Water for our Future Strategy

water
FOR OUR FUTURE

2022 Urban Water Strategy

Barwon Water

water
FOR OUR FUTURE

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 operate on the lands of Wadawurrung and Eastern Maar. We proudly acknowledge them as the Traditional Owners of the land and water on which we rely, and pay respects to their Elders, past, present and emerging.

We also acknowledge that Wadawurrung and Eastern Maar never ceded this land or the water that flows through it. We thank them for the care they have taken of land, water and natural environment for at least 80,000 years and still continue this today.

Our vision for reconciliation is for all peoples to stand unified in an inclusive and connected community.

We aim to have respectful and meaningful relationships with Traditional Owners and Aboriginal and Torres Strait Islander communities, supporting a shared commitment to Caring for Country. We strive to incorporate indigenous values into everything we do and are committed to enhancing economic and employment opportunities for Aboriginal and Torres Strait Islander peoples.

We are incredibly grateful to Wadawurrung for the deep relationships we have formed in the work we do together, and for continuing to allow us to learn from them on our journey to heal Country together

We are beginning our journey with Eastern Maar, and we will work genuinely to grow our relationship and provide support on their priorities.

We commit to supporting Wadawurrung and Eastern Maar in the development and implementation of their Country Plans and in their journey for self-determination.

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Barwon Water

Our region is growing and our climate is changing.

The Water for our Future Strategy sets out how we will respond to these challenges now and in coming decades to meet the needs of our cities, towns, businesses, industry and agriculture, return water for Traditional Owner cultural values and improve the health of our rivers.

Our adaptive plan will deliver an average of one billion extra litres of water every year for the next 50 years. With a hotter drier climate likely, we will gradually shift to more climate resilient sources to ensure that there is enough water to support the prosperity and liveability of our region.

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Foreword

I am pleased to present Barwon Water's 2022 Urban Water Strategy – Water for our Future.

Water for our Future provides a visionary, 50 year outlook for each of our region's water systems and identifies a range of actions that will be taken to secure high quality, affordable water for all our service areas.

The strategy is unique in that, for the first time, Barwon Water partnered with you, our customers, community and stakeholders to co-design a vision and actions for the region's water future.

Together, we have worked to not only ensure there is enough water to meet our needs, but also explored how we can harness the value of water to support a prosperous region, a thriving economy, liveable communities and a healthy environment.

Like elsewhere, our region is being impacted significantly by climate change. This means over the next 50 years we will gradually transition to climate resilient sources of water. Instead of using mostly river and groundwater sources we will gradually invest in supplies of manufactured water – such as fit for purpose recycled water, storm water and desalinated water.

The Water for our Future program saw us commit to empowering the community to make decisions about our region's water future, collaborating with them and building trust and confidence through the process of developing this strategy.

Key to this was continually reporting back what we had heard through each stage of the strategy's development and adapting to feedback.

We sought feedback on the draft strategy late last year and have used it to refine this final document.

Pleasingly, the draft received a high level of support from the community. The Water for our Future panel reconvened in November 2021 to check that the actions we proposed aligned with the vision they had set in 2020. At its final session, the community panel said they all believed the draft strategy reflected the vision and felt confident or very confident their recommendations would be implemented.

Broader feedback received during this time highlighted to us the need to continue to engage with communities in Lorne and Apollo Bay about identifying long-term supply upgrades. We have updated the strategy to reflect this and will work with these communities over the coming five years to involve them in the planning.

We also tested willingness to pay for key water security options via a survey of more than 1,850 customers as part of the 2023 Price Submission. Recycled water investment was the largest supported initiative from our customers in the survey.

More than 95 per cent of customers surveyed for our 2023 Price Submission said we need to maintain affordability for all – feedback we are acutely conscious of.

As a result, we have a strategy that includes an adaptive pathway that seeks to balance all the needs for water in our region by finding smarter ways to use the water we already have and transitioning to include climate independent sources of water.

We will continue to invest to secure future water supplies in a way that respects the environment and cultural values. We will invest in a timely way so that new sources of water are brought on line when needed and link appropriately to the relevant pricing period.

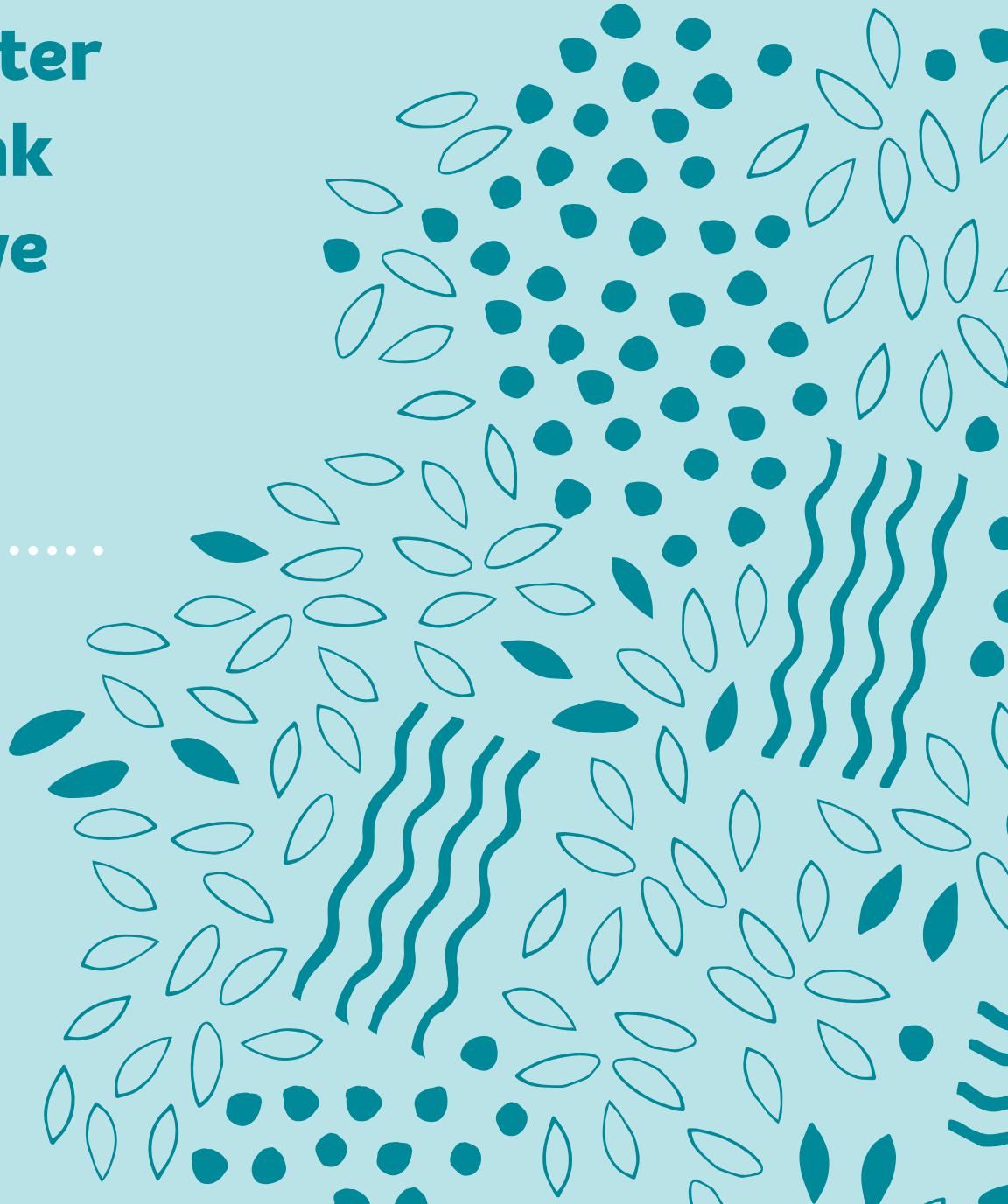
With its 50-year outlook, five-year planning cycle, and annual review, I am confident this strategy ensures we are prepared to respond flexibly and adaptively to manage the uncertainty of the future.

We are incredibly grateful to the thousands of people who took time to share their thoughts through the Water for our Future program and we look forward to continuing the conversations as we implement the strategy actions over the coming years and decades.

Jo Plummer
Chair

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?



Our strategy – at a glance

We will support our growing region to be prosperous, with enough water for all our needs.

We will deliver actions to progressively invest in more manufactured water such as fit-for-purpose recycled water, stormwater and desalinated water, embrace integrated water management opportunities and facilitate smarter water use.

Over the past two years, we have been working with our community to co-design a water future that meets all of our needs.

We have shared our challenge and its complexity.

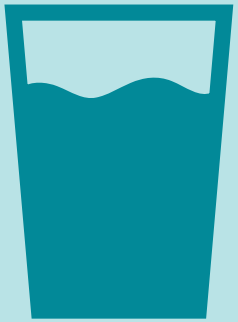
We have heard what our region values about water and what we need to keep in mind when planning for the next 50 years. We also heard new ideas for how we might think differently about how we use water and where it comes from.

The 2022 Urban Water Strategy has been informed by extensive engagement with our community. It proposes adaptive plans to ensure a secure water future for each of the systems in our region, based on what our community has told us is important to them.

Every Victorian urban water business must prepare an Urban Water Strategy that outlines a 50-year plan to manage demand for, and ensure sufficient supplies of, drinking water. The Urban Water Strategy is revisited every five years, which helps ensure we are constantly adapting to our ever-changing world.

157,932
customer connections across

5 water supply systems, covering 8,100 square kilometres



Need to find or save an extra
53,470
million litres
of water each year,
within 50 years' time, under a worst case scenario – even more to meet environmental and cultural values

Average annual water consumption of
34,500
million litres over past 3 years

Over next 5 years, we expect that water restrictions will be:

Very Rare (<1%)
Geelong, Golden Plains, Bellarine, Surf Coast, Colac and Gellibrand

Rare (<5%)
Lorne and Apollo Bay

Over the next 50 years, **we may need to be on water restrictions in a dry period or drought,** but we plan for this to occur less than **5%** of the time.

We will not run out of water.

At all times, even during droughts and emergencies, we will continue to supply drinking water to meet essential human needs.

Current water supplies will no longer reliably meet customer demand for water, under a worst case scenario, by:

2054 for Colac

2027 for Geelong, Golden Plains, Bellarine and Surf Coast

>2070 for Gellibrand

2027 for Lorne

2028 for Apollo Bay

25 actions proposed over the next 5 years, which will:

- Deliver 4,950 million litres of extra water security for our growing region
- Put 1,000 million litres of recycled water to productive use
- Save 1,000 million litres of drinking water
- Return 3,700 million litres of water to rivers – to support environmental and cultural values
- Progress opportunities to support agriculture and business with fit for purpose water

Our strategy sets out how we will deliver our community's vision for our water future

Our water future is ...

A secure water future where our rivers flow, our foods grow and our impact is low.

Resilient, innovative and sustainable, with abundant water from a range of sources and where we actively protect and improve water for the environment.

Ethical, healthy and responsible, with affordable and equitable access for everyone.

A shared responsibility, by valuing and conserving water and respecting the diverse needs of our community, cultures and the environment

This Urban Water Strategy is set out as follows:

Section 1

Our challenge

Our water supply systems currently rely on a variable source – rainfall.

Section 1 outlines the challenge we face in light of a hotter, drier climate,urban growth and economic development and a need to support healthy rivers and Traditional Owners cultural water values.

Section 2

Our process

We have partnered with Traditional Owners, residential and business customers, community, regional leaders and stakeholders.

Section 2 sets out the process we have undertaken to co-design a new water future for our region, in response to the challenge we face.

Section 3

Our adaptive plan

We have taken an adaptive planning approach to this strategy

With its 50-year outlook, five-year planning cycle, and annual review, the Water for our Future strategy ensures we are prepared to respond flexibly and adaptively to manage the uncertainty of the future.

Sections 4 to 8

Our systems

We manage five discrete water supply systems – the Geelong, Golden Plains, Bellarine and Surf Coast system is our largest supplying >90% of our customers

Sections 4 to 8 step through the following elements for each system:

Our system

How does the system work?

Where does its water come from?

Our challenge

How has the system performed?

What is the scale of the challenge for this system?

Our response

What do we propose to do?

Why do we propose to do it?

Because this strategy has a 50-year outlook, we identify the response we propose to take for each system over different time horizons. This is part of ensuring we remain adaptable to an uncertain and evolving future.

In the next 5 years

- Actions that we plan to take over the next 5 years, which will be costed and reflected in our 2023 Price Submission
- We will monitor and report on the effectiveness of these actions in each year's Annual Water Outlook

Over the next 50 years

- Long term actions that we expect to pursue, and need to plan for, to deliver a secure water future
- Using an adaptive pathways approach, we will revisit these long-term actions when we next update our *Water for our Future* Strategy in 2027

During drought or emergency

- Actions that we are ready to take in response to events such as severe drought, bushfires or critical asset failure

Section 9

What we heard

Over the past two years, we've been exploring our community's aspirations for our water future.

