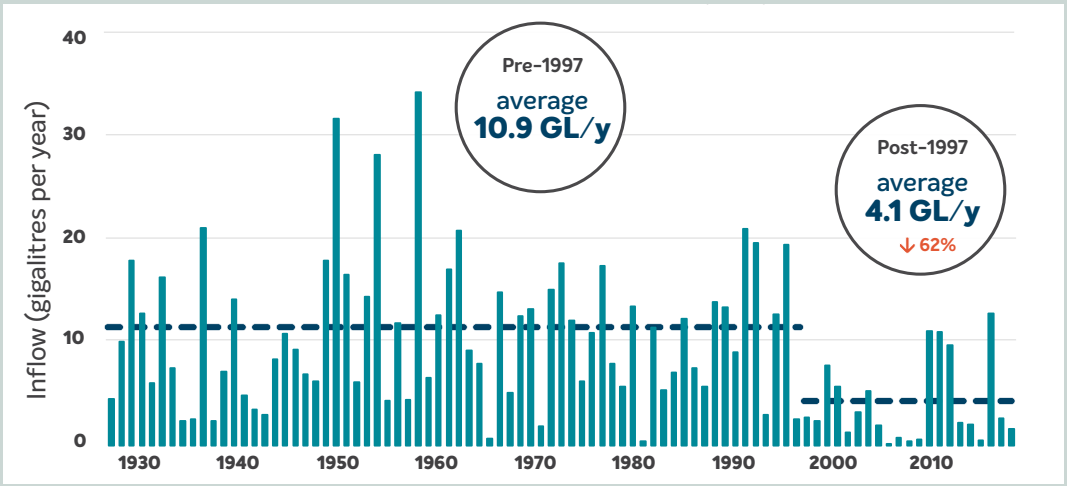
Annual inflows to West Barwon Reservoir have varied between 8,000 and 35,000 million litres since 1997.

Figure 2. West Barwon Reservoir yearly inflows



West Barwon Reservoir has seen a 32 per cent reduction in annual inflows since 1997 compared to the long-term average. GL = 1000 million litres.

Figure 3. Lal Lal Reservoir (Barwon Water share) yearly inflows



Lal Lal Reservoir, which forms part of the Moorabool catchment and also supplies water to parts of Geelong, has seen a 62 per cent reduction in annual inflows since 1997. GL = 1000 million litres.

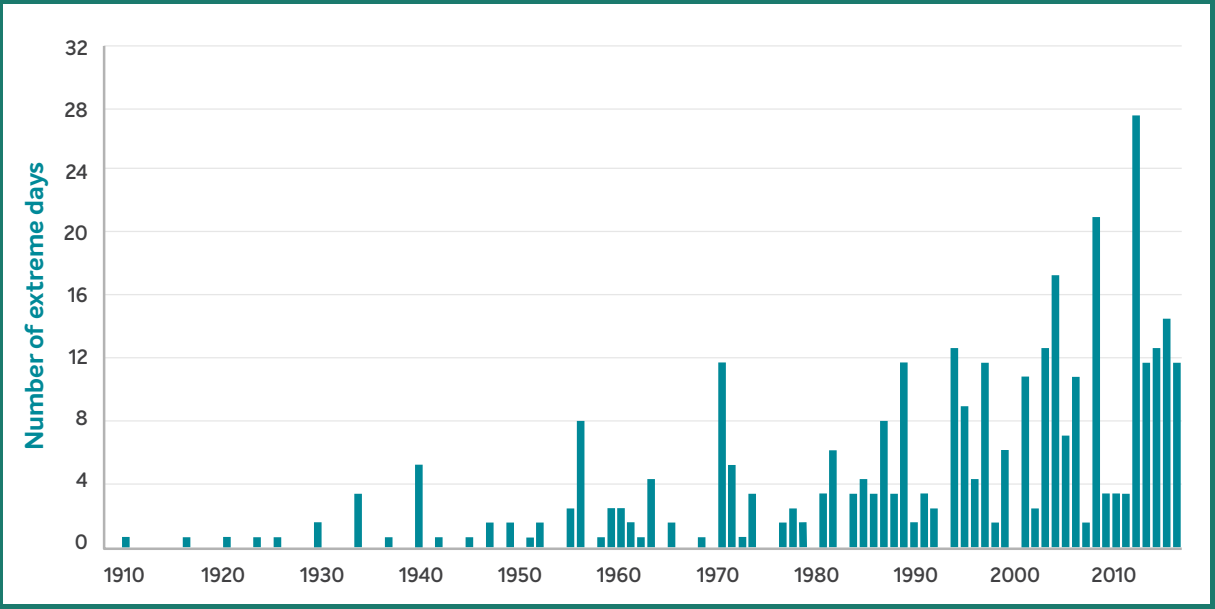
Science is also telling us that our climate is becoming warmer and drier, with predictions that by 2040, streamflow in our catchments could reduce by 30 per cent and by 2065, by up to 50 per cent under a high climate change scenario.[4]

Climate science data is suggesting we need to be planning for less rainfall in the future as weather patterns shift – resulting in more winter rain-bearing systems falling over the ocean rather than the southern part of Australia.

For our region, these shifting weather patterns mean it is likely the traditional autumn rainfall that wets the ground ahead of the typical winter-spring 'filling season' for water supply systems will become less reliable. This will reduce both the length and the effectiveness of the typical winter-spring 'filling season'.[5]

4 – 5 DELWP, 2016 The State of Victoria Department of Environment, Land, Water and Planning (2016), Managing extreme water shortage in Victoria – lessons from the Millennium Drought

Figure 4. Extreme heat events



**Number of days each year where the Australian area-averaged daily mean temperature is extreme. Extreme days are those above the 99th percentile of each month from the years 1910–2017. These extreme daily events typically occur over a large area, with generally more than 40 per cent of Australia experiencing temperatures in the warmest 10 per cent for that month.*

Climate change will also mean more extreme events more frequently, like bushfires, droughts, floods and heatwaves. Communities across Australia are already experiencing the impacts of more extreme heat events (Figure 4).[6]

Rising temperatures and reducing rainfall, river flows and runoff to our storages can increase human and environmental demand for water, impact on cultural values, productivity and health and also threaten water infrastructure.

Although scientific knowledge about climate change is continually evolving, there is inherent uncertainty about both natural climate variability and the future impacts of climate change. Given the effect of climate on both water demand and supply, it is essential that long-term water resource planning considers a wide range of future climate outcomes.

Further information about the impacts of climate change on our water supplies an be found on the DELWP website at: *https://www.delwp.vic.gov.au/__data/assets/pdf_file/0023/428054/ISBN-Managing-Climate-Change-Risk-Guidance-Water-Entities-20190702-02-.pdf*

6 Bureau of Meteorology

Case study

– *water scarcity in Perth*

Perth is famous for being an isolated provincial capital city surrounded by the Indian Ocean and the outback. Its position on the western side of the continent creates long, dry summers with steadily declining rainfall and an accompanying reduction in the water that flows into groundwater systems.

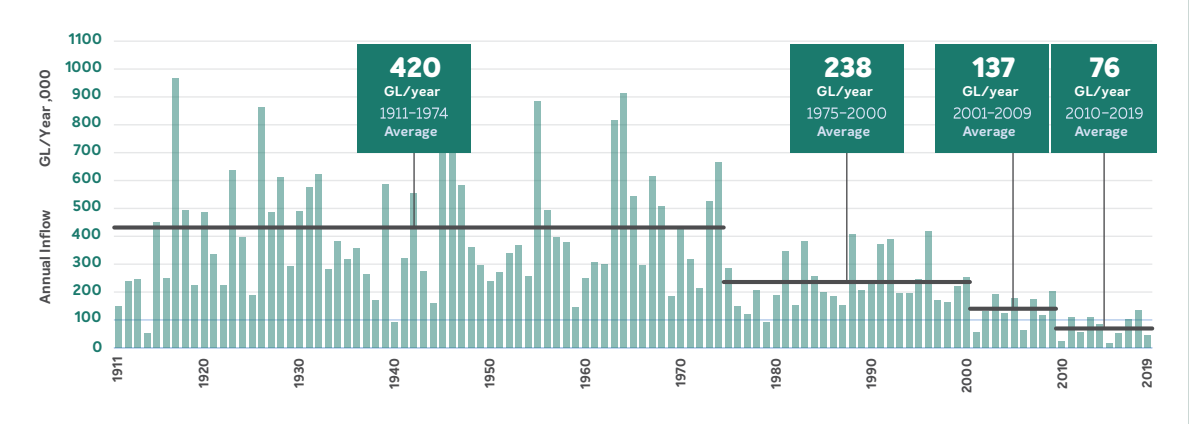
Perth has experienced the growing effects of climate change and is now drier and hotter than at any time in its recorded history. Rainfall has declined almost 20 per cent since the 1970s, and the amount of water flowing into the city's dams has fallen from an average of 300,000 million litres a year to just 25,000 million litres – a decrease of 80 per cent. Perth has seen multiple "step changes" in average inflows over this time (Figure 5).

Perth has avoided a water crisis through a multifaceted strategy that encourages water conservation, adds alternative sources of water to complement traditional supply, and seeks new ways to recycle both stormwater and wastewater.

The city now relies chiefly on groundwater and seawater desalination rather than dams. Seawater desalination now supplies almost half of Perth's water needs. More recently, Perth has begun trialling a groundwater replenishment scheme to recharge aquifers with treated wastewater. By 2060 groundwater replenishment could make up to 20 per cent of Perth's annual drinking water supply.[7]

7 *Water Corporation, Climate change continues to impact our water supplies https://www.watercorporation.com.au/Our-water/Climate-change*

Figure 5. Historic Streamflow into Perth's Dams



Growth

Victoria's population was 6.6 million at 30 June 2019 (Australian Bureau of Statistics, 2019). It is the second largest state in Australia by population and is expected to add another million people by 2026.

A growing population generates new urban development as well as shifts in land use, industry composition and demographics. However, the way we use water is also evolving, with new properties tending to have more water efficient appliances and smaller gardens, while customer awareness about the value of water continues to improve. Factors like these influence the level of demand for water across the cities and towns in our region.