Section 9 captures and reflects key insights and learnings about what our community value about water and their ideas for our water future.

Section 10

What we did

We developed our draft strategy in response to what our community told us.

Section 10 explains, in more detail, the technical analysis underpinning the proposed actions in our draft strategy.

Section 11

Next steps

Having finalised the strategy, we now move to implementation.

Section 11 set outs the next steps we will take to start delivering our community's vision for our water future.

Our challenge

Our region is growing rapidly.

A hotter drier climate means our catchments are already receiving much less rainfall. The combination of climate change and extraction to meet urban demand are also impacting on our iconic rivers - the Barwon and the Moorabool - both of which have significant cultural value to our Traditional Owners and their connection to Country.

Our priority is to deliver a secure water future through services that are affordable which our customers have told us is important.

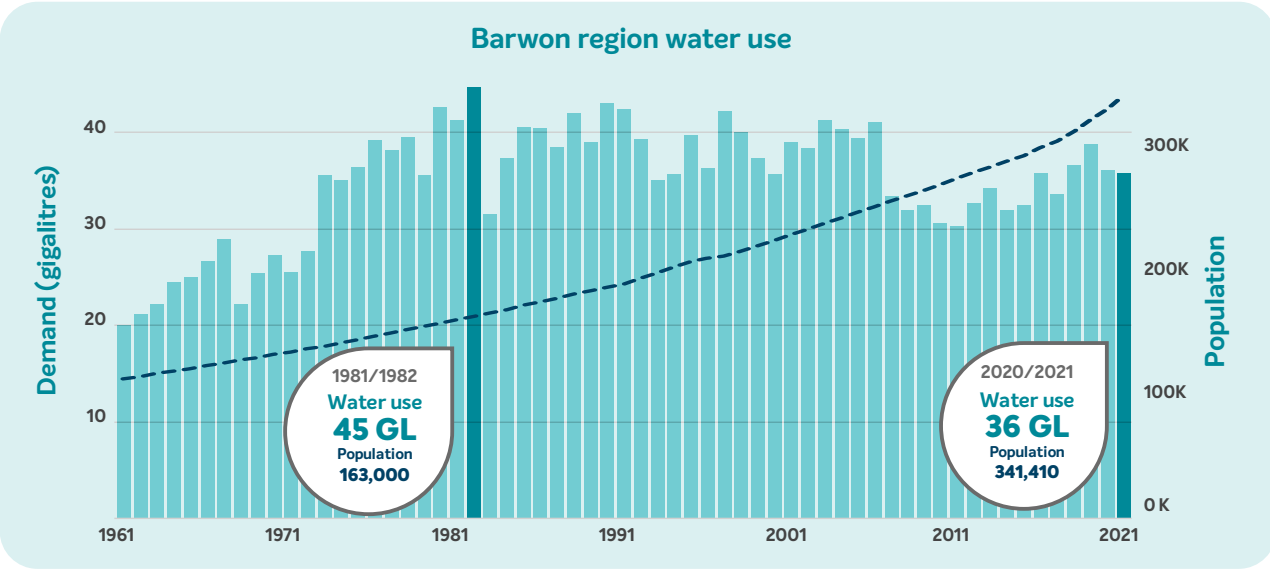
Growing water needs of our cities and towns

We currently supply about 35,000 million litres of water across our region annually[1]. The amount of drinking water used in our region each year has declined from a peak in the early 1980s, despite our population almost doubling since then, from 163,000 to more than 300,000 people.

Geelong's population is growing fastest out of Australia's largest 20 cities, experiencing the highest 5-year and 1-year growth rates in both 2019-20 and 2020-21[2]. Whilst the long-term effects of the COVID-19 pandemic are yet to be seen, population trends to date have indicated a clear migration from Melbourne to Regional Victoria, with the Surf Coast having one of the strongest growth rates across all of Regional Australia in 2020-21[3].

Improved technology, water efficient appliances, behaviour change, education and awareness campaigns and the introduction of recycled water have all helped to improve our water use efficiency.

However, with more extreme heat events, less rainfall and a growing population, demand for water is increasing again. Over the past 10 years, our region's water use has increased from 172 litres per person, per day in 2010-11 to 205 litres per person, per day in 2020-21.



[1] 33,533 million litres supplied in 2020-21

[2] https://blog.id.com.au/2021/population/population-trends/the-50-largest-cities-in-australia-2021-update/ and https://blog.id.com.au/2020/population/population-trends/the-50-largest-cities-and-towns-in-australia-by-population-2020-update/

[3] https://blog.id.com.au/2021/population/demographic-trends/telling-the-local-story-migration-in-the-covid-era/

As our region continues to prosper, we expect the population to once again double to 670,000 by 2065. More people using more water will place further pressure on our water supplies.

Growing water needs of industry and agriculture

Water is essential for a prosperous economy. Greater Geelong supports over 100,000 jobs with an annual economic output of $34.8 billion[4].

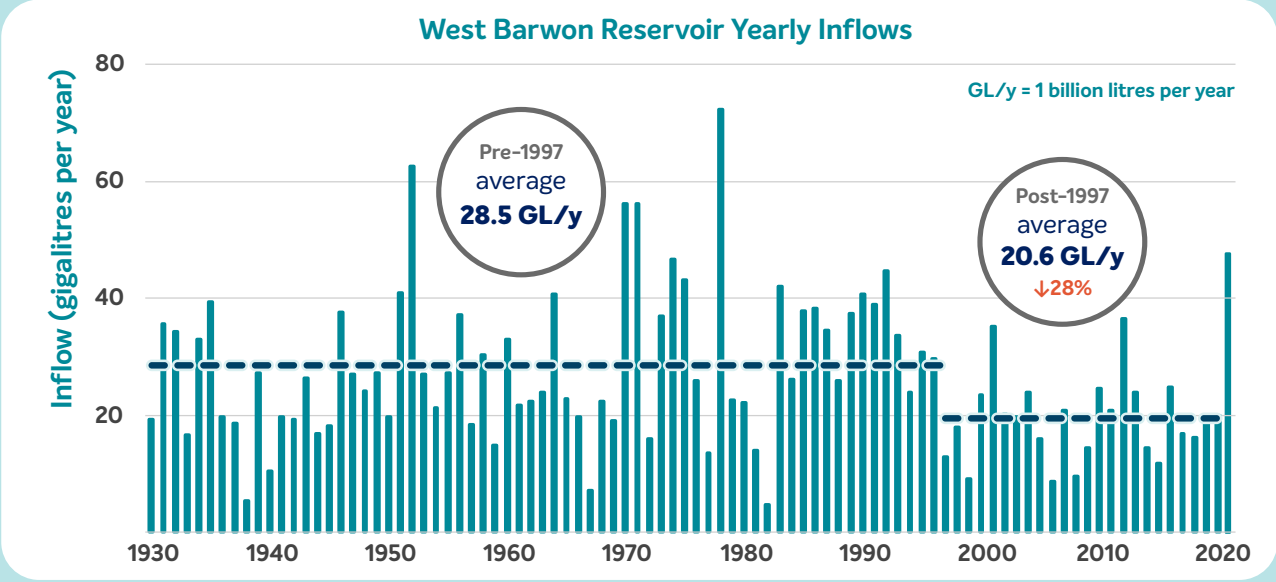
Our economy is made up of many diverse sectors including health, education, retail, construction, finance and insurance, advanced materials manufacturing, research, cleantech, engineering, agribusiness, tourism and innovative creative and cultural activities.

Our region is also leading the transition to new energy with wind, solar, bioenergy and hydrogen initiatives. For example, we are partnering with major businesses and local councils on two Renewable Organics Networks to reduce the amount of organic waste that goes to landfill, create clean renewable energy, reduce costs, generate jobs and drive economic growth in the region.

Climate is changing, becoming hotter and drier

Since the Millennium Drought (1996–2010) we have seen a reduction in inflows to our water storages – a "step change" of between 30 to 60 per cent reduction in average annual inflows since 1997, compared to the long-term average.

Science is telling us that our climate is becoming warmer and drier, with the Intergovernmental Panel on Climate Change recently concluding that global surface temperatures will continue to increase and further intensify the global water cycle, including its variability and the severity of dry events[5].



The majority of climate models project a drier climate future for Victoria. The recent cool-season downward trend in rainfall is projected to likely continue, with current observations (including natural climate variability) tracking at the drier end of these projections[6].

We need to be prepared for the possibility of a drier, hotter future. Climate change will mean less rainfall and more extreme events, such as bushfire, drought, floods and heatwaves. The combined effect will be less water available from traditional, rainfall-dependent sources, at the same time as human and environmental demand for water increases.

Declining environmental health of our rivers

Rivers across southern Victoria are flow-stressed and additional water is needed to prevent further deterioration of waterways and protect their environmental values and other benefits for the future.

The amount of water available in both the Barwon and Moorabool River basins has declined by 11 per cent and 19 per cent respectively since 2005 due to a drying climate. This means that less water is available to both support healthy river flows and provide drinking water to urban communities in our region. However, there has been a larger decline in the amount of water available for healthy river flows,

[4] https://app.remplan.com.au/geelong/economy/summary?state=b2rRFdkabH53BPDf4YImwQC4hYhAYJ

[5] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (available at https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf)

[6] DELWP; Bureau of Meteorology; CSIRO; The University of Melbourne, 2020. Victoria's Water in a Changing Climate (available at https://www.water.vic.gov.au/__data/assets/pdf_file/0024/503718/VICWACI_VictoriasWaterInAChangingClimate_FINAL.pdf)

with the share of water set aside for this purpose decreasing from 86 to 84 per cent for the Barwon, and from 68 to 63 per cent for the Moorabool[7].

The combination of a drying climate and continued extraction for consumptive purposes means declining environmental health is evident for both the Barwon and Moorabool Rivers, causing negative impacts on cultural heritage.

The Moorabool River is recognised as one of the most flow-stressed rivers in Victoria. Most summers, disconnected pools develop in the lower reach of the river, and if no flows are provided, the pools dry out completely within a week, resulting in fish deaths. The Barwon River is also highly flow-stressed and there is currently not enough water to meet any of the environmental flow recommendations for this river.

Redressing water injustice of Traditional Owners

Our service region includes parts of the Traditional lands of Wadawurrung and Eastern Maar, who are the legally recognised Registered Aboriginal Parties under the Aboriginal Heritage Act 2006 (Victoria). We proudly acknowledge them as the Traditional Owners of the land and water on which we rely. We also acknowledge that they never ceded this land or the water that flows through it.

The Barwon and Moorabool Rivers have significant cultural values for our Traditional Owners and their connection to Country. Because of the way our waterways have been managed since European settlement, the current volumes and patterns of flow in our region's rivers represent a major change from millennia past, undermining their cultural value and the connection for Traditional Owners. Redressing this requires more water to be made available for the natural flow of the rivers to conserve cultural heritage values and connection. Traditional Owners aspirations and knowledge must also be recognised and embedded, and Traditional Owners empowered to contribute, to the way flows are managed.

For example, the Wadawurrung are clear that "without access to Country and water, we are limited in our role and ability to care for Country"[8]. Wadawurrung goals include that by 2025, the waterways of the Barre Warre Yulluk[9] will have sufficient cultural flows and connectivity to support culturally important species and that the Wadawurrung will have negotiated access to water rights.

The Eastern Maar also have a goal that "our Country is healthy and our natural resources are managed and used sustainably"[10].

We want to support our Traditional Owners in the development and implementation of their Country Plans and in their journey for self-determination. We also want to be guided by our Traditional Owners in our decisions about sourcing and moving water on Country, with a strong collaboration to further integrate their cultural values and goals under the framework of their Country Plans into the work we do.

[7] DELWP, 2020. Long-Term Water Resource Assessment for Southern Victoria. The State of Victoria Department of Environment, Land, Water and Planning (available at https://www.water.vic.gov.au/__data/assets/pdf_file/0025/457126/DELW0146_LTWRA_OverviewReport.pdf)

[8] Wadawurrung Traditional Owners Aboriginal Corporation, 2020. *Paleert Tjaara Dja* – let's make Country good together 2020-230 – Wadawurrung Country Plan.

[9] *Yulluk* (great river) that runs from the *barre* (mountains) to the *warre* (ocean); includes Barwon, Moorabool and Leigh Rivers (refer page 34 of above Wadawurrung Country Plan)

[10] Eastern Maar Aboriginal Corporation, 2015. *Meerreengeeye ngakeepoorryeeyt* - Eastern Maar Country Plan..

Maintaining affordability for customers

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

We continue to have one of the lowest average residential customer bills in Australia[11]. Our bills have actually decreased by more than 15% over the past ten years in real terms. However, our region is socially and economically diverse, with some communities in our region among the most disadvantaged in Victoria.

More than 95 per cent of customers surveyed for our 2023 Price Submission said we need to maintain affordability for all. They also wanted us to ensure charges are designed and applied fairly.

We provide a range of payment and support programs to assist customers in need. This includes bill extensions, payment plans, relief grants, and access to government concession. We also provide financial counselling referrals and can help customers save water and money on their bill by replacing inefficient appliances and fittings such as leaking taps and toilets.

When prompted in the 2022 willingness to pay survey, the majority (68 per cent) of residential customers felt they could not offer any suggestions to Barwon Water to improve their service.

Of those who could provide further comment, a key area of service improvement was focused around 'financial / bills / fees (40 per cent). Additionally, 'environment / water savings / investment' (25 per cent) and 'general maintenance / customer service' (22 per cent) were are noted as areas in which Barwon Water could help to improve services.

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 can be transferred via gravity, thereby avoiding expensive pumping costs. 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.

The 2022 willingness to pay research indicated customers are concerned about how the work Barwon Water does will impact them directly (financially, service levels and reliability). Customers are conscious of their behaviours in regards to the environment, and support any advice or behaviour change guidance to facilitate positive outcomes for the environment. However, this influence on behaviour change is reinforced if there is a personal benefit. For example, 'what impact does taking shorter showers have on my bill?'.

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

[11] Compared to other water utilities with more than 100,000 customers.

Our process

Finalisation of the Water for our Future Strategy sees us enter Phase 5. We will begin implementing the actions outlined for the next 5 years and 50 years.

Our process is also described in more detail in the "What we heard" and "What we did" sections of this strategy.

Phase 1
Community vision and criteria

July 2019 – November 2020

In Phase 1, thousands of people from across the region shared with us what they value about water and how they see water being used in 50 years' time. We also heard new ideas for how we might think differently about how we use water and where it comes from.

Phase 2
Ideas / options assessment

December 2020 – March 2021

In Phase 2, we shared some of the ideas we heard from our community, local businesses, staff and independent experts and asked our Traditional Owners, community and stakeholders to learn more about the possible options and provide feedback.

Phase 3
Strategy Development

April – December 2021

In Phase 3 we heard feedback from the community on our proposed plans for the next 5 years and 50 years.

Phase 4
Finalise Strategy

January – May 2022

Final *Water for our Future* Strategy May 2022

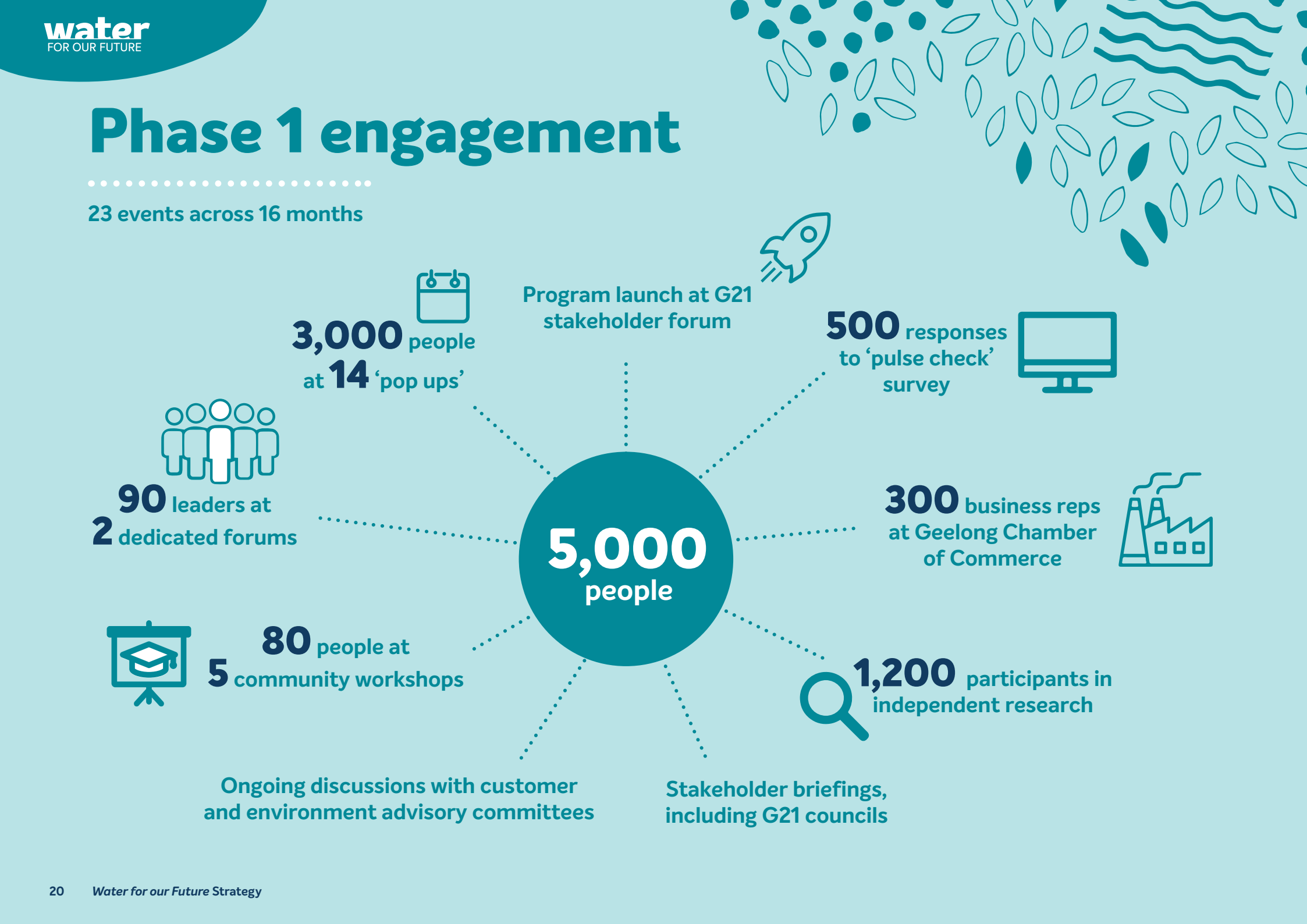
Phase 5
Implement agreed options

(2022–2027)

Price Submission
October 2022

Phase 1 engagement

23 events across 16 months



Phase 2 engagement

3 events and 12 online opportunities over 4 months

37 leaders at a dedicated forum

297 responses to online poll about 11 high-level options

18 council officers across 5 local councils at a dedicated workshop

>12,500 interactions

11 social media posts with reach of 44,250 and post engagement of 12,240

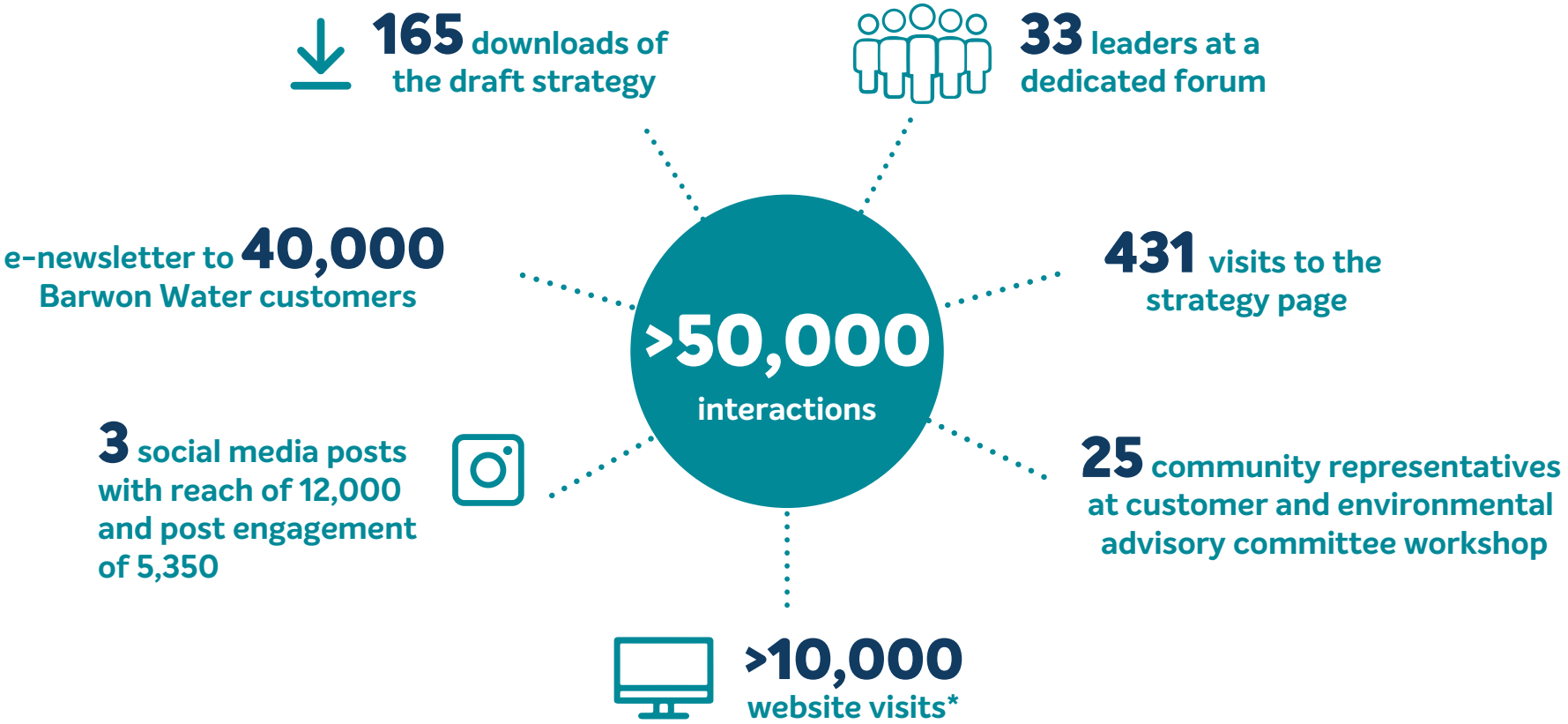
27 community representatives at customer and environmental advisory committee workshop

7,013 website visits*

*across both Phase 1 and 2

Phase 3 engagement

Promotion and information on the draft Water for our Future strategy over 2 months



*across Phases 1 to 3

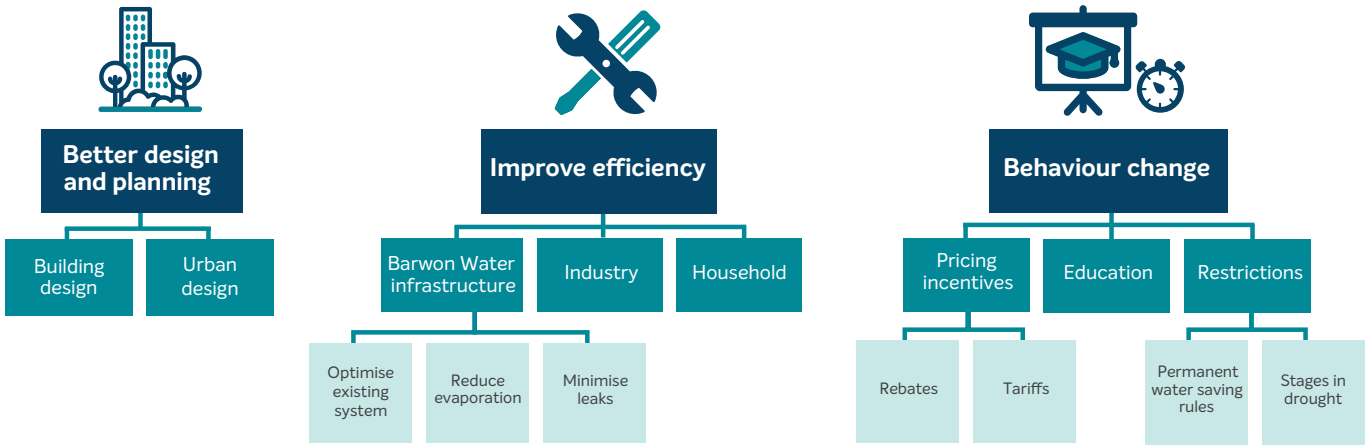
In parallel to, and to help inform, our engagement with the community, we have undertaken significant technical analysis to support our understanding of the challenge we face and the options we might implement in response.