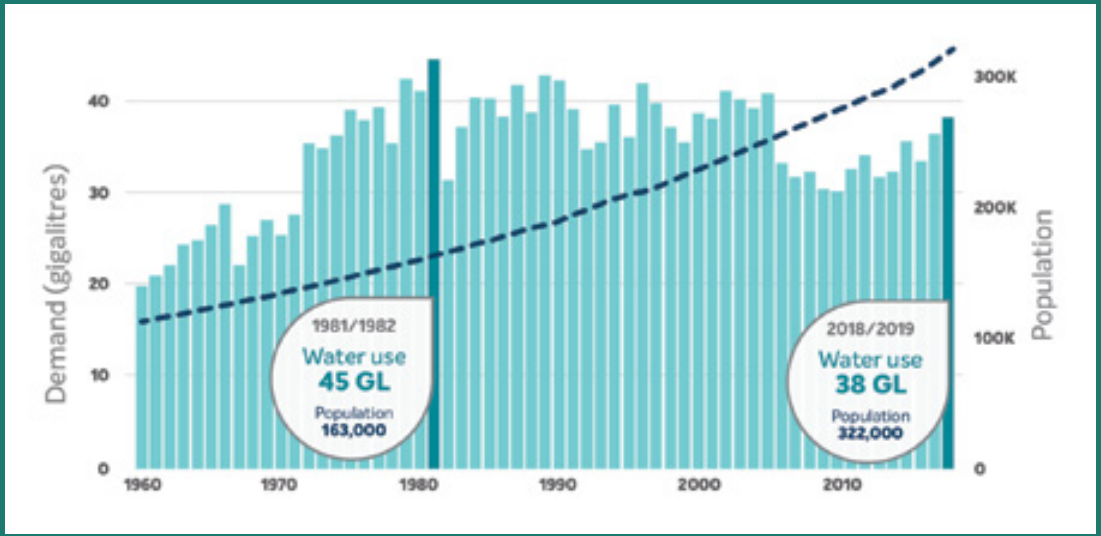
Barwon Water currently supplies about 35,000 million litres of water across our region annually. Our role as a water corporation is to service the needs of the population in our region. We do not regulate population growth, although we work closely with local and state government to ensure we provide water, wastewater and recycled water services that cater for growth in a sustainable and cost-effective manner.

Since the 1980s, our region's water use has reduced by 20 per cent despite our population almost doubling in this time from 163,000 to more than 300,000 people. This has been achieved through a variety of measures including water efficiency and conservation, improved technology, behaviour change, education and awareness campaigns and the introduction of recycled water.

Since 2010, people in Geelong have increased their use of water by 18 per cent, from 172 litres per person, per day to 203 litres per person, per day in 2019-20.

As our region continues to prosper, we expect the population to once again double to 670,000 people by 2065. By 2065, we could be using an extra 32,000 million litres of water a year (.idSAFI, 2019).

Figure 6. Our region's demand for water.



Affordability

Keeping prices for water, wastewater and recycled water services affordable for our customers is important if our region is to prosper.

Our region is socially and economically diverse, with some communities in our region among the most disadvantaged in Victoria.[8]

Depending on the type of business, the cost of water and sewerage services can also be an important consideration for industry. It is important that we keep prices for water, sewerage and recycled water services affordable for our residential and business customers to allow our region to prosper.

However, different sources of water come at different costs. This is due to the level of treatment required for different types of water and the cost of transferring water across the network.

Water sourced from our catchments costs less from an operational perspective because it requires little treatment and very low effort to transfer it through the network (e.g. the Wurdee Boluc Inlet Channel covers 55 kilometres and transfers water via gravity without the need for pumps). Recycled water can be 10–15 times more expensive than traditional surface water sources because of the need for highly advanced treatment and the requirement to pump it uphill.

Water Source	Indicative Variable Cost $ per million litres
Barwon surface water	40
Moorabool surface water	80 – 110
Anglesea groundwater	200
Melbourne-Geelong Pipeline	340
Class A recycled water from Black Rock	650

Table 1: *Indicative variable costs associated with the operation and treatment of existing water sources. Indicative variable costs do not include the start-up or shut down costs or any fixed annual costs.*

8 .idcommunity City of Greater Geelong
https://profile.id.com.au/geelong/seifa-disadvantage-small-area

Balancing urban and environmental needs

DELWP recently completed its first ever Long-term Water Resource Assessment for southern Victoria. This assessment considered whether long-term water availability has declined in each river basin and importantly, if the decline has been shared equally between consumptive uses (e.g. agriculture, industry, cities and towns) and the environment.

The Long-term Water Resource Assessment found that water availability has declined across Southern Victoria by up to 21 per cent in recent decades due to a drying climate. The assessment also found that decline in water availability has not always been shared equally, with the environment being impacted more than consumptive uses in some basins.

For our region, it was found that the amount of water available in both the Barwon and Moorabool river basins has declined by 11 per cent and 19 per cent due to climate. It was also found that the environment's relative "share" of available water for both rivers has decreased, whilst that available for consumptive use has increased. This means a smaller share of the available water is now set aside for the environment than it was before.

In practice, we can see the impacts of climate on river flows in our region, where low flow and even cease to flow events are happening more often in the Barwon and Moorabool rivers. Careful management of environmental flow releases will become even more important in future. For example, the Moorabool River near Batesford stopped flowing in January 2020. As a result environmental flow releases from Lal Lal Reservoir needed to be increased.

Based on the findings of the Long-term Water Resource Assessment, the Minister for Water has determined that a review of water sharing arrangements is required for seven river basins; Barwon, Moorabool, Werribee, Maribyrnong, Yarra, Latrobe, and Thomson. We currently rely on water from four of these seven rivers.

The Minister for Water has decided that opportunities to restore the balance in how our water is shared in these river basins will be explored through the new Central and Gippsland Region Sustainable Water Strategy, as part of broader planning to improve water security now and into the future.

Further information about the Long-term Water Resource Assessment and the Central and Gippsland Sustainable Water Strategy can be found in the "Water resources planning framework" section on page 14 of this report and on the DELWP website at: *https://www.water.vic.gov.au/planning/long-term-assessments-and-strategies/ltwra*

https://www.water.vic.gov.au/planning-and-entitlements/long-term-assessments-and-strategies/sws/central-gipps-sws

System performance

We plan using the latest climate and population data generated by the Victorian Government.

However, the uncertainty that exists around climate variability, climate change and population growth mean there are many different scenarios we must consider and plan for. There is no guarantee that the future will be exactly like any of these scenarios. That is why Barwon Water is committed to being prepared for a range of possible futures.

Levels of service

We use computer models to assess how our water supply systems would perform under various scenarios, taking into account different assumptions about climate and growth. These computer models help us to understand the circumstances under which customer demand can – and cannot – be met.

Importantly, our computer models rely on an assumption about the level of service we propose to offer to our customers.

Levels of service, or service standards, are performance measures and targets that drive the operation of Barwon Water's business. These standards are set to ensure we provide a high quality service to customers.

Generally, the higher the service standard, the higher the cost of providing the service. We try to set service standards that, on balance, deliver best value to our customers.

Current level of service

When it comes to water supply, our key level of service relates to how water restrictions would need to be imposed. Our systems are not currently designed to meet unrestricted demand all of the time, meaning that we expect to impose water restrictions from time to time – for example, in drought years.

Water supply systems can be designed to meet unrestricted demand 100 per cent of the time, so that water restrictions would never be required regardless of the weather or climate. However, this means investing in significant infrastructure to ensure there is sufficient water available, even in the worst of extreme droughts. This infrastructure would come at a significant cost and would potentially sit idle when not in drought.

Instead, we plan on the basis of what is understood to be an acceptable level of water restrictions. This is measured in terms of how often water restrictions are likely to be imposed, how severe water restrictions will be when they are needed (from Stage 1 through to Stage 4) and for how long water restrictions will be required.

Our target is to have enough water available so that, in all of the possible futures that we consider and plan for, water restrictions are needed no more than 5 per cent of the time. This means that, when we run our computer models, we see that water restrictions are not required across 95 per cent of the possible futures we have considered.

In practice, to help keep customer bills affordable we need to achieve the right balance between investing in water supply upgrades and potentially triggering water restrictions in drought. This balance needs to be retested with our community to understand how often and when water restrictions are appropriate, and at what cost.

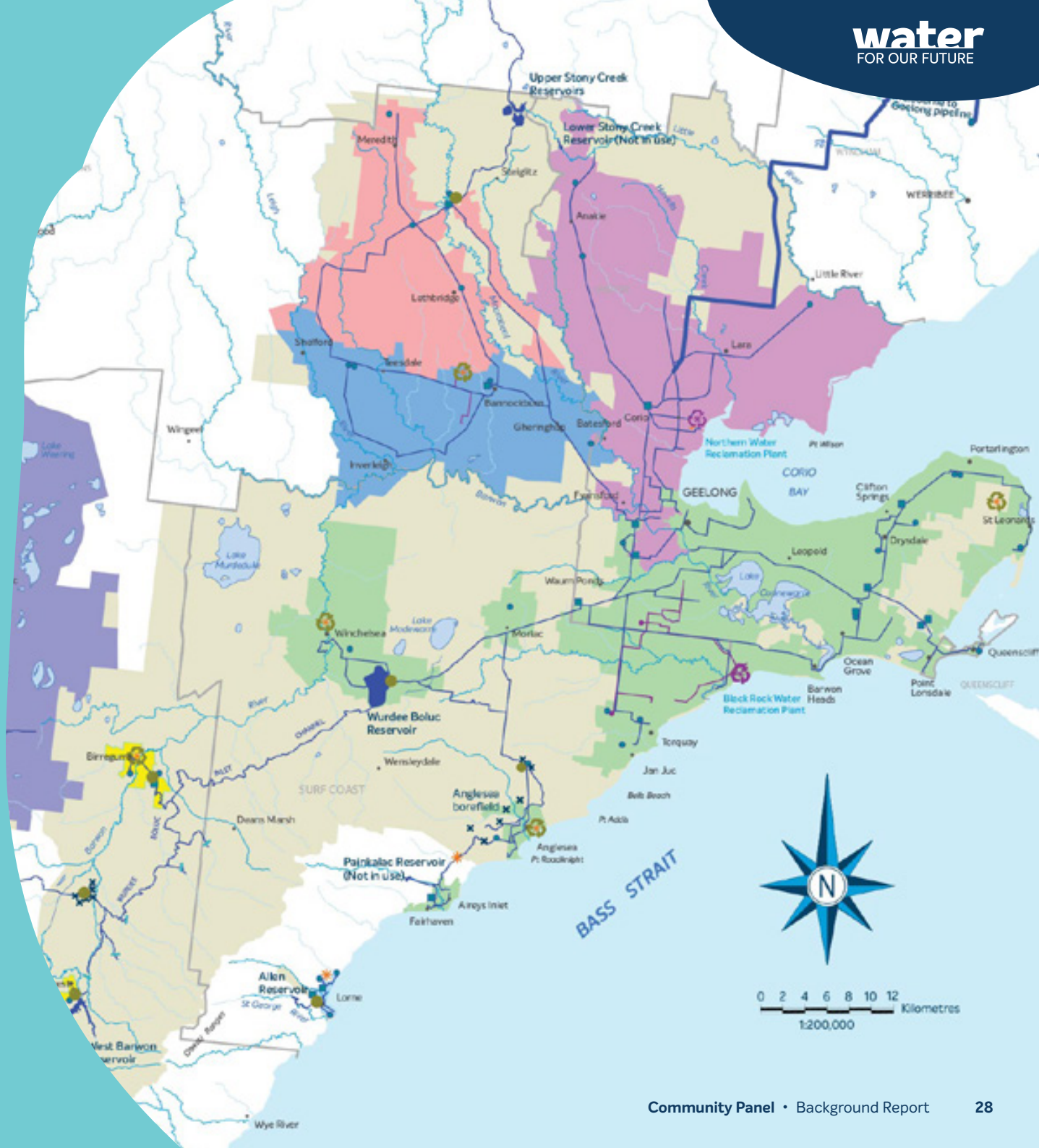
Simplistically, this means that across the possible futures we consider, water restrictions are necessary for three months every five years, or one year in every 20. In reality, the future is not as predictable as that. Our modelling shows that if droughts go on for consecutive years, there is an increased possibility of introducing harsher water restrictions, more often and for longer. While water restrictions are a last resort, they can help save up to 5,000 million litres per year.