We have:

- Adopted a scenario-based approach to understanding our challenge, by applying latest Victorian Government guidance on climate change projections and population growth so that we have confidence in the range of possible supply/demand balances for which we must be prepared to help our region prosper.
- Enlisted the help of more than 20 independent experts and specialists in the fields of climate science, national and international water policy, town planning, water research and innovation, climate economics, and environmental science, so that we ensure we are considering our challenge from a range of perspectives and in light of best possible information.
- Commissioned Isle Utilities – an independent technology and innovation consultancy with global water sector knowledge and experience – to undertake a comprehensive and exhaustive review of our long-list of options and identify any gaps from an international leading-edge perspective, so that we have confidence that nothing has been missed.
- Collaborated with research partners, Traditional Owners and water industry colleagues to understand how innovative or shared infrastructure opportunities might provide cost effective outcomes.
- Engaged engineering and economic consultants to firm up our understanding of the technical feasibility, viability and financial cost of our most significant options, so that we have confidence we are basing our assessments on the most up-to-date information.
- Developed a bespoke economic appraisal model, in partnership with independent economic experts, to evaluate the community costs and benefits of different portfolios of options.
- Designed an adaptive planning approach to developing and implementing our strategy, so that we have confidence the actions set out in this draft strategy will provide a robust, responsive and agile pathway to navigating and responding to the uncertainty associated with the challenge we face.
- Tested key water security options for willingness to pay from more than 1,850 customers as part of the 2023 Price Submission.

Our technical analysis has enabled us to consider more than 600 ideas to help us find or save water. We have grouped these ideas into 11 major themes, under two broad headings – finding more water (supply options) and smarter water use (demand options), as shown in the diagram overleaf. The breadth and depth of our analysis means we have left no stone unturned in the development of our *Water for our Future* strategy.

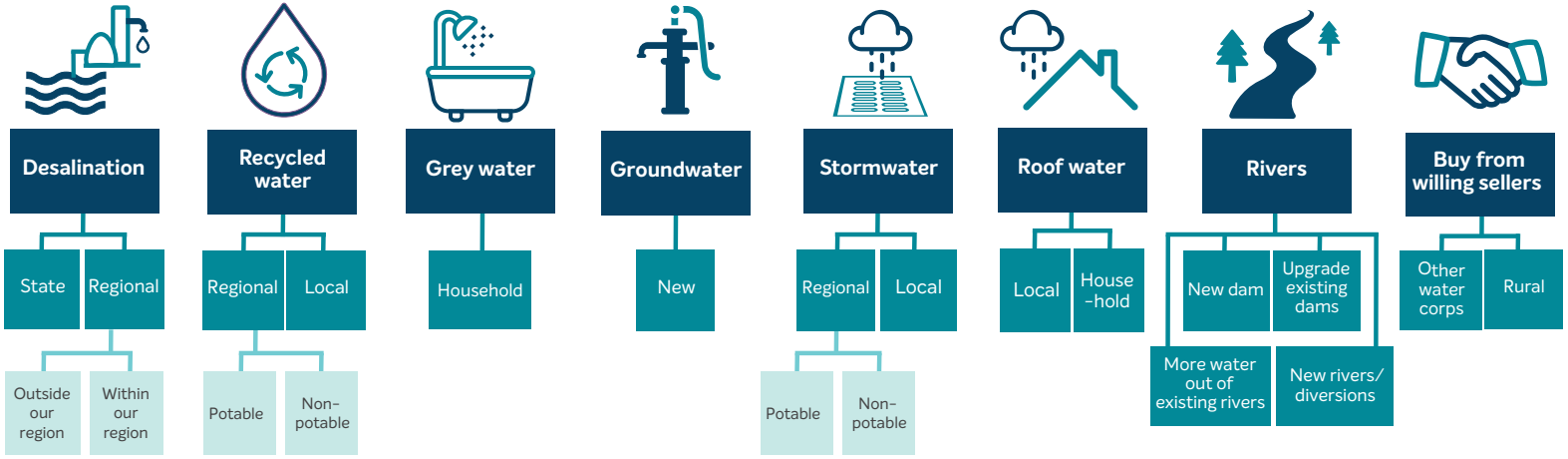
Smarter water use...



Definitions of scale:

- **Regional – whole-of-system scale (e.g. Greater Geelong)**
- **Local – suburb or township scale**
- **Household – building or household scale**

Finding more water...



The *Water for our Future* Community Panel has played an important and central role in considering all the feedback collected through our wider engagement.

The panel was established as a randomly selected group of individuals to represent the diversity of our region, with the responsibility of:

- developing a vision for our water future
- recommending a set of principles and criteria for us to consider when evaluating the ideas and options that might help achieve the vision
- considering assessments of different options against these principles and criteria, to share their views about which options should and should not be further considered by Barwon Water as part of our region's water future.

To help guide their discussions, the panel considered a wide range of information about our changing climate and the impact it is having on the amount of water we collect from rainfall. The panel heard from, and asked questions of, more than 20 independent experts including Traditional Owners, and specialists in the fields of climate science, national and international water policy, town planning, water research and innovation, climate economics, and environmental science.

It has been the responsibility of the panel to understand the views of the broader community reflected through our wider engagement and work together to represent those views in their in their deliberations.

Community Panel deliberations

Phase 1 - Vision & criteria

52 community members

1600+ hours

4 days in Oct-Nov 2020

resulting in:

criteria on how to assess options for the future:

- **5** principles
- **6** themes
- **19** criteria
- **23** metrics

a vision for our water future:

Our water future is....
A secure future where our rivers flow, our foods grow and our impact is low.

Resilient, innovative and sustainable, with abundant water from a range of sources and where we actively protect and improve water for the environment.
Ethical, healthy and responsible, with affordable and equitable access for everyone.
A shared responsibility, by valuing and conserving water and respecting the diverse needs of our community, cultures, and the environment.

Phase 2 - Options & ideas assessment

41 community members

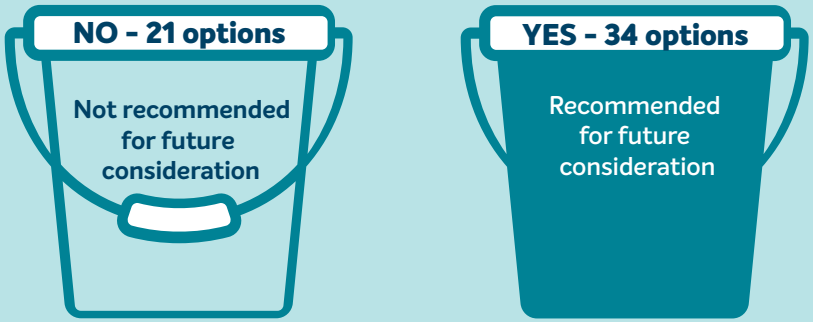
1100+ hours

3.5 days in Feb-Mar 2021

55 **options** were reviewed, representing **638** **ideas** submitted by the community and experts.

resulting in:

advice for Barwon Water to consider in developing a draft Urban Water Strategy that meets the community's vision:



Forward-thinking options for the next 50 years

Phase 3 – Reviewing the draft strategy

26 community members

275 hours

1 full day and 1 webinar in Nov 2021

resulting in:

Feedback to Barwon Water on the draft strategy, including recommendations for the final and their level of comfort in relation to how the vision influenced the strategy and the cost implication of the strategy on the average customer.

Overall, the panel members were very positive about both the 5-year and 50-year actions proposed in the draft strategy, with 60 per cent saying "Love it" and 40 per cent of participants saying "Like it" when asked if the strategy reflected the vision they had developed in November 2020.

Community Panel composition*

water FOR OUR FUTURE

Barwon Water
Water for our Future
About our Community Panel participants

	SELECTED/ CONFIRMED	CENSUS
	52 ATTENDEES	52 TOTAL

GENDER

	SELECTED/ CONFIRMED	CENSUS
Male	27 51.9%	25 48%
Female	25 48.1%	27 52%
Other	0 0%	0 0%

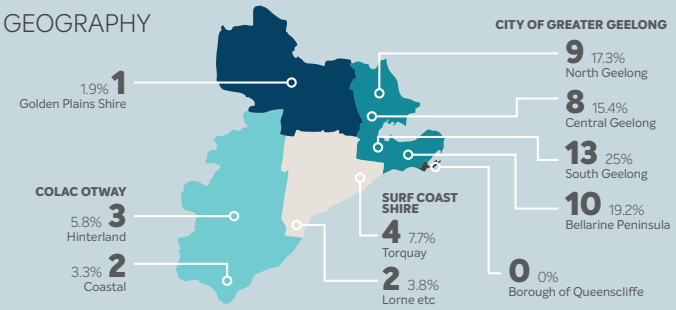
AGE

	SELECTED/ CONFIRMED	CENSUS
0–14	0 0%	0 0%
15–24	7 13.5%	7.8 15%
25–34	8 15.4%	7.8 15%
35–49	13 25%	12 23%
50–59	7 13.5%	8.3 16%
60–69	8 15.4%	7.8 15%
70 or older	9 17.3%	8.3 16%
100+	0 0%	0 0%

TENURE

	SELECTED/ CONFIRMED	CENSUS
Home owner	35 67.3%	34.8 67%
Renting	17 32.7%	17.2 33%

GEOGRAPHY



	SELECTED/ CONFIRMED	CENSUS
Golden Plains Shire	1 1.9%	1 1.2%
CITY OF GREATER GEELONG		
North Geelong	9 17.3%	9.1 17.5%
Central Geelong	8 15.4%	7.1 13.7%
South Geelong	13 25%	13.7 26.3%
Bellarine Peninsula	10 19.2%	11.8 22.6%
COLAC OTWAY		
Hinterland	3 5.8%	2.3 4.5%
Coastal	2 3.3%	1 1.9%
SURF COAST SHIRE		
Torquay	4 7.7%	4 7.7%
Lorne etc	2 3.8%	1.5 2.9%
Borough of Queenscliffe	0 0%	0.5 1.0%

DIVERSITY
In our panel there is much diversity, including:

1	**Aboriginal**
15	**People born overseas** Thailand, England, Mexico, Malawi, Malaysia, New Zealand, India, Germany, Sri Lanka, and Nepal.
8	**People who speak languages other than English at home** Bahasa Malaysia, Gujarati, Singhalese, Hindi, Nepali, Spanish, and Malayalam.
2	**People are living with a disability**

*Sixty people were originally randomly-selected for the *Water for our Future* Community Panel, however a number of people were unable to participate for all of the panel sessions

Our adaptive plan

What is adaptive planning?

The only thing we know for sure about the future is that we cannot predict it with any certainty. We can only explore different scenarios that describe how the future might look, depending on assumptions we make about key sources of uncertainty, like the impact of population growth and the effects of climate change.

Scenario planning inevitably tells us that, depending on the conditions that might arise, the action required to meet future needs could be very different. For example, the actions needed to secure urban water supplies are typically vastly different in scale and timing depending on the assumed impacts of climate change into the future[11]. The graph shows that Victoria is expected to continue to get warmer, but the extent of warming varies depending on the assumed emissions scenario. Rainfall projections are associated with even larger uncertainties compared to temperature projections, because rainfall varies more in time and space than temperature[12].

Despite uncertainty about the effects of climate change on rainfall, we must still make decisions about when and how to respond to meet future water needs, or otherwise there is a risk that we will need to impose harsh water restrictions, more often and for longer, or that we could run out of water. To manage this risk, we must always be ready to act in a way that responds to whatever conditions we find ourselves facing. A proportionate response needs to find the right balance between acting too early or investing too much – which impacts customer prices – and acting too late or investing too little, which impacts customers' level of service.

Adaptive planning is a way of managing uncertainty. It allows for ready adjustment in response to new conditions or better information, making it particularly useful when planning for an uncertain future. Adaptive planning recognises that a combination of actions, sequenced over time – with some actions taken now, and some actions that may be taken in the future – can lead to a most responsive and resilient planning strategy[13].

An adaptive planning approach also enhances system resilience, as having a diverse portfolio of actions planned over time gives us the flexibility to respond to unprecedented events when they occur. For example, our ability to manage disruptive, unforeseen emergencies or meet changing community expectations about environmental and cultural needs or respond to rapid technological advancements are all optimised with adaptive planning."