Our systems

Greater Geelong

Quick stats for Greater Geelong	
Current population	The current population of the Greater Geelong region is approximately **303,000**. Parts of the region are experiencing rapid population growth, with the total number of residents projected to grow to beyond 670,000 by 2065 (.idSAFI, 2019).
Current demand for water	Geelong's annual water demand of **35,000 million litres** comprises residential and non-residential (commercial and industrial) use. The region includes a number of large users, such as refineries, research institutes, metal processors, malting houses, wood processors and breweries. Demand is projected to potentially double over a 50-year horizon.
Surface water supplies – from rivers in our region	Although more recently diversified to include other sources, Geelong traditionally relied upon the three major surface water catchments of the Barwon, East Moorabool and West Moorabool rivers. Barwon Water is entitled to take up to **127,400 million litres** over three years in the Barwon system, **23,800 million litres over three years** from the West Moorabool and **9,000 million litres a year** from the East Moorabool system. Importantly, the volume that can be taken in any given year is subject to annual streamflows into the reservoirs, meaning the water that is available from year to year varies depending on how much it rains.
Surface water supplies – from rivers in other regions	Barwon Water is entitled to take up to **16,000 million litres** a year from the Yarra and Thomson rivers in Melbourne and Gippsland and has access to store this water in the Melbourne system. Importantly, the volume that can be taken in any given year is subject to annual streamflows into the Melbourne reservoirs, meaning the water that is available from year to year varies depending on how much it rains. Melbourne Water is responsible for deciding how much water can be made available in a given year.Completion of the Melbourne to Geelong Pipeline in 2012 connected Geelong to the resources of the Melbourne system.
Groundwater supplies	Geelong's water supply includes a bulk entitlement for the **Anglesea borefield** within the Jan Juc Groundwater Management Area. Periodic operation of the borefield is based on system attributes and requirements, and in accordance with the licence and entitlement conditions.
Recycled water use	The **Northern Water Plant** provides up to 2,000 million litres year of Class A recycled water to the Viva refinery in Corio. **The Black Rock** Water Reclamation Plant provided 2100 million litres of recycled water for agricultural and residential customers in 2019-20, with the excess 23,000 million litres discharged to Bass Strait under an EPA discharge licence.

Greater Geelong system map



Short-term water security

Investments made during the Millennium Drought mean that Geelong's water supplies are secure in the short term. As a result, both our residential and industrial customers are continuing to receive unrestricted volumes of high quality water to meet their needs, even in dry years.

For example, the hot, dry summer of 2018–19 meant that Geelong's storages dropped from 66 per cent to over 33 per cent over eight months. We are continually monitoring and taking action to ensure a secure water supply for the Geelong region. Some of the work we have done in the short term includes:

- activating the Melbourne–Geelong Pipeline and extending its reach further into the City of Geelong
- switching over to supplying Class A recycled water from the Black Rock recycled water plant to customers in Armstrong Creek and parts of Torquay, Mound Duneed and Charlemont
- activating the Anglesea borefield, which operates in conjunction with an extensive environmental monitoring program, including community oversight through the Anglesea River Working Group
- increasing our focus on encouraging and enabling our customers to be water efficient through home audits and schools programs.

These actions, together with some welcome winter–spring rainfall, meant that storages rose to 70 per cent by mid–September, 2019.

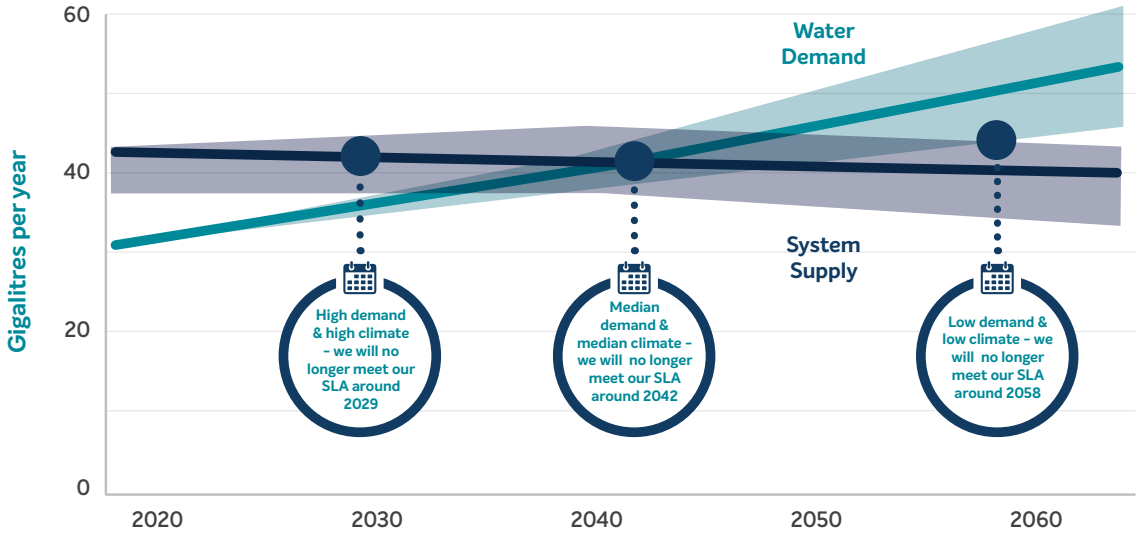
However, six of the first seven months of 2020 have seen below average rainfall. We are closely monitoring winter–spring inflows over 2020, and will adapt our operations as we need.

Long–term water security

Based on current assumptions, a water supply upgrade will be required by 2029, under a "worst–case" scenario of high climate change and high population growth, for Barwon Water to continue reliably meeting our current level of service for Greater Geelong (i.e. water restrictions no more than five per cent of the time).

Geelong will not run out of water by 2029, rather the likelihood of water restrictions increases. In other words, we can no longer meet our current level of service – meaning an increased possibility of harsher water restrictions, more often and for longer.

Figure 7. Supply demand projection



The 2029 date is not 'fixed' – an upgrade may be required earlier if the future differs from our assumptions. For example, if more water is needed to improve waterway health, which will be determined by government policy, or if our region grows faster than expected.

Equally, this date may be pushed back as far out as the late 2050s if the climate is wetter than expected, growth in our region slows or access to our alternative water sources changes.

We are currently critically analysing all of the assumptions underpinning this modelling. Early indications are the 2029 date is likely to be brought forward, not pushed back.

How much water do we need?

The table to the right outlines Geelong's consumptive water demand over the next 50 years under a "high" population growth scenario. It also shows the difference between this demand and the amount of water available from current supplies under a "high" climate change scenario.

There is currently a surplus, but beyond 2030 there is a shortfall between available supply and projected demand. That shortfall grows as over time if no action is taken. The shortfall grows even further if additional environmental water needs over the next 50 years are taken into account.