[11] RCP8.5 and RCP2.6 are two representative concentration pathways used by the Intergovernmental Panel on Climate Change as inputs to global climate models

[12] The State of Victoria Department of Environment, Land, Water and Planning 2019, Victoria's Climate Science Report 2019

[13] Water Services Association of Australia, Adaptive Planning Pathways and Methods

An adaptive planning approach is characterised by:

- **scenario planning to understand the range of possible future outcomes we may face**
- **identifying the triggers for 'no regrets' actions that are necessary to maintain service levels under worst case conditions**
- **minimising the time required to deliver large-scale action by being ready to deliver it once triggered (for example, having all design and approvals in place)**
- **sequencing and staging actions so that they meet future needs with flexibility and without over-investment.**

Victoria is expected to continue to get warmer

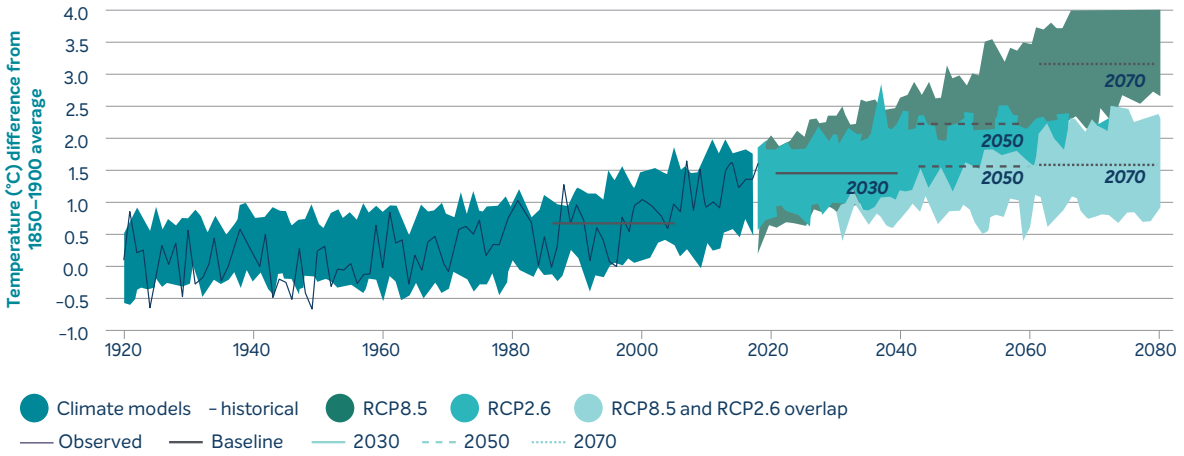


Figure 11: Average annual temperature of Victoria in observations and models relative to the pre the highest emissions pathway (RCP 8.5) and the lowest (RCP 2.6) separately. The thicker lines show the 20 temperature from the average of all models for each time period (CSIRO, 2019).

Framing our adaptive plan

Water for our Future is a 50-year strategy that will be revisited every five years. This makes *Water for our Future* the heart of our adaptive planning for a secure water future. It allows us to continually look forward to plan for the evolving longer-term, while making sure that we are periodically reviewing and adjusting our shorter-term actions.

Uncertainty is greater the further into the future we look. Adaptive planning ensures we make best use of the time available to respond to whatever conditions emerge. Our draft *Water for our Future* strategy does this by framing what we propose to do in each of our systems over different time horizons and circumstances:

- **the actions we propose in the next five years, corresponding with the life of the strategy and our next regulatory price period - these actions include both implementation and readiness activities**
- **the actions and opportunities we expect to pursue over the 50-year horizon of the strategy to ensure a secure water future for our region**
- **what we will do in the event of an emergency to ensure that service levels are maintained.**

For each system, the actions we take in the next five years will allow us time to prepare for the implementation of long-term actions required over the next 50 years. Our five-year actions include both **implementation** and **readiness** activities - meaning that we will both deliver initiatives on the ground in the next five years, and prepare ourselves over the next five years so that we are ready to implement medium-term initiatives (in 5-20 years). We will also be ready to take actions in the event of drought or emergency conditions that are beyond our planning assumptions.

Consistent with the way we have grouped and organised our options, the actions we propose to take fall under two categories:

Finding more water – Actions that generate or tap into new sources of water for a range of different fit-for-purpose uses.

Smarter water use – Actions that improve the water use efficiency of our assets or appliances, or changing our behaviour to reduce the amount of water we use.

We have also introduced a third category:

Integrated water management – Actions that reflect a collaborative approach to water planning and management, bringing together organisations with an interest in all aspects of the water cycle. These actions may reflect options to find more water, or save more water, or both.

In all cases, our plans and actions are informed by comprehensive modelling of our systems. Longer-term planning is based on forecasting system performance for a given level of service under a range of future climate and population scenarios. We can also forecast how our storages might behave in the short-term, which helps us understand how resilient our supplies are under potential worst-case scenarios of low inflows. Predicting storage levels helps guide our actions with more precision, so that we only act when necessary and can defer major augmentations as long as possible, whilst maintaining levels of service.

Example of long-term planning under a range of scenarios

We consider a range of plausible future climate scenarios identified by the Victorian Government, noting there is no 'most likely' scenario. We also consider a range of possible demand scenarios, principally influenced by projections of population growth. The combination of scenarios is used to inform the possible timing of action that may be required to maintain service levels in future.

Our scenario-based planning means we consider a wide range of possible future outcomes. However, we must then decide about the potential circumstances we invest to protect against.

For example, we could aim to deliver new water supplies that can reliably meet demand under even the worst drought imaginable – but the cost of this for customers would be very high. Alternatively, we can accept that there might be some chance that we need to curb our demand – through water restrictions – during the less frequent, drier years.

This trade-off represents the 'level of service' that we need to establish and maintain over time. Because it directly impacts how much we invest, and therefore our water prices, customers have a critical role in helping to inform this decision.

Our *Water for our Future* strategy has been developed based on the following levels of service:

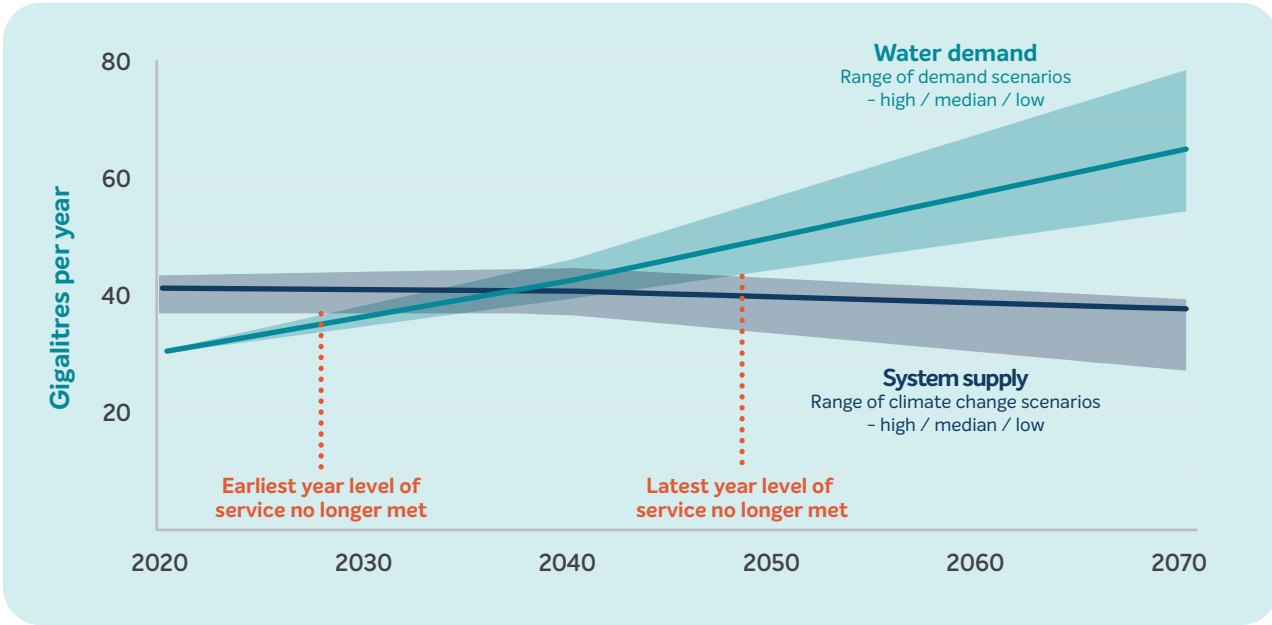
- **Agreed service level – during normal operation**

  We will supply water to meet unrestricted demand at least 95% of the time. This means we plan for water restrictions to be required no more than 5% of the time, over our 50-year planning horizon.

- **Minimum service level – during drought and emergency**

  At all time, even during drought and emergency, we will continue to supply drinking water to meet essential human needs.

Example of a supply-demand balance under a range of climate and demand scenarios



Implementing our adaptive plan

An adaptive planning approach relies upon monitoring and responding to conditions over time. In some cases, this will influence the actions we pursue and their timing, whether sooner or later than anticipated.

We constantly monitor the status of each of our water supply systems. Storage levels are published on our website and updated daily, with weekly updates shared via social media.

Ahead of every summer we also prepare and publish our Annual Water Outlook. This is an opportunity to reflect on storage levels following winter/spring inflows and demonstrate how our supply systems will provide sufficient water security in the short-term. This short-term outlook is based on prevailing storage levels, modelling of potential climate scenarios, demand patterns, and the latest climate outlook from the Bureau of Meteorology.

By reviewing the status of each system, the Annual Water Outlook enables us to communicate this with customers, including the likelihood of action, if any, such as the potential need for water restrictions. It is also an opportunity to regularly orientate ourselves against the potential future trajectories we have modelled. Depending on how conditions align with the scenarios we have prepared for, we may review the triggers, timing and prioritisation of the actions we have planned.

The Annual Water Outlook will help to guide the implementation of the *Water for our Future* strategy across its different time horizons. It will provide a regular review of progress against our planned **five-year actions,** help identify if our **50-year actions** might be needed earlier or can be delayed, and establish the likelihood of needing to draw on any **drought response** measures in the short-term.

With its 50-year outlook, 5-year detailed plan, and annual review cycle, the *Water for our Future* strategy ensures we are prepared to respond flexibly and adaptively to manage the uncertainty of the future.

Alongside our adaptive plan

Our adaptive plan identifies the key actions we will take for each of our systems. Alongside these system-specific actions, we commit to two overarching actions that will apply across all our systems. These actions will, in turn, help to inform the evolution of our adaptive plan.

Action BW1

Deepen our relationship with Wadawurrung and continue to build our relationship with Eastern Maar

We want to support our Traditional Owners in the development and implementation of their Country Plans and in their journey for self-determination.

Through our partnerships with Wadawurrung and Eastern Maar, and our Reconciliation Action Plan, we commit to identifying and realising tangible opportunities to contribute to Healthy Country.

We also want to be guided by our Traditional Owners in our decisions about sourcing and moving water on Country, with a strong collaboration to further integrate their cultural values and goals under the framework of their Country Plans into the work we do.

Action BW2

Support research that helps to address our challenge

We are committed to partnering with the water industry, our community and academic institutions – including Deakin University – to understand new and innovative ways of delivering our services and meeting our region's future water needs.

We currently have six PhD researchers, as well as a dozen undergraduate and honours students, working on a variety of projects specifically tailored to Barwon Water's context. We are also currently a joint participant in more than 10 projects with other water industry businesses in Australia and overseas

We will provide the opportunity for three more post-graduate research projects to commence in the next twelve months. The new research projects will be focussed on key opportunities or knowledge gaps arising from the actions in our adaptive plan. One project has already been identified (see Action AB) and the other two will focus on finding more water and smarter water use opportunities.

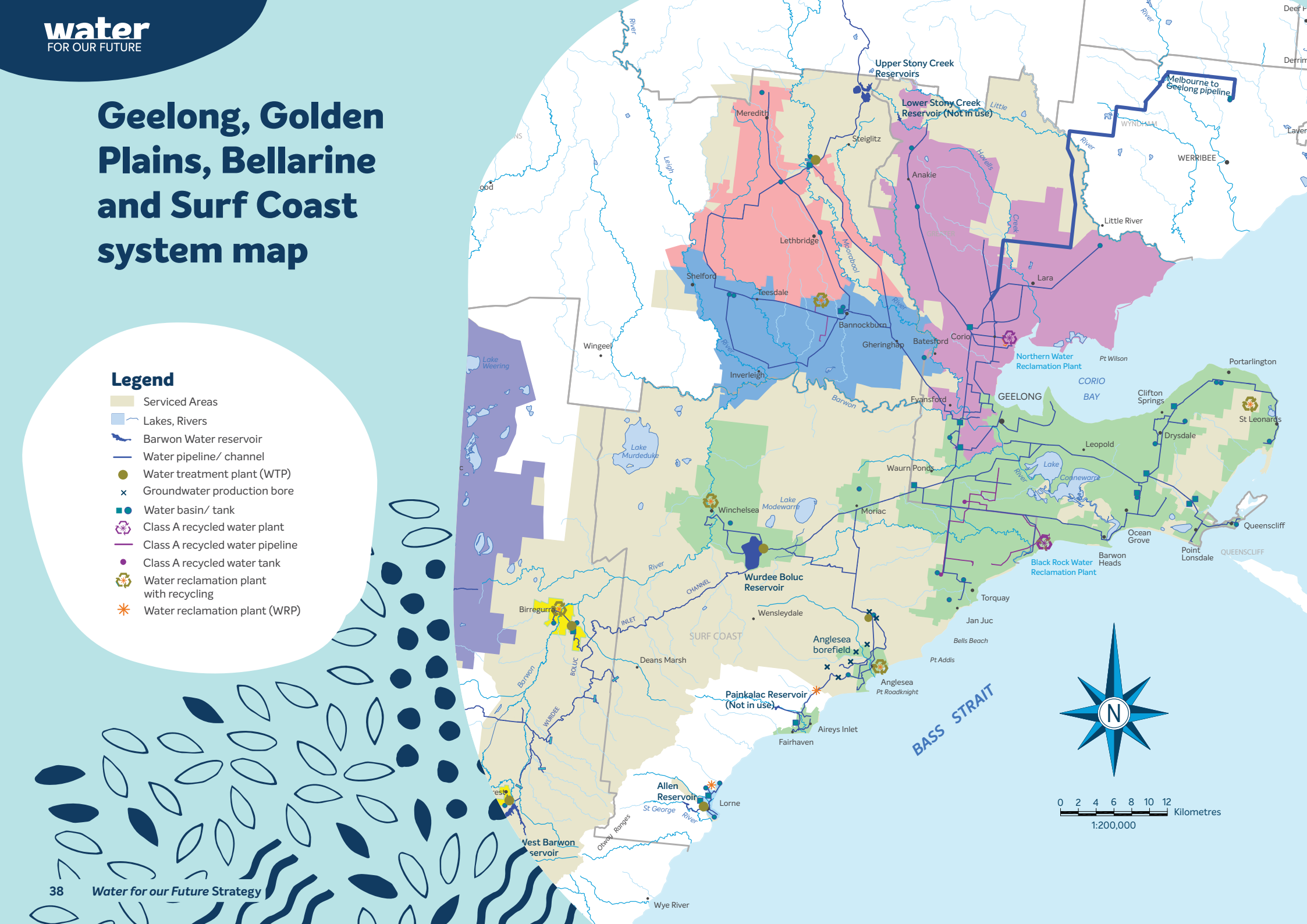
The outcomes of this research will help build our organisational knowledge and in turn the evolution of our adaptive plan to deliver a sustainable, affordable and reliable water future for our community and the environment.