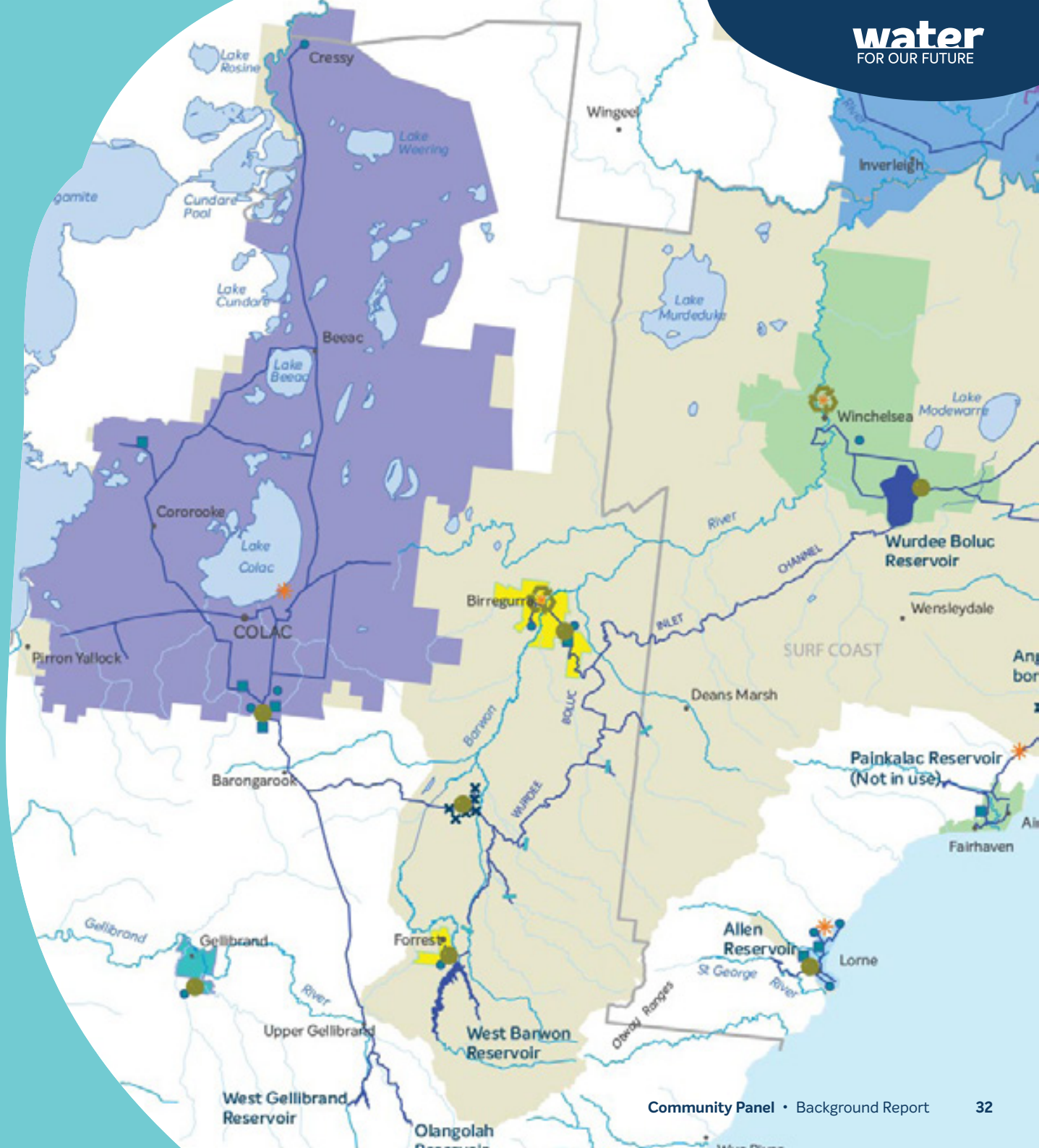
In summary, Geelong may require up to 40,000 million litres of extra water over the next 50 years – that is, 10,000 million litres every ten years from 2030 onwards.

	2020	2030	2040	2050	2060	2070
Demand high population growth	**35,100**	**41,300**	**47,600**	**54,800**	**61,900**	**69,100**
Supply availability (+/-) high climate change	+8,200	-800	-9,900	-18,700	-27,500	-36,300

Colac

Quick stats for Colac	
Current population	The Colac area has a population of approximately **14,300,** which is projected to increase to around **24,000** by 2065 (.idSAFI, 2019).
Current demand for water	Current demand is approximately **3,000 million litres a year,** comprising residential, industrial and agricultural use. Major non-residential use includes local industries such as timber processing, abattoirs and dairy processing. Changes in land use and local industry are expected to have a more profound impact on demand over time than residential population growth.
Surface water supplies – from rivers	Water supply to Colac is sourced from the protected catchments of the **Gellibrand River** and **Olangolah Creek** in accordance with a bulk entitlement for up to **5,400 million litres a year.** The catchments are noted for their high environmental value as part of the Otways Ranges.
Groundwater supplies	No groundwater is used to supply Colac.
Interconnection	Colac was connected to the Geelong system in 2017, providing the ability to transfer water from the Geelong system to Colac in dry periods.
Recycled water use	The Colac Water Reclamation Plant is located on the north eastern edge of the town and treats approximately **2,000 million litres a year**. The plant treats wastewater from residential, commercial and industrial customers in the area to produce Class C recycled water. A small proportion of recycled water is reused onsite, with the remainder being discharged to Lake Colac. Lake Colac largely dried out during the Millennium Drought and again as recently as summer 2015–16. Discharges from the Colac water reclamation plant are important as one of the major sources of water for the lake during dry periods.

Colac system map



Colac's water is sourced from the West Gellibrand and Olangolah reservoirs in the Otway Ranges. Although the catchments surrounding these reservoirs generally receive good rainfall, Colac's water supply system has limited storage. This means there is limited ability to build up a reserve of water from good rainfall in wet times that can be drawn upon during dry times.

Short-term water security

Construction of the Barwon-Colac pipeline in 2017, which connected Colac to the Geelong system, means that Colac is secure.

Before the connection, Colac's water supply system was vulnerable to the timing of seasonal inflows as local storage basins weren't large enough to safely see Colac through periods of low inflows or high demand. For example, Colac storage levels fell from above 90 per cent at the start of December 2015 to 24 per cent by April 2016 due to record dry conditions. With just 636 million litres of water left in reserve, the need for stage 3 water restrictions was triggered until autumn rainfall arrived.

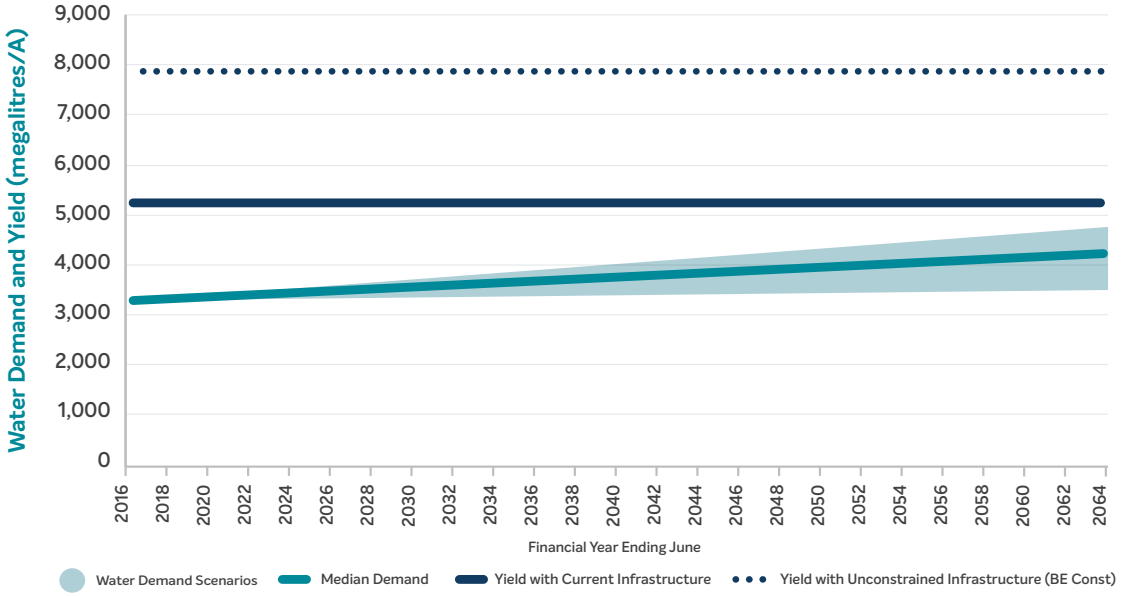
The Barwon-Colac pipeline provides an 'insurance policy' to Colac should prolonged dry conditions occur or if the Gellibrand system is unavailable. The pipeline connects Colac to one of Geelong's major sources of water – the West Barwon Reservoir – and can provide close to an additional 3,000 million litres a year, which is equivalent to a full year of Colac's demand.

Long-term water security

Based on current assumptions, an upgrade won't be required, under a "worst-case" scenario of high climate change and high population growth, by Barwon Water until after 2064 to continue reliably meeting our agreed level of service for Colac (i.e. water restrictions no more than five per cent of the time).

The ability to draw on Geelong's water supplies should the need arise secures Colac's long-term water future.