Our systems

Geelong, Golden Plains, Bellarine and Surf Coast

water
FOR OUR FUTURE

Geelong, Golden Plains, Bellarine and Surf Coast system map



Our system

How does the system work?

Country

The Geelong, Golden Plains, Bellarine and Surf Coast water supply system covers much of our service region, across the Traditional Owner land of the Wadawurrung and small areas of Eastern Maar land. It extends from Little River in the east to Birregurra and Forrest in the west, along the Bellarine Peninsula and as far along the Surf Coast as Fairhaven and to Meredith in the north.

Urban water demand

Currently home to more than 300,000 people, the area's population is expected to grow beyond 670,000 by 2065. The Geelong, Golden Plains, Bellarine and Surf Coast system covers most of Barwon Water's service area and represents over 90% of our customer connections.

The system's annual water demand from residential and non-residential (industrial and commercial) customers is just over 30,000 million litres. The system supplies several large water users, such as refineries, research institutes, metal processors, malting houses, wood processors and breweries. Demand for water is projected to potentially double over the next fifty years.

Surface water supplies

The Geelong, Golden Plains, Bellarine and Surf Coast system traditionally relied upon surface water from the Barwon and Moorabool Rivers. Over time, this has been diversified to include a connection to Melbourne's surface water supplies via the Melbourne–Geelong Pipeline.

The Otway Ranges feed the Barwon system, which typically supplies most of the water delivered to Geelong, the Bellarine Peninsula and Surf Coast via the Wurdee Boluc Reservoir and Water Treatment Plant.

The catchments that feed the Moorabool system provide water to the Moorabool Water Treatment Plant at She Oaks, north of Lethbridge. The Moorabool system supplies a portion of the water needs of the northern suburbs of Geelong and the smaller townships of Bannockburn, Gheringhap, Teesdale, Shelford, Meredith and Inverleigh.

The Melbourne–Geelong Pipeline can transfer up to 16,000 million litres per year from Melbourne's major reservoirs, which are fed by the Yarra and Thomson Rivers in Melbourne and Gippsland. This equates to approximately 50 per cent of the system's current annual water demand.

Importantly, the volume that can be taken from any of these surface water supplies 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.

Under the bulk entitlement issued to Barwon Water under the Water Act 1989, we are entitled to a maximum of:

- 127,400 million litres over three years from the Barwon River
- 23,800 million litres over three years from the West Moorabool River
- 9,000 million litres/year from the East Moorabool River
- 16,000 million litres/year from the Yarra and Thomson Rivers.

Groundwater supplies

The Geelong, Golden Plains, Bellarine and Surf Coast system can access groundwater from the Anglesea borefield, within the Jan Juc Groundwater Management Area. Periodic operation of the borefield is subject to a stringent environmental monitoring program, with community oversight from a dedicated working group.

We no longer have a licence to access groundwater from the Barwon Downs borefield, within the Gerangamete Groundwater Management Area near Colac. Technical work in 2017 confirmed that intermittent use and historical management of the Barwon Downs borefield over the past 30 years – combined with the effects of a dry climate – led to environmental impacts in Boundary Creek and Big Swamp. In 2019, we withdrew our application to renew our extraction licence and we no longer have a licence for this source of water. Instead, we are focusing wholly on remediation of these environmental impacts.

We are currently working on developing a decommissioning plan for the Barwon Downs borefield. The plan will need to be accepted by Southern Rural Water prior to undertaking any decommissioning activities.

Accordingly, we have ruled out the use of the Barwon Downs borefield as a source of urban supply in this *Water for our Future* strategy. All water resource modelling undertaken for the Geelong, Golden Plains, Bellarine and Surf Coast system therefore assumes that no water is accessible for urban supply from the Barwon Downs borefield.

Wastewater

We treat about 25,000 million litres of sewage annually from homes, businesses and industries in the Geelong, Golden Plains, Bellarine and Surf Coast region.

The majority of wastewater is treated via the Black Rock reclamation plant and the Northern Water Plant.

Black Rock, located near Breamlea is our largest plant and treats wastewater from much of greater Geelong and produces more than 80 per cent of our recycled water. A total of 24,330 million litres of treated wastewater was discharged to the ocean from the Black Rock Water Reclamation Plant in 2020–21.

The Northern Water Plant was commissioned in 2013 to treat trade waste from the adjacent oil refinery and sewage from Geelong's northern suburbs.

Other, smaller plants at Bannockburn, Birregurra and Winchelsea collectively reused or applied to land all of the 380 million litres of available recycled water they generated over 2020–21. Our plant at Portarlington also generated 340 million litres of recycled water for local reuse, with the excess discharged to the ocean via Black Rock, and our remaining plant at Anglesea discharged 440 million litres of treated wastewater over the same time period.

All discharges are governed by Environment Protection Authority (EPA) licensing requirements.

Recycled water use

We supply recycled water to about 50 commercial customers in the Geelong, Golden Plains, Bellarine and Surf Coast system. The Northern Water Plant provides up to 2,000 million litres of Class A recycled water each year to the Viva Refinery in Corio.

The Black Rock Water Reclamation Plant provides Class C and Class A recycled water to agricultural customers and new residential developments at Armstrong Creek and Torquay North respectively.

In 2020–21, just over 1,000 million litres of recycled water was used by the Viva Refinery and a further 1,000 million litres was used by residential and agricultural customers.

We anticipate that total recycled water production will grow to 32,000 million litres per year at 2030, and approximately 50,000 million litres per year by 2065.

Our challenge

How has the system performed?

At the peak of the Millennium Drought, the Geelong, Golden Plains, Bellarine and Surf Coast system was placed on Stage 4 restrictions to curb demand as storages declined to a record low level of 14% due to sustained low inflows. At the time, the only alternative water source available was the Barwon Downs borefield, which supplied up to 70% of the system's daily water needs. Without use of the borefield, Geelong, Golden Plains, Bellarine and Surf Coast would almost certainly have run out of reticulated drinking water.

Since then, large projects such as the MGP, Anglesea borefield and Northern Water Plant have been delivered to diversify our water resources and increase supply to be more resilient to climate variability. We no longer have a licence to access water from the Barwon Downs borefield and are instead wholly focussed on remediation of environmental impacts in Boundary Creek and Big Swamp.

This experience has taught us a range of valuable lessons. The Millennium Drought underscored the critical importance of having a diverse portfolio of water supply options, preferably with some resilience to climate variability. It also highlighted the limited ability to continue to rely solely on traditional surface and groundwater supplies in the future. This was further demonstrated by our community's strong preference not to seek ongoing access to groundwater at Barwon Downs.

What is the scale of the challenge?

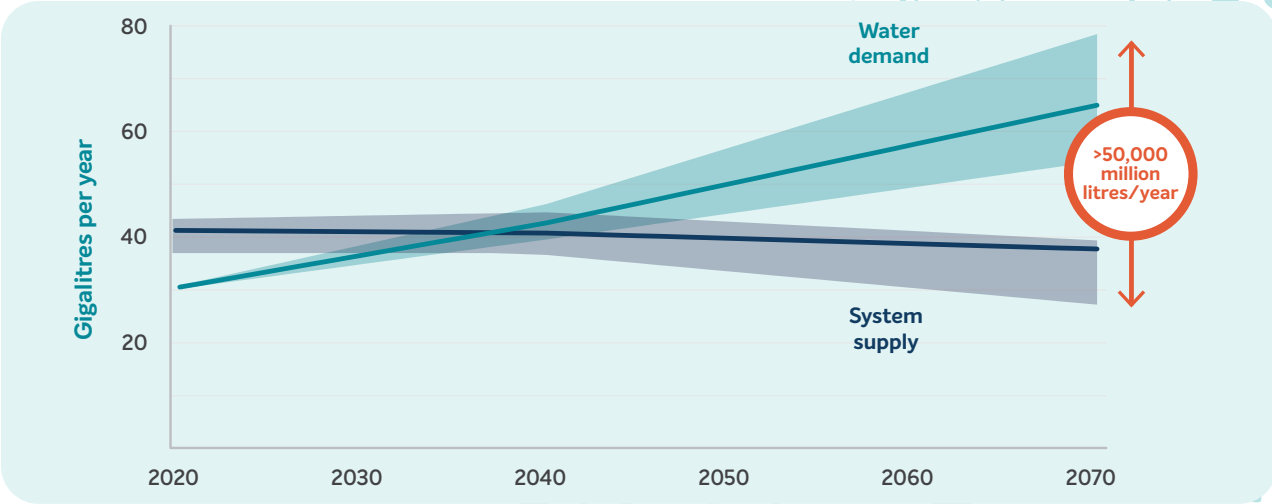
Under a worst-case scenario, we need to find or save an extra 1,000 million litres of water each year for the next 50 years to meet the needs of residential and business customers, the environment and Traditional Owners of the Geelong. This equates to an extra 50,000 million litres of water per year by 2070.

The graph shows that, under a worst-case scenario of high climate change and high population growth, we will be unable to reliably meet the water needs of our Geelong, Golden Plains, Bellarine and Surf Coast customers by 2027.

It does not mean the system will run out of water by 2027, rather there is an increased possibility of harsher water restrictions, more often and for longer.

The table shows how the gap between supply and demand grows over time if we do nothing to increase supply or reduce demand (in millions of litres of water per year).

Geelong supply and demand forecast



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2040	2050	2060	2070
Median Growth / Median Climate Change	9,500	8.900	8,300	7,600	6,300	6,300	5,700	5,100	4,400	-1,900	-10,400	-18,900	-27,400
High Growth / High Climate Change	4,600	3,800	3.100	2,300	1,500	700	0	-800	-1,600	-9,700	-23,600	-37,500	-51,500

Our response

What do we propose to do?

Our adaptive plan to respond to the challenge faced by Geelong, Golden Plains, Bellarine and Surf Coast is set out over three time horizons.

In the next 5 years:

Find more water

GG1 Extend the reach of the Melbourne–Geelong Pipeline so that it can supply growing demand for residential, business, industry and agriculture in Geelong, Bellarine and the Surf Coast, and allow for water to be returned to the Moorabool River for Traditional Owner cultural values and environmental needs

GG2 Put more recycled water to productive use

GG3 Continue to investigate and increase our readiness to implement long-term actions, to help inform our 2027 Urban Water Strategy

Smarter water use

GG4 Work with customers to save water through our sustainable water use program

GG5 Expand our use of smart technology to help reduce costs and save water across our networks and in our homes and businesses

GG6 Maintain efforts to continually optimise our system, so that we can make best use of available water resources and entitlements

Integrated water management

GG7 Start delivery of the integrated water management plan for the new Northern and Western Geelong Growth Areas, including construction of a "purple pipe" network to supply Class A recycled water

GG8 Work with the City of Greater Geelong, Golden Plains Shire, Surf Coast Shire and Borough of Queenscliffe to progress localised integrated water management opportunities

GG9 Support improved flows and waterway health on the Barwon River by undertaking complementary river rehabilitation works

GG10 Investigate the feasibility of a large-scale alternative water grid to distribute recycled water and stormwater for beneficial uses to boost water supply for agriculture and primary industries

Over the next 50 years:

Find more water

We will gradually reduce our reliance on rivers and groundwater as we transition to more climate resilient manufactured water sources such as fit-for-purpose recycled water, stormwater and desalinated seawater. By accessing a share of the State's next large-scale water supply upgrades, we can continue to meet the water needs of our growing region and also return more water to the Barwon and Moorabool rivers in line with the Central and Gippsland Region Sustainable Water Strategy

Smarter water use

Continue to work with customers to encourage smarter water use, including through the use of innovative technologies

Integrated water management

Adopt an integrated water management approach when planning all future urban growth, in partnership with the City of Greater Geelong, Golden Plains Shire, Surf Coast Shire and Borough of Queenscliffe

During drought or emergency:

Find more water

Activate the Anglesea borefield from “standby” to “operational” mode if storage levels at Wurdee Boluc reservoir fall below defined trigger points

Commission ultra-low lift pump stations if storage levels at Wurdee Boluc reservoir fall below defined low levels

Smarter water use

Implement water restrictions if total system storage levels fall below defined trigger points.

Restrictions likelihood

Our adaptive planning approach focuses on the actions we propose to take over the next five years, to help prepare us for the future.

The combination of these five year actions will deliver 4,800 million litres of water supply capacity, shifting the timeframe for when we will be unable to reliably meet the water needs of customers in our Geelong, Golden Plains, Bellarine and Surf Coast system from 2027 to 2034, under a worst-case scenario of high climate change and high population growth.

In the meantime, we expect water restrictions will be very rare over the next five years (<1%, or 3 weeks out of 5 years).

Action GG1

Extend the reach of the Melbourne–Geelong Pipeline so that it can supply growing demand for residential, business, industry and agriculture in Geelong, Bellarine and the Surf Coast, and allow for water to be returned to the Moorabool River for Traditional Owner cultural values and environmental needs.

Currently, only 40% of connected properties in the system can access water from the Melbourne–Geelong Pipeline. Construction of two new pump stations at Cowies Hill and Highton, and upgrade of an existing pump station at Lovely Banks, will extend the reach of the Melbourne–Geelong Pipeline further into the system. These works will increase the capacity of the Melbourne–Geelong Pipeline from 16,000 million litres to ~22,000 million litres each year.

These works will improve the resilience of water supply to areas such as southern Geelong, the Bellarine Peninsula and the Surf Coast. At present, these southern areas can only be supplied from the Barwon River and when needed, the Anglesea borefield which can be brought online if local storage levels are low. With climate change anticipated to reduce surface water inflows by up to 50 per cent by 2040, there is need to increase operational flexibility in how water is transferred across the network to enable more of our customer base to have access to climate resilient sources while also minimising potential disruptions to supply in the event of unplanned emergencies.

Together, these actions will reduce the system's current reliance on the Moorabool River, the most flow stressed river in the State. In return, up to 3,700 million litres/year of water from the Moorabool River will be transferred to the custodianship of Wadawurrung Traditional Owners and/or the Victorian Environmental Water Holder.

This water will be a combination of water for the West branch of the Moorabool River, held in Lal Lal Reservoir (3,000 million litres/year) and water for the East branch of the Moorabool River, held in Bostock Reservoir (700 million litres/year). Like our existing entitlement, the newly created entitlement/s will be subject to annual streamflows into the reservoirs, meaning the water that is available from year to year will depend on how much it rains.

We will work with Wadawurrung Traditional Owners and the Victorian Environmental Water Holder to determine how best to share this water.

Reliable access to 22,000 million litres of water from the Melbourne system will be achieved through the South Central Entitlement Reforms proposed in the Central and Gippsland Sustainable Water Strategy.

Action GG2

Put more recycled water to productive use

Recycled water that is fit for purpose can meet many of the region's water needs. We will continue our focus on putting more recycled water to productive use and will not use recycled water for drinking water supplies. Putting fit-for-purpose recycled water to productive use will help reduce demand on our drinking water supplies (currently sourced from rivers) and improve our region's economic prosperity, by supporting agriculture and industry.

Residential use of recycled water for garden watering, car washing and toilet flushing will increase over the next five years, as more properties connect to our existing Class A recycled water network at Armstrong Creek and Torquay North and new properties connect to our new Class A recycled water network in the Northern and Western Geelong Growth Areas. Over the next five years, we expect that this will decrease demand on our drinking water supplies will be around 300 million litres/year.

We will support existing agricultural and industrial customers to increase their productive use of recycled water by exploring options to further reduce the salinity of the recycled water we produce. We will also explore new opportunities for agricultural or industrial use of Class A recycled water in the vicinity of the Northern Water Plant and the Class A network at Armstrong Creek, and of Class C recycled water in the Thompson Valley and around Bannockburn and Portarlington

For example, we are expanding recycled water infrastructure on the Bellarine Peninsula to reach more high-value customers, and upgrading the existing plant to supply 450 million litres/year of low salinity, high-quality recycled water to new and existing customers. The $13.9 million project is jointly funded by the Australian Government ($5.5 million), the Victorian Government ($2 million) and Barwon Water ($6.4 million). Recent agreements with Deakin University and the National Trust also give us confidence that new opportunities can be found.

Over the next five years, we expect these actions will help to increase the productive use of recycled water by agricultural and industrial customers by up to 700 million litres/year. About 20% of this will directly replace drinking water use, decreasing demand on our drinking water supplies by around 150 million litres/year.

Together, we expect we will be able to put an extra 1,000 million litres of recycled water to productive use. Most of this recycled water will be sourced from, and in turn benefit, the Greater Geelong, Golden Plains, Bellarine and Surf Coast system.

However, we will also pursue recycled water opportunities arising from other, smaller water reclamation plants across our region.

Recycled water investment was the largest supported initiative from our customers in the 2023 Price Submission willingness to pay survey. With an average support for a $3 per year increase for residential customers.

We remain committed to our long-term goal of achieving 100% reuse of recycled water by 2030. This ambitious target was set out in our Strategy 2030 document.

We will continue to pursue large-scale opportunities for the productive use of recycled water, recognising that even with the actions proposed over the next five years, there remains a significant volume of recycled water (over 25,000 million litres/year) to reuse by 2030 if we are to reach our target. However, this is the nature of a stretch or ambitious target – even though it might be difficult to achieve, it still remains worthy of effort.

Deakin University is implementing a $7.8M IWM plan for its Waurn Ponds campus, which involves an extension of Barwon Water's Class A recycled water network to irrigate sports fields and campus grounds, reducing potable water use by 75 million litres/year. A $2M project to provide high quality, fit-for-purpose recycled water at the National Trust's Barwon Park at Winchelsea, will transfer 80 million litres/year of recycled water to Barwon Park for irrigation

Action GG3

Continue to investigate and increase our readiness to implement long-term actions, to help inform our 2027 *Water for our Future* strategy

Our analysis shows that completing our planned actions over the next five years will shift the timeframe for when we will be unable to reliably meet the water needs of customers in our Geelong, Golden Plains, Bellarine and Surf Coast system from 2027 to 2034, under a worst-case scenario of high climate change and high population growth.

However, our adaptive planning approach means we need to continue to progress our understanding of potential long-term actions, so that we are ready for implementation when the need arises. We will continue to work with customers, Local Councils and our water sector colleagues to further explore and increase our readiness to implement long-term actions identified in our adaptive plan.

For example, based on our current analysis, our preferred large-scale alternative water source is to access a share of Melbourne's next major water supply augmentation. Any decision about the type and timing of such an augmentation would be a matter for the State Government and no such decision has yet been made. We will continue to work closely with DELWP and the metropolitan water corporations so that our needs are considered in their long-term planning.

We are also committed to partnering with the water industry and academic institutions – including Deakin University – to understand new and innovative ways of delivering our services and meeting our region's future water needs. We currently have six PhD researchers, as well as up to 12 undergraduate and honours students working on a variety of projects specifically tailored to Barwon Water's context. We are also currently a participant in more than 10 joint projects with other water industry businesses in Australia and overseas.

We intend to provide the opportunity for two more students/researchers to join our organisation in the next twelve months. The new projects will be specifically focussed on research needs arising from the *Water for our Future* program – one relating to how we find more water and the other to how we can be smarter with our water use. We will also continue to leverage joint partnerships through WaterRA and the Intelligent Water Network. The outcomes of this research will help build our organisational knowledge and in turn our long-term plan for providing a sustainable, affordable and reliable water future for our community and the environment.

Customers expect Barwon Water to be at the forefront of innovation and invest in long-term initiatives like recycled water. More than 60% of customers are willing to pay for Barwon Water to invest in digital technology to help collect more accurate and timely data for our network.

Action GG4

Work with customers to save water through our sustainable water use program

Through our sustainable water use program, we will continue to work with customers to encourage water efficient behaviour and help them make use of alternative water sources that can save our precious drinking water. We expect savings from this program to total 1,000 million litres of water across all of our systems over the next five years, with the majority of these savings coming from the Geelong, Golden Plains, Bellarine and Surf Coast system.

The sustainable water use program will focus on:

- **Sustainable Communities –** Following the success of our work with the Birregurra community in 2020–21, we will identify other priority towns or parts of our region with whom we will partner to achieve water savings through installation of digital meters or smart networks and support to identify leaks and opportunities for more efficient water use.
- **WaterAssist Business –** We will work to increase participation in our grant and rebate programs, which supports small, medium and large businesses to implement water efficiency improvements. We will also offer businesses a structured water audit with a specialist partner to help identify opportunities to save water.
- **WaterAssist Home –** We will work to increase residential customer uptake of our reliable plumbing service to repair or replace inefficient water fittings and fixtures such as tap washers, toilet cisterns and showerheads. We will target high water using suburbs and households, and work with real estate agents and not-for-profit organisations to target rental holiday homes and community housing. We will also expand our offering to include a focus on residential outdoor water use including rainwater tanks.
- **WaterSmart Councils –** We will work with Councils to maximise community-based water efficiency opportunities including use of alternative water sources, community gardens, environmental grants and an emphasis on efficient irrigation of public open space, given Councils are one of our major water users for this purpose.
- **Community Water Literacy –** We will upscale our community education activities to create a stronger awareness about the value of and need to save water, through online education hubs, social media campaigns, sustainable water use ambassador, open days, signage at water bubblers and community murals.

Our sustainable water use program will complement the work we do to promote and encourage adherence to our Permanent Water Savings Rules - a set of five, simple, common-sense rules to reduce demand and make sure we all use water wisely.

Customers are open to helping save water, but want quick and easy ways they can help. In our 2022 willingness to pay survey, customers said their behaviour change is reinforced if there is a personal benefit. For example, 'what impact does taking shorter showers have on my bill?'

Action GG5

Expand our use of smart technology to help reduce costs and save water across our networks and in our homes and businesses

We will continue to expand our use of both customer and network digital meters and sensors to help identify opportunities to save water across our network and by our customers.

New technology will provide better data about how our system performs which, together with rapid data analytics and alternative asset management strategies, means we can rethink how we design, operate and maintain our system to generate both water savings and cost savings. Over the next five years, we will continue to develop and refine our Smart Networks Strategy to make the most of these potential opportunities.

We teamed up with the Birregurra Community Group to explore opportunities to save water using smart technology.

We introduced 400 digital meters in residences and businesses across Birregurra, monitoring hourly water use, to support water efficient behaviour change and detect and repair leaks. Around 10% of the residential customers participated in a 12-week behaviour change pilot program, harnessing data from the digital meter technology.

Those participating ending up using 27% less water. Much of this success was attributed to making it fun, competition between groups, and building on the strong local connections that regional communities enjoy. Participants were able to view water use data online through their own personalised dashboard and received weekly reports.

The digital metering technology helped identify 36 leaks at residential, business and agricultural properties in the first 6 months. So far the project has contributed to 11 million litres in water savings, the equivalent of about six Olympic-sized swimming pools.

Action GG6

Maintain efforts to continually optimise our system, so that we can make best use of available water resources and entitlements

Our largest water supply system comprises several different water sources, which can be drawn upon in different ways. This provides us with operational flexibility and resilience, but also introduces a degree of complexity in how we best choose to run the system. We will maintain our constant focus on optimising our system and its operation, so that we are making best use of the water that is available.

For example, we will build a new underground pipeline to connect Birregurra to the Colac system. Despite being geographically closer to Colac, Birregurra's water is currently supplied from the West Barwon Reservoir, which services the Geelong, Golden Plains, Bellarine and Surf Coast system. Whilst Birregurra's annual water demand is very small in comparison to that of either Colac or Geelong, the new pipeline will reduce water losses and greenhouse gas emissions (see Action C2 for further details).

As another example, we will be undertaking a detailed assessment of the Anglesea borefield to help guide its sustainable future use. This is part of a review that is required by the Minister for Water in accordance with the terms of the bulk entitlement that provides us with access to this resource.

The conditions of the bulk entitlement are very different to those that governed our historical use of groundwater from the Barwon Downs borefield. Our Anglesea bulk entitlement combines a comprehensive monitoring and assessment program with triggers set at levels to protect the environment. Together, these measures are designed to prevent environmental impact. We must take action as required in response to the triggers to ensure that the borefield's operation does not threaten groundwater dependent ecosystems.

We work closely with the community through the Anglesea River Working Group to provide transparency and community oversight of the environmental monitoring program. This includes regular reporting of groundwater levels and how these compare to the triggers set in the bulk entitlement.