Figure 8: Colac long-term water security

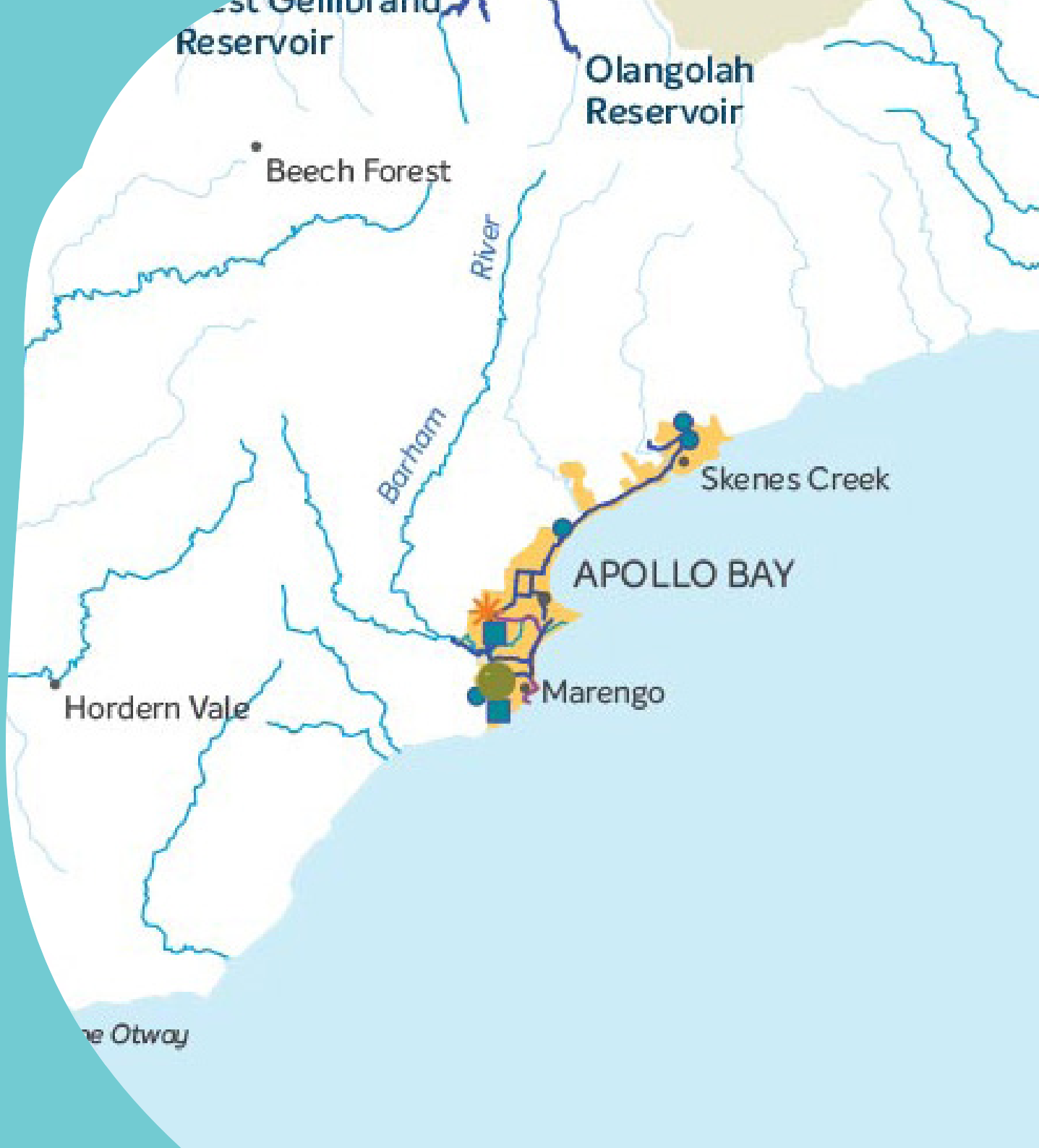


Apollo Bay and Skenes Creek

Quick stats for Apollo Bay	
Current population	The existing permanent population of Apollo Bay and surrounds is approximately **2,000.** This is projected to grow towards 3,000 by 2065 (.idSAFI, 2019). However, visitors to the coastal destination increase the population to around **20,000** each summer.
Current demand for water	Apollo Bay's annual water demand of **445 million litres** is predominantly for residential use. Daily demand is substantially higher over the summer months with the influx of visitors. This period also coincides with higher water use to maintain gardens, public open space and other irrigated areas such as the golf course.
Surface water supplies – from rivers	Water supply for the towns of Apollo Bay, Skenes Creek and Marengo is sourced from the **Barham River** in accordance with a bulk entitlement for up to **800 million litres a year**. In practice, the volume of water harvested by Barwon Water is limited by seasonal water availability, storage capacity and passing flow conditions that prioritise water for the environment. The Barham River originates in the Otways Ranges, which typically experience high, reliable rainfall.
Groundwater supplies	No groundwater is used to supply Apollo Bay.
Interconnection	Apollo Bay is a discrete system, meaning it is not connected to any of Barwon Water's other systems.
Recycled water use	None at present, although preliminary investigations are underway to determine if supplying the golf course with recycled water is feasible.

water
FOR OUR FUTURE

Apollo Bay system map



Legend

- Serviced Areas
- Lakes, Rivers
- Barwon Water reservoir
- Water pipeline/ channel
- Water treatment plant (WTP)
- Groundwater production bore
- Water basin/ tank
- Class A recycled water plant
- Class A recycled water pipeline
- Class A recycled water tank
- Water reclamation plant with recycling
- Water reclamation plant (WRP)

The communities of Apollo Bay, Skenes Creek and Marengo rely solely on the Barham River for water supply. Water harvesting is limited during summer to preference water for the environment. At the same time, demand is at its peak due to the surge in tourism.

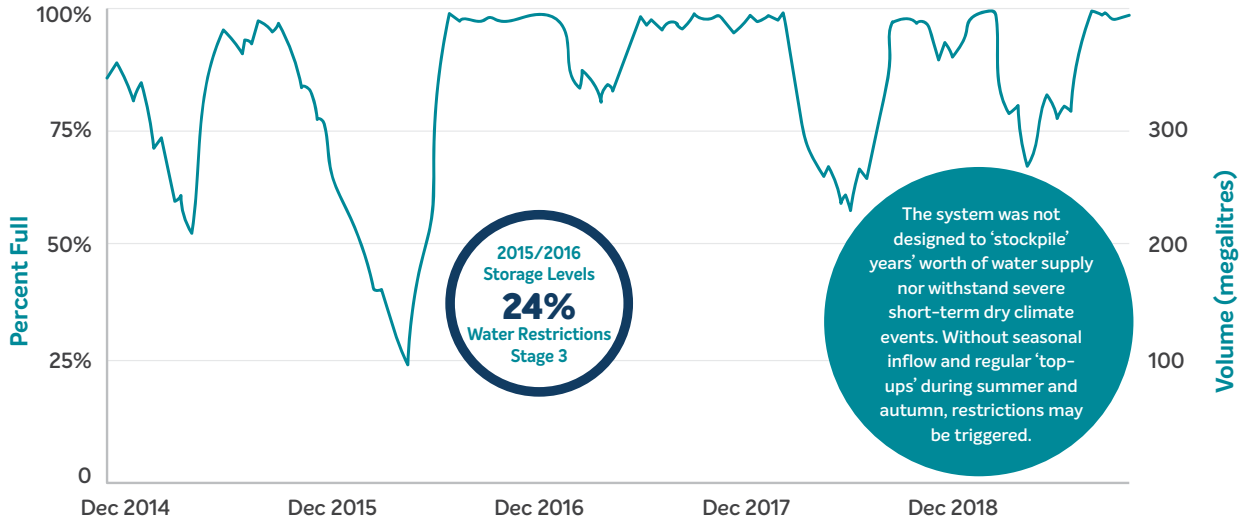
Short-term water security

Water harvested directly from the Barham River during high flow periods in the winter and spring are stored in two basins for use throughout the year. Even with an additional 250 million litre basin constructed in 2014, the system was not designed to 'stockpile' years' worth of water supply or withstand severe short-term dry climate events.

Our previous 2017 Urban Water Strategy highlighted the vulnerability of Apollo Bay's water supply system to conditions outside a 'normal' climate range. In 2015–16, Apollo Bay experienced its lowest rainfall on record (0 percentile) and worst on record streamflow.

With little streamflows to harvest, storage levels dropped rapidly to 24 per cent before recovering again with winter flows. The figure below illustrates the impact of this short-term extreme dry climate event with storage decline triple what is 'normally' expected. Level 3 water restrictions were introduced to slow the rate of storage decline.

Figure 9. Apollo Bay storage levels



Long-term water security vulnerability

A recent assessment of supply and demand for Apollo Bay indicated that, under the "worst-case" scenario of high climate change and high population growth, we will no longer meet our agreed level of service for the Apollo Bay water supply system after 2023. This is consistent with our 2017 Urban Water Strategy that identified a need for water supply upgrade by 2024 to mitigate the system's vulnerability to events outside a 'normal' climate range.

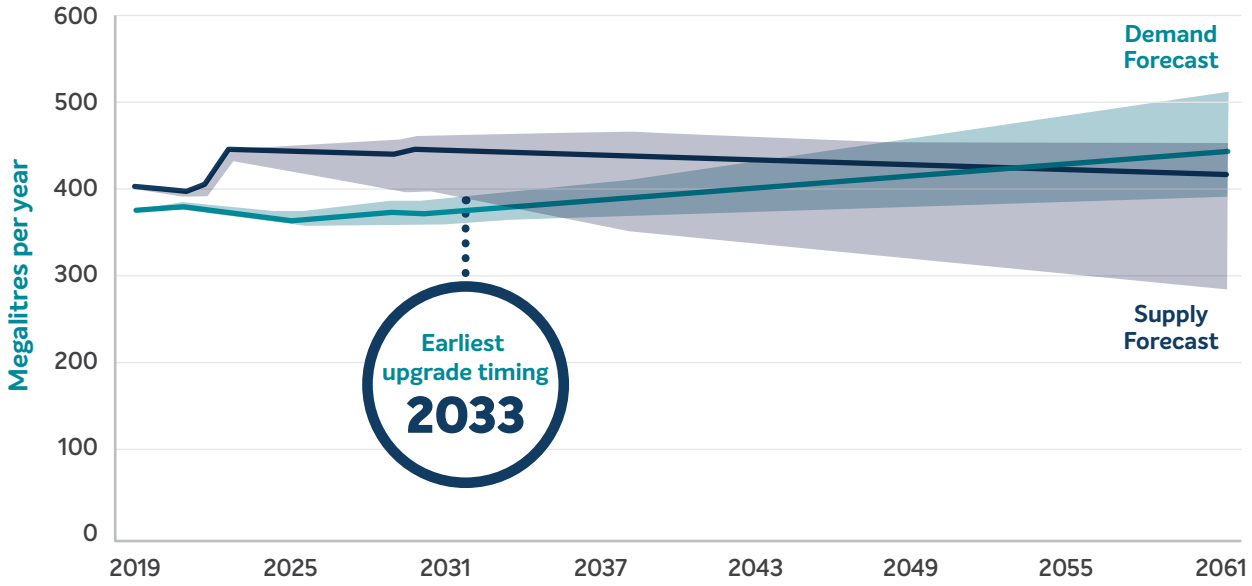
Short term actions that will be carried out in the next two years to reduce losses in the water supply system are expected to delay the upgrade timing by up to 10 years, providing Apollo Bay with water security to at least 2033.

These actions include:

- Installation of a cover on the Apollo Bay raw water storage and modification of the spillway of the storage to increase capacity
- Supply of recycled water to Apollo Bay Golf Club to substitute for drinking water used for watering of greens and tees, subject to agreement with the club
- Working with businesses, including the BIG4 Caravan Park, to improve water efficiency.

Based on current assumptions, an upgrade won't be required under a "worst-case" scenario of high climate change and high population growth by Barwon Water until 2033 to continue reliably meeting our agreed level of service for Apollo Bay (i.e. water restrictions no more than five per cent of the time).

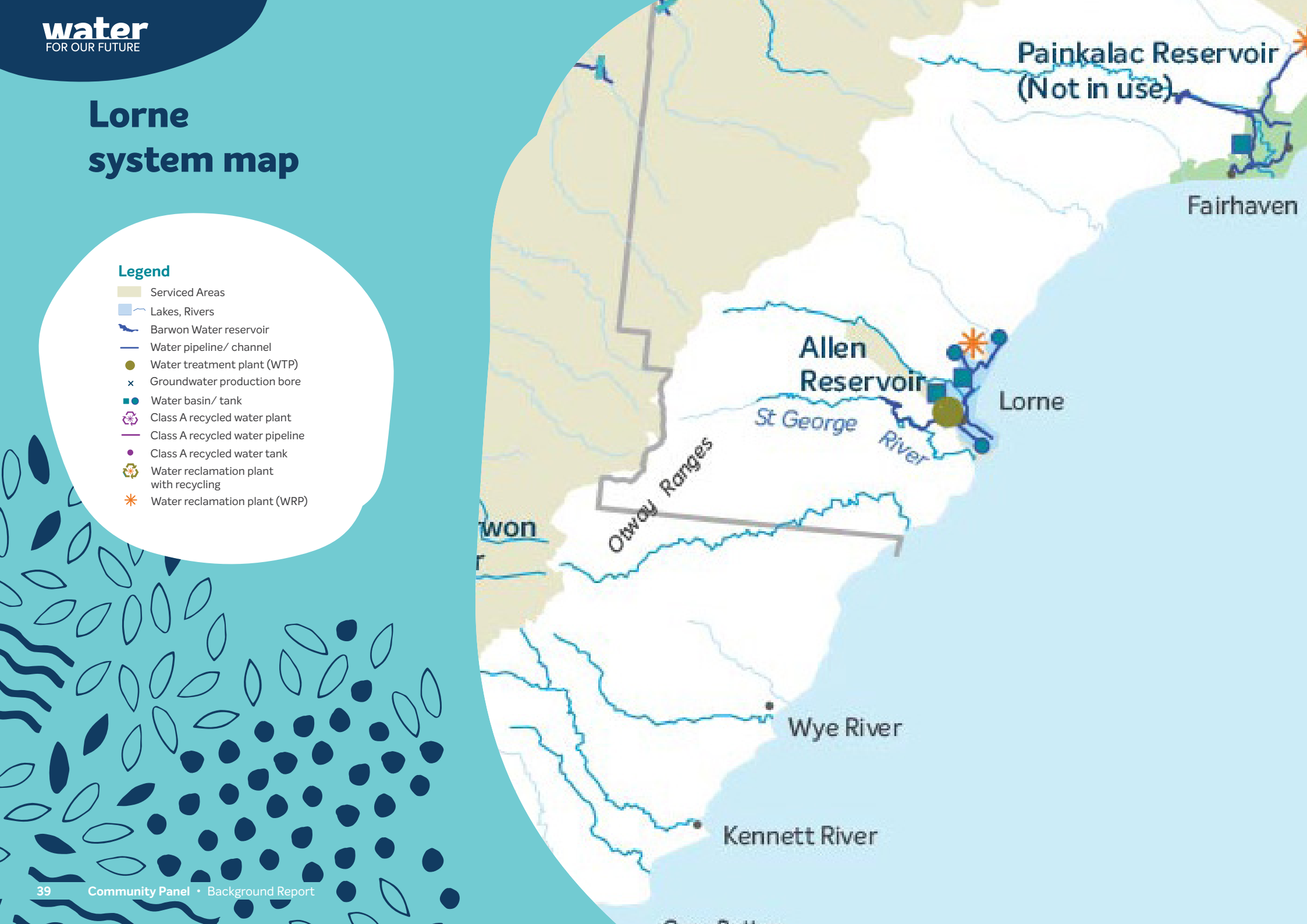
Figure 10. Apollo Bay supply and demand forecast



Lorne

Quick stats for Lorne	
Current population	Lorne has a permanent residential population of approximately **1,750** people, which increases up to **18,000** over the summer holiday period (.idSAFI, 2019).
Current demand for water	Lorne's annual demand of **355 million litres** is mostly residential use. Daily demands are significantly higher during summer, when the population swells.
Surface water supplies – from rivers	Lorne's drinking water is sourced exclusively from the Allen Reservoir on the **St George River,** about 3 kilometres west of the town. The bulk entitlement allows for up to **510 million litres a year** to be harvested. The Lorne supply system is best described as 'seasonal', with storage levels drawn down over the peak summer months then recovering during winter and spring. Although annual demand exceeds the capacity of Allen Reservoir, high reliable rainfall and a steep catchment generally means the system replenishes quickly in the wetter months. In practice, the volume of water harvested by Barwon Water is limited by seasonal water availability, storage capacity and passing flow conditions that prioritise water for the environment.
Groundwater supplies	No groundwater is used to supply Lorne.
Interconnection	Lorne is a discrete system, meaning it is not connected to any of Barwon Water's other systems.
Recycled water use	A small proportion of the Class C recycled water produced each year is reused onsite at the wastewater treatment plant. The remainder is discharged via an ocean outfall in accordance with an EPA Licence.

Lorne system map



The Lorne water supply system is a standalone system, which means it is not connected to the Geelong system and it relies solely on water sourced from Allen Reservoir.

Short-term water security

Allen Reservoir typically fills over the winter period due to good rainfall and inflows. Over the summer months, this stored water is drawn down as demand increases due to an increase in tourism, which sees the population rise from approximately 1,750 to 18,000 people.

The 2015–16 summer saw conditions in our region beyond what we have ever experienced and nowhere was more severe than at Lorne. Although storages were almost at 100 per cent heading into summer, by early 2016 Allen Reservoir dropped to its lowest level on record, with rainfall 50 per cent below the 10-year average. This triggered the need to apply stage three water restrictions until autumn rainfall arrived. For the first time, Barwon Water also needed to cart water to Lorne from the Geelong system to top up dwindling local supplies.

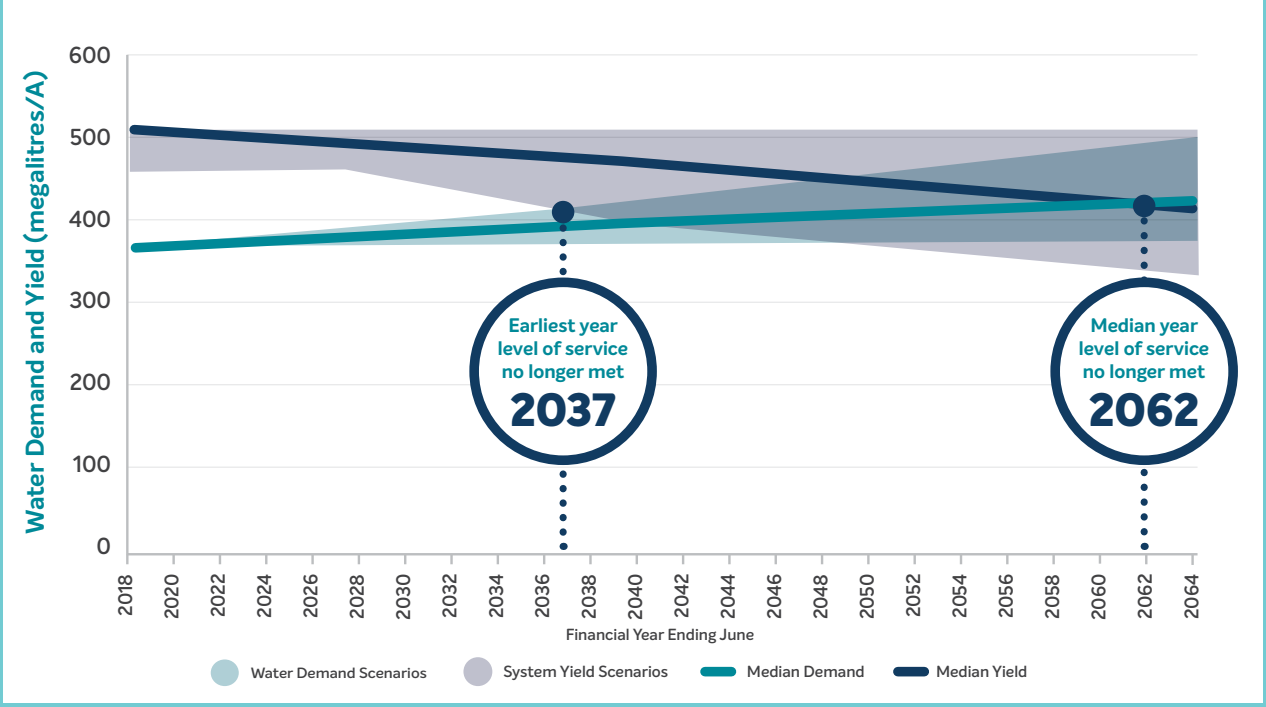
High demand without any significant downpours to replenish storage levels over summer means that Allen Reservoir can be drawn down rapidly. As a result, over winter, our customers receive unrestricted volumes of high quality water to meet their needs. However, under a dry climate scenario, water restrictions may be required during summer.

Long-term water security

Based on current assumptions, an upgrade won't be required, under a "worst-case" scenario of high climate change and high population growth, Barwon Water until after 2037 to continue reliably meeting our agreed level of service for Lorne (i.e. water restrictions no more than five per cent of the time).

In 2018, we completed dam safety works at Allen Reservoir which increased the storage capacity of the reservoir by 19 million litres – close to an extra 10 per cent of storage capacity.

Figure 11. Lorne long-term water security



Our response

Water for our Future

Our co-design approach

We are partnering with our community, stakeholders and regional leaders to design a new water future for our region in response to the challenge we face. While Barwon Water can design solutions on our own, we know we get better outcomes when we work alongside our customers and community.

The key question we are exploring with our community, known as our "remit", is:

With less rain and a hotter climate, it's time to think differently about how we use water and where it comes from. How can we create a new water future that balances all our needs?

Our challenge presents an exciting opportunity to think differently about how we source and use water.

Water is a vital part of our everyday lives. When it comes to thinking about water for our future, we can all make an important contribution.

Your contributions will help us develop our next Urban Water Strategy, our long term plan for ensuring a sustainable, reliable and affordable water future for everyone.

What have we heard so far?

The *Water for Our Future* program has connected with community members, strategic partners and stakeholders through a number of engagement activities since August, 2019.

Our engagement activities included:

- Online engagement platform, featuring 'pulse check' survey and ideas lab (where people could submit an idea) attracting 2700 visitors between August 2019 and June 2020
- 14 community 'pop ups' across the region, reaching more than 3000 people
- Community workshops in each local government area, attended by 77 people
- Regional forum, attended by more than 50 leaders in government, business, industry, community and environment, plus youth representatives
- Qualitative and quantitative customer research
- Stakeholder briefings.

Reports detailing the outcomes of our engagement activities can be found on the Community Panel portal at *www.barwonwater.vic.gov.au/future*

What are our options?

Good planning means considering a wide range of options – this is the philosophy of the *Water for our Future* program.

We want to explore all of the possible options that could help to address the challenge we are facing before we make a decision. Exploring a range of options, from a range of different perspectives, means we can make better informed decisions.

So far, we have identified over 450 ideas that could help us find more water or use water smarter.

These ideas have come from:

- **Our community** – contributions at our face-to-face and online engagement activities, including our "Ideas Lab" (an online forum that enabled the community to post and discuss new ideas)
- **Our staff** – ideas from previous strategies and plans together with new ideas from staff who are experts about how our systems operate
- **Independent experts** – technical reports and gap analysis undertaken by qualified experts.

The different ideas we have heard are grouped into themes in Figure 12. This "Options Tree" shows the range of ideas we have heard and provides some important context about these ideas.

The Options Tree is separated into two branches – finding more water (supply options) and using water smarter (demand options).

Finding new water includes options such as rainwater, groundwater, seawater, stormwater and recycled water.

We are working closely with our neighbouring water corporations to the west of Melbourne to understand any shared infrastructure opportunities that might provide cost effective outcomes.

Using water smarter includes options such as designing and planning how we use water in our homes or suburbs differently, improving the water use efficiency of our assets or appliances and changing our behaviour to reduce the amount of water we use.

There are a number of variants or individual options relating to each of these high-level ideas. Individual, more specific options may relate to a similar concept but differ in terms of geographic location, size or timing of development.

More information about urban water supply options for Australia can be found in a recent report published by the Water Services Association of Australia, which is available on its website *–https://www.wsaa.asn.au/news/new-report-all-options-table-urban-water-supply-options-australia*

Finding more water...

Using water smarter...

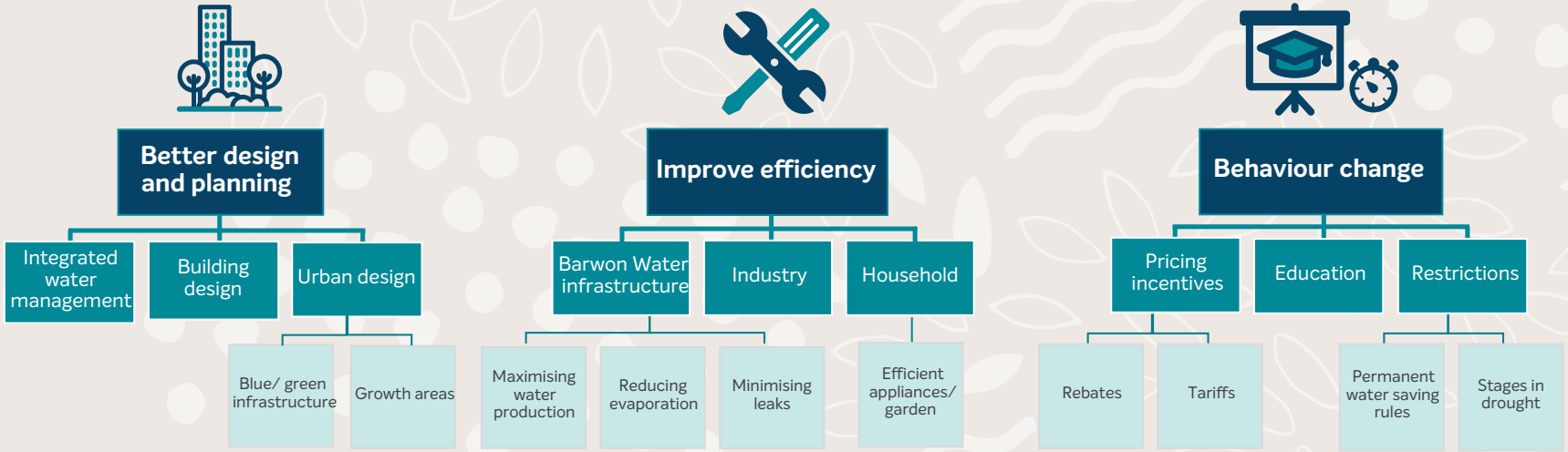


Figure 12 The *Water for Our Future* Options Tree.

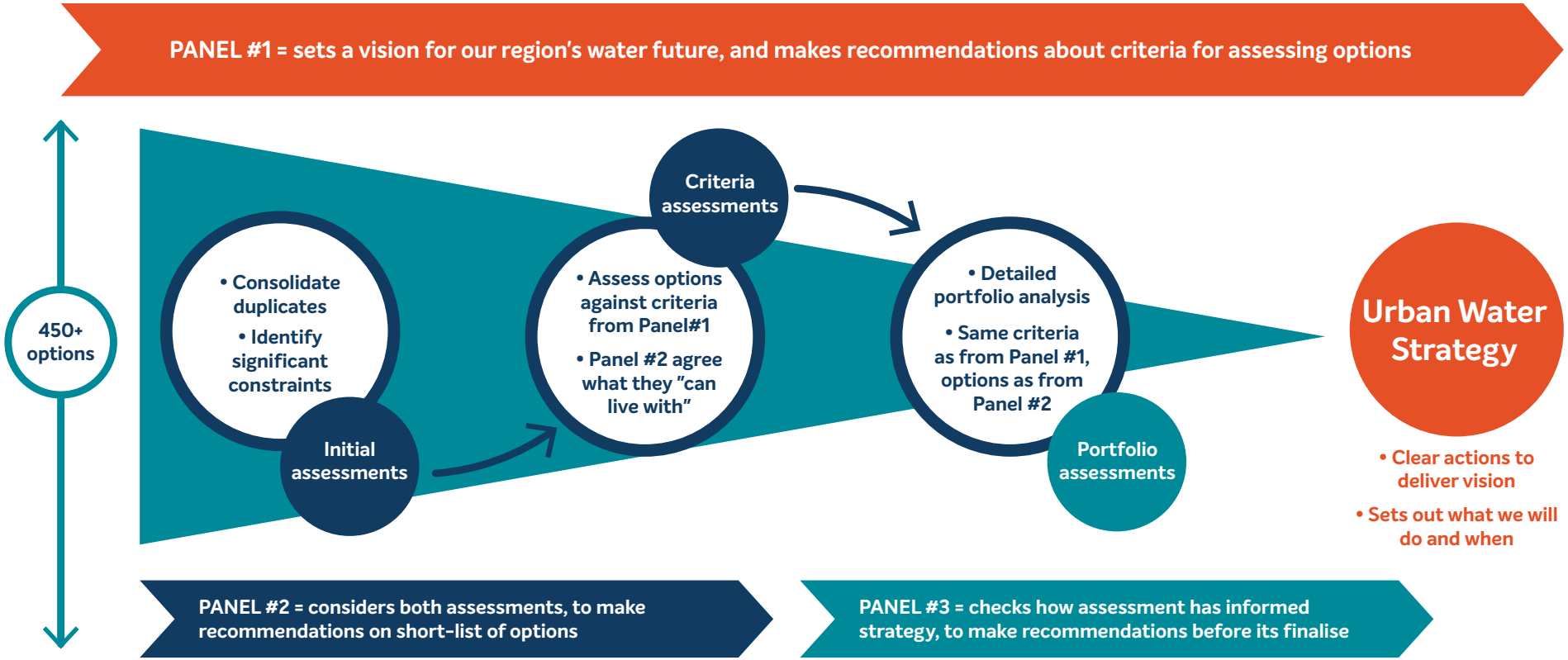
How will we decide what to do?

Choosing between hundreds of different options is not a simple task, particularly when the outcomes of the decision will have profound impacts on the future of our region. We have therefore made the views of our community central to our decision-making process.

Our decision-making process is shown in Figure 13. There are four key steps, which will guide the evaluation and translation of the long-list of options into a robust strategy that clearly sets out the actions we will take in response to our challenge. The vision and criteria agreed by the *Water for our Future* Community Panel will underpin each of these steps.

Our decision-making process is also nested within broader, statewide policy and planning processes. For example, the Central and Gippsland Sustainable Water Strategy that is currently under development will consider water security challenges across a broad geographic area that includes our region. It will explore issues and solutions that cross the boundaries of individual water corporations. We have the opportunity, through our decision-making process, to inform the development of this strategy with a clear understanding of the preferences of our community.

Figure 13. Decision making framework



Vision

A shared community vision for our region's water future provides the platform for our decision-making framework.

The vision should:

- Be forward looking – consider what we want our region to look like in 50 years
- Address the remit – describe what a water future that balances all of our needs looks like
- Establish a clear direction – provide a reference point to guide our decision-making over the next 50 years.

The vision will most likely be a high-level statement. Importantly, the vision should avoid mention of specific options or ideas – it should describe where we want to go, not how we want to get there.

Agreeing the vision will be the first task of the *Water for our Future* Community Panel when it meets for the first time (October-November 2020). Barwon Water will adopt the vision that is developed by the panel.

Criteria

A set of criteria will help us to assess and understand the extent to which different options can achieve our vision.

The criteria should:

- Directly relate to the vision – options that perform well against the criteria are more likely to help us achieve our agreed water future
- Help to show differences between options – for example, some options might perform better against the criteria than others
- Be clear, specific and measurable – the performance of options against criteria can be readily assessed

The *Water for our Future* Community Panel will make recommendations about a suitable set of criteria when it meets in October-November 2020. Barwon Water will incorporate these recommendations to the maximum extent possible when finalising the criteria. Barwon Water may refine or add to the criteria suggested by the panel, for example, to reflect regulatory or legislative obligations that we must meet or policy and planning processes that we must comply with.

Step 1
Initial assessment

The first step in our decision-making process is to consolidate the long-list of options by grouping ideas that are based on a similar concept, to avoid duplicates and repetition. Specific options that are considered highly unlikely or technically infeasible due to significant constraints or hurdles will also be highlighted.

The initial assessment will refine the long-list of options to a more workable number of feasible options for further, detailed assessment.

The results of the initial assessment will be reviewed by the *Water for our Future* Community Panel when it meets for the second time (February-March 2021). The panel can choose to seek further information about any specific option that may have been excluded as a result of the initial assessment, if they wish.

Step 2
Criteria assessment

The second step in our decision-making process is to assess the refined list of options using the criteria that have been set in light of our vision.

The criteria assessment will provide a detailed understanding of each option – including a balanced view of the extent to which each option can help to achieve our vision. Any criteria that are difficult to assess in objective, numerical terms will be scored using best available knowledge, experience and judgement.

The results of the criteria assessment will be reviewed by the *Water for our Future* Community Panel when it meets for the second time (February-March 2021). The panel will use this information to make recommendations about options that can deliver our vision.

The panel will identify a set of agreed options it would like to see carried forward in the process, rather than a single preferred option, as it is likely that more than one option will be able to achieve our vision.

Barwon Water will incorporate the panel's recommendations about options to the maximum extent possible, noting that we must work within broader policy, planning, regulatory and legislative processes.

We will work closely with the State Government to ensure our community's views about options are understood and reflected in broader policy and planning processes wherever possible, for example, in the development of the Central and Gippsland Sustainable Water Strategy. Equally, we will work closely with our neighbouring water corporations and the State Government to ensure that the possibility of shared infrastructure opportunities that cross water corporation boundaries can be amongst the options considered by our community.

Step 3
Portfolio assessment

The third step in our decision-making process involves grouping the agreed list of options into different portfolios. This means that, instead of each option being considered individually, the performance of different groups of options will be considered together.

Each portfolio of options will be assessed using the same criteria as in Step 2. However, a more comprehensive evaluation of relative costs and benefits will be undertaken, so that the performance of each portfolio against criteria can be understood in $ terms. This may require further research and/or the use of data from other comparable projects or regions.

Each portfolio of options will also be considered under a range of possible futures. No-one knows exactly what the future holds. So, we will test different assumptions about key uncertainties that will impact our region's water future, for example, future climate and population scenarios. This means we will be able to understand how different portfolios perform over a 50-year timeframe, depending on how these uncertainties might play out.

The portfolio assessment will enable us to compare different portfolios of options and their expected performance under a range of future scenarios. We will choose the portfolio that offers the greatest community value under the most scenarios.

Depending on the options that make up this portfolio, final decisions may rest with the State Government. For example, large-scale infrastructure investments that provide benefits beyond the boundary of any individual water corporation are subject to State Government decision-making processes.

The portfolio assessment process will allow us to move forward with the confidence that the options we have chosen can achieve the vision we have set for our region's water future, irrespective of the challenges that the future may bring.

Step 4
Strategy development

We will develop our 2022 Urban Water Strategy based on the portfolio of options chosen through our decision-making process. Our strategy will clearly set out the actions we will take over the next five years to deliver these options. Some options may be ready for implementation straight away, others may require further research, development, evaluation, and/or funding prior to delivery.

Certain options may also be subject to State Government decision-making processes.

We will publish a draft of our 2022 Urban Water Strategy for our community to review.

Our draft 2022 Urban Water Strategy, and community feedback on this draft, will be considered by the *Water for Our Future* Community Panel when it meets for the final time (December 2021). The panel will check whether we have appropriately considered community views in developing our strategy and will make recommendations on the draft strategy before it is finalised by Barwon Water.

We will finalise our 2022 Urban Water Strategy based on what we hear through the final deliberations of the *Water for our Future* Community Panel.

Our 2022 Urban Water Strategy will inform, and align with, the Central and Gippsland Sustainable Water Strategy that will consider water security challenges and opportunities across a broader geographic area.

The development of these strategies in parallel provides opportunities for the outputs of each step of our decision-making process to be considered in the formulation of the Sustainable Water Strategy.

It also means that aspects of our 2022 Urban Water Strategy may be subject to decisions made and policies set out in the Sustainable Water Strategy. We will keep our community informed about the development of the Sustainable Water Strategy as it progresses.

What will we do and when?

Our 2022 Urban Water Strategy will be a key input to our next Price Submission, which is due in late 2022 for new prices to take effect from 1 July 2023.

Our 2023 Price Submission will set out the costs we will incur to deliver services to our customers, and the prices we propose to charge in return. Any water supply or demand management actions we propose in our 2022 Urban Water Strategy will need to be costed and included as part of our 2023 Price Submission. As mentioned in the 'what we don't do' section on page 11 of this document, prices are independently reviewed and determined by the ESC.

Many factors will influence the prices proposed in our 2023 Price Submission. However, as a rule of thumb, every additional $15 million that we spend on capital projects or $1 million that we spend on operating our systems will add $5 to an average residential customer bill, unless equivalent savings can be found elsewhere across the Barwon Water business. We review all of our expenditure carefully, in line with our commitment to maintain affordability for all of our customers.

We will adopt an adaptive approach to the implementation of our 2022 Urban Water Strategy, meaning we will take stock each year whether or not we need to bring forward or push back our actions depending on how the future unfolds.

We will keep our community informed about our progress by publishing annual updates in December to confirm current status, progress made and actions for the year ahead. These annual updates – known as Annual Water Outlooks – will be available on our website.

We will also update our 2022 Urban Water Strategy within five years, so that we can reassess our actions and adapt our long-term strategy as better information comes to hand.

In this way, we are confident we will be able to deliver our community's shared vision for our region's water future.

Useful terms

Term	Definition
Basin	Earthen water storage.
Blackwater	Wastewater discharged from domestic homes including toilets and kitchens. It may also include greywater.
Bulk and Environmental Water Entitlements	Legal rights to water granted by the Water Minister under the Water Act 1989.
Catchment	A geographic area where water is collected by the landscape, bounded by natural topography.
CCMA	Corangamite Catchment Management Authority – responsible for integrated planning and coordination of land, water and biodiversity management in the Corangamite region.
DELWP	Department of Environment, Land, Water and Planning – Victorian Government department whose responsibilities include the overarching management of Victoria's groundwater, catchments and waterways.
DHHS	Department of Health and Human Services – Victorian Government department whose responsibilities include overseeing the provision of safe drinking water.
EPA	Environment Protection Authority – Victoria's environmental regulator.
ESC	Essential Services Commission – Victoria's independent body responsible for regulating price, quality and reliability of essential services.
Filling season	The time of year when catchments receive consistent high rainfall events to fill up reservoirs or dams, typically winter and spring for south eastern Australia.
Fit for Purpose water use	Matching water of a certain quality to a use that is appropriate to that quality of water.
GL	Gigalitre, 1000 million litres (or one billion litres).
Greywater	Wastewater discharged from domestic washing basins, baths and showers.
Groundwater	Water held below ground in cracks and soil, sand pores and rock.
Groundwater recharge	The flow of water into a groundwater system.
Inflow	The runoff that flows into tributaries, creeks and rivers which is captured in reservoirs or dams after consistent rainfall.
Industrial wastewater	Effluent derived from an industrial or commercial process. Interchangeable with industrial sewage, industrial effluent or trade waste.
Integrated Water Management	A process which promotes a coordinated approach to urban water services, land development, building design and related resources with the objective of maximised economic, social and environmental benefits.

Useful terms

Term	Definition
Recycled water	Water that has been derived from sewerage systems or industrial processes and is treated to a standard that is appropriate for its end use. The following classification is utilised in Victoria and based on the presence or assumed presence of pathogens based on the level of treatment. **Class A:** Tertiary treated wastewater with a high level of disinfection. Reclaimed water can be utilised for non-potable purposes including irrigation of food crops and sporting fields and the washing of clothes. **Class B:** Secondary treated wastewater with some disinfection. Reclaimed water can be used for animal grazing and industrial washdown. **Class C**: Secondary treated with some disinfection. Reclaimed water can be used for irrigation in controlled public space, industrial use with no risk of human exposure or agricultural use for food crops that will be cooked or processed. **Class D:** Secondary treated. Reclaimed water can be used for non-food crops, including instant turf, woodlots and flowers.
Levilised cost	The overall project expenditure relative to the amount of water provided over the asset life. Allows different approaches to be compared in units of $/kL or $/ML.
Local Government Authority (LGA)	Local level of government.
ML	Megalitre or (1,000,000 litres).
Potable Water	Water that is appropriate for human consumption i.e. drinking.
Price signals	A price signal is information conveyed to consumers and producers, via the price charged for a product or a service.
Rainwater	Water originating from roofs. Once mixed with water from other urban surfaces (roads, carparks etc.) it becomes stormwater.
Rebates	A portion of money that is returned to you. Returns may be tied to expenditure on certain items like water savings infrastructure.
Reverse Osmosis (RO)	Reverse osmosis is the process which uses a membrane under pressure to separate relatively pure water from a less pure solution. The approach is often applied to salt water for drinking water purposes.
Runoff	More water than the ground can absorb, which flows across the surface to nearby creeks and rivers.
Septic Tank / Onsite treatment system	Wastewater treatment system that retains water on its own site.
Sewage	Domestic or municipal wastewater.
Sewerage	The infrastructure that conveys sewage/domestic wastewater.
SRW	Southern Rural Water – organisation responsible for regulating surface dams and surface and groundwater extraction in the southern half of our state.
Stormwater management	Technological and institutional initiatives and interventions to mitigate the impacts on the natural environment of excess stormwater (quality and quantity) resulting from the development of landscapes.
Streamflow	The flow of water within a natural waterway, such as a river.

Useful terms

Term	Definition
Supply augmentation	The action or process of making or becoming greater in size or amount – providing a greater amount of water.
Time of Use Pricing	Pricing is charged at different rates depending on the time of day or year.
Trade waste	Term is used to describe both industrial or commercial wastewater/effluent. For organisations discharging large volumes of trade waste costs are generally charges are assigned based on the volume and quality of discharged water.
Urban heat island effect	The effect of a localised increase in heat (temperature) within urban areas relative to surrounding natural or rural environments. This is a result of greater paved and concrete areas, less vegetation and increased thermal impacts from vehicle and building emissions.
Variable Tariff	A variable tariff can change based on the determination of the seller or pricing regulator.
VEWH	Victorian Environmental Water Holder – independent statutory body responsible for holding and managing Victoria's environmental water entitlements.
Wastewater	Water that has been used in a home, business or an industrial process.
Water restrictions	Temporary water restrictions are short term measures imposed in times of drought to reduce demand and conserve water supply for essential needs.
Water Sensitive Urban Design	An approach to the planning and design of urban environments focused on integrating the urban water cycle (including potable water, wastewater, and stormwater) with the built and natural landscape.
WSAA	Water Services Association of Australia – the industry body representing Australia's urban water sector.

water
FOR OUR FUTURE