Since its commissioning in 2010, operation of the Anglesea borefield has largely been limited to pumping tests to improve our understanding of the groundwater resource. However, during dry conditions in 2019 we operated the borefield for around eight months to help boost water supplies. Under the conditions of our bulk entitlement, recommencing pumping from the borefield triggered the requirement for a review of the bulk entitlement within five years.

We need to submit this review to the Victorian Minister for Water by 2024. We will be undertaking a groundwater pumping test as part of the technical investigations required to inform this review. The investigations are also being conducted in parallel with similar tests by Alcoa, which are aimed at helping inform their plans for remediation of their decommissioned site in Anglesea.

Collectively, this testing and monitoring program will give us the clearest picture of the behaviour of the aquifers in the area. The Anglesea River Working Group will continue to play an important role as the testing progresses through 2022.

As well as informing the bulk entitlement review, the extensive data and information we obtain from the testing will guide the sustainable future use of the resource. The Anglesea borefield can play an important role in the region's future water security, but we will only ever operate it in a way that protects the environment and in consultation with the community.

Action GG7

Deliver the integrated water management plan for the new Northern and Western Geelong Growth Areas, including supply of Class A recycled water via a “purple pipe” network

New growth areas in the north and west of Geelong, which will become home to over 110,000 new residents and a variety of new business and industry over the next 50 years, will be planned and delivered using an integrated water management approach.

These growth areas will constitute over a third of the total expected population growth within Greater Geelong, yet a clever and creative approach to urban design and place-making will generate a green, liveable city and build regional water resource resilience by providing a potential pathway for achieving no net import of potable water supplies to these areas in the long-term and instead, creating new water to support environmental and Traditional Owner cultural values.

We are investing now to help facilitate this growth in a sustainable way over the next 50 years. Whilst benefits will take time to realise, the plan aims to deliver the following benefits, in partnership with other stakeholders:

- class A recycled water will be delivered via a “purple pipe” network to homes, local industry and open spaces to reduce the future demand for potable water supplies by 3,400 million litres/year. Pending further investigation, this could also enable the provision of recycled water for environmental flows in the Moorabool River as pumped groundwater contributions from the Batesford Quarry decline or support irrigated agriculture, horticulture and viticulture in the Moorabool Valley
- passively irrigated street trees, swales and enhanced infiltration billabongs will retain 4,400 million litres/year of water in the landscape and support enhanced tree canopy of an additional 85 hectares to create an enriched local identity and landscape character
- local waterways will be naturalised and rehabilitated, including vegetation enhancement of the Barwon, Cowies and Moorabool Rivers to create high value green corridors and enhance biodiversity
- provision for the long-term capture and transfer of treated stormwater from wetlands within the development to supplement potable water supplies by over 5,000 million litres over a 30–50 year timeframe, subject to ongoing investigations confirming the viability of this proposal.

Action GG8

Work with the City of Greater Geelong, Golden Plains Shire, Surf Coast Shire and Borough of Queenscliffe to progress localised integrated water management opportunities

We chair the Barwon Integrated Water Management (IWM) Forum, which drives a collaborative and integrated approach to water management in our region. Made up of regional leaders including Traditional Owners, Local Councils, statutory authorities and government agencies, the forum works together to identify capital and strategic opportunities that improve the way we plan and manage water in an urban context.

Some of the localised integrated water management capital projects we will look to progress, in partnership with Local Councils serviced by the Greater Geelong water supply system, include:

- **Use of recycled water and urban stormwater in the Surf Coast hinterland** (Surf Coast Shire) – The Black Rock Water Reclamation Plant produces large volumes of recycled water that is available for productive use in the Surf Coast hinterland. The Karaaf wetlands are a coastal saltmarsh that currently receives large volumes of additional urban runoff from residential development in Torquay. The stormwater volumes pose a high risk to the existing value of the wetlands, which rely on a balance of salt and freshwater flows for ecological health. We are partnering with Surf Coast Shire Council and local stakeholders to explore opportunities to use recycled water and urban stormwater to support high value agriculture, horticulture and other productive uses in the Surf Coast hinterland while protecting the Karaaf wetlands
- **Jan Juc Creek Daylighting Project** (Surf Coast Shire) – This project has the objective of returning the highly disturbed urban waterway to a more natural state, recreating biodiversity, habitat and amenity values as well as delivering significant stormwater quality objectives to an older urban catchment that drains to a popular beach location. Stage 1 is completed and involved decommissioning and modifying the existing underground drainage, returning stormwater flows to the surface of the creek, building a sedimentation basin, reshaping creek banks and planting thousands of indigenous plants. Stage 2 would involve removing an old low flow drainage pipe and constructing a wetland and sediment basin that will allow for significant treatment of creek flows
- **Bannockburn IWM Plan** (Golden Plains Shire)– Bannockburn is the largest township in the Golden Plains Shire and is growing rapidly at 8.5% per annum. This growth is likely to accelerate with the adoption of the Victorian Planning Authority's Bannockburn Growth Plan in 2021. The Bannockburn IWM Plan would consider both the existing township, areas under development and potential future growth areas, to ensure water is managed efficiently now and into the future. The plan will cover options at a range of scales (household through to precinct) and include both public and private land. It will support residents and organisations to improve water management and maximise the benefits of integrated water use. The plan will also investigate alternatives to substitute drinking water use, as well as look for opportunities for future developments to use alternative water sources.

Action GG9

Support improved flows and waterway health on the Barwon River by undertaking complementary river rehabilitation works

We will continue to work in partnership with the Corangamite Catchment Management Authority to improve the health of the Barwon River, through complementary works that will enable existing environmental water to better flow through the river for greater environmental benefit.

Currently, sections of the Barwon River are so degraded and choked with weeds that environmental flows are unable to be delivered effectively. We will continue to invest in willow removal, streambed stabilisation, off-stream water systems, revegetation and weed management on the land owned and managed by Barwon Water on both the East and West Barwon River. Works are planned for the next two summers, at least, building on the success of a joint willow removal and revegetation project over 2017–2020 on Dewings Creek (tributary of the Barwon River).

We also look forward to active participation in the program of works to be designed and developed by the Corangamite Catchment Management Authority for their Regional Catchment Strategy. We will also help to implement actions arising from the State Government response to the recent recommendations of the Barwon River Ministerial Advisory Committee.

In the long term, we will access a share of the State's future large-scale water supply upgrades so we can continue to meet growing demand and gradually reduce our reliance on rivers and groundwater as we transition to more climate resilient water sources. Doing so will enable water from the Barwon River to be transferred to the custodianship of Traditional Owners and/or the Victorian Environmental Water Holder.

Working in partnership with other agencies in our region to undertake complementary works along the Barwon River now will help us ready the river for more effective delivery of extra water for environmental and cultural flows, when this water is available.

Action GG10

Investigate the feasibility of a large-scale alternative water grid to distribute recycled water and stormwater for beneficial uses

Barwon Water has an ambitious goal of 100% productive use of recycled water. By 2070 the volume of recycled water available for beneficial use in the Barwon region could increase to in the order of 40 GL/y. While this is a significant challenge, it also presents a huge opportunity to achieve positive outcomes for the regional economy and provide for environmental and cultural needs.

The regional alternative water grid concept involves the staged transition away from a traditional water, sewerage and stormwater systems that discharge to the ocean, to a connected grid of alternative water sources that distributes alternative water for beneficial uses, enhancing the resilience and prosperity of the region in the face of a changing climate.

The alternative water grid would be strategically located to pass through locations where there is high potential for beneficial use of the water. It would link to and enhance a number of local integrated water management (IWM) initiatives currently in progress in the region, including the Northern and Western Geelong Growth Area IWM Plan.

Subject to further assessment, the potential benefits of this long term alternative water grid concept are:

- boost to agriculture and primary industries
- reduced environmental impact from urban stormwater
- increased resilience to climate change for existing river water irrigators
- potential for environmental flow benefits from substitution of existing river diversions
- efficient management of sewage from key future growth areas
- increased resilience of the regions sewerage and recycled water systems.

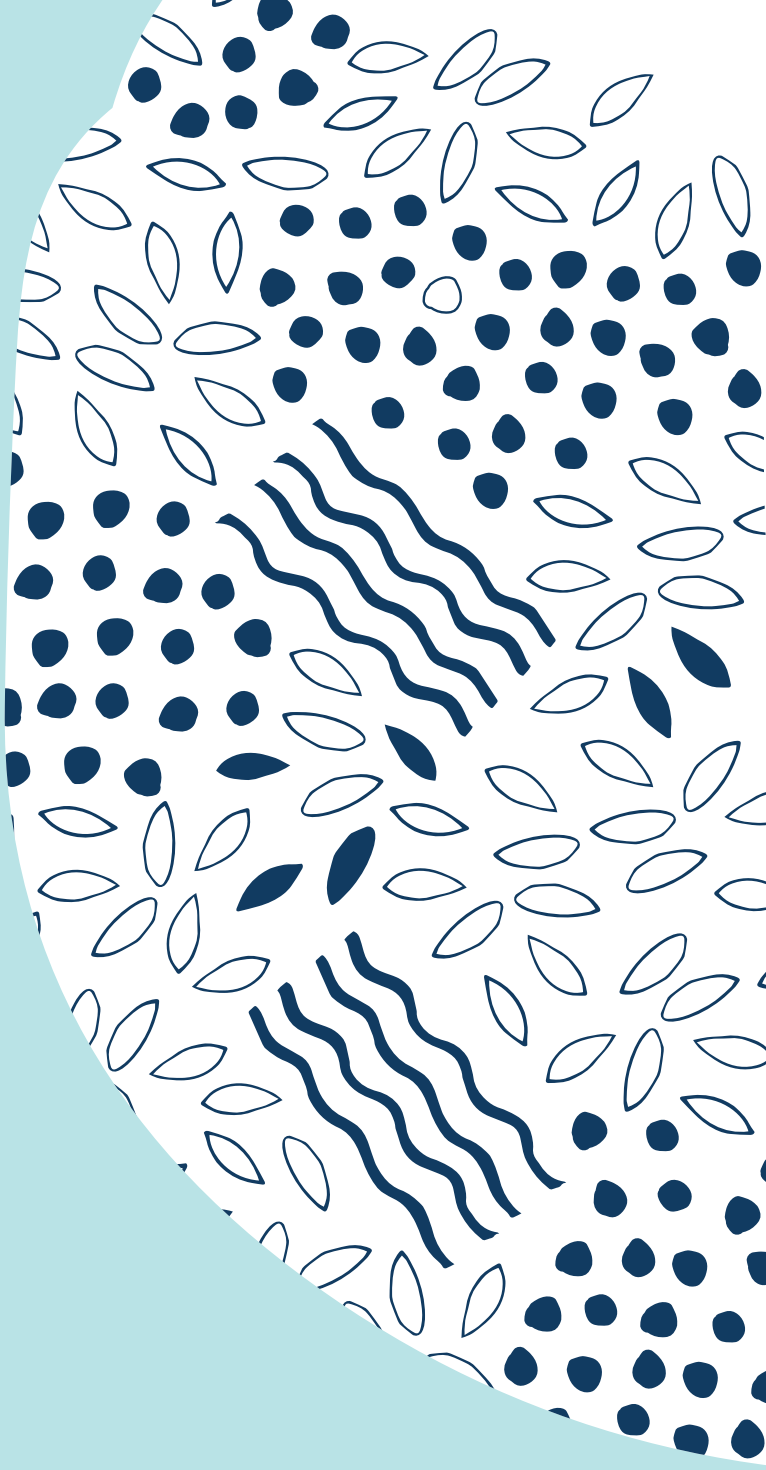
Why do we propose to do it?

The conversations we have had with our community have guided the types of actions we have proposed in our adaptive pathway for the Geelong, Golden Plains, Bellarine and Surf Coast system.

Key insights we gained from our engagement process, and how we used these insights to shape our proposed actions, are detailed in the "What we heard" and "What we did" sections of this draft strategy.

Rather than rely solely on our own interpretation of these insights, we convened the *Water for our Future* Community Panel to represent the diversity of our region, and reflect on the outcomes of our broader engagement, when making suggestions to us about which options should be taken forward for further consideration.

Combined, the 34 options suggested by the panel in March 2021 could find or save more than 100,000 million litres of water in the future, which is double the amount of water the Geelong, Golden Plains, Bellarine and Surf Coast system would need even under a worst case scenario. These suggestions were consistent with insights gained from our wider engagement process. When considering which of these options to implement, and in what order, we made four key findings.



Insight 1

It is not possible to do everything, straight away, and maintain affordability

We assessed a wide range of representative options against the criteria set by the panel to help inform their deliberations. Our assessment presented high-level, preliminary information only – much of this reflected the best knowledge, assumptions and/or judgements of Barwon Water professionals.

Consistent with the panel's criteria, we included an estimate of the capital and operating costs of each option, along with indicative average annual bill impacts for a range of different customers. The information we provided to the panel was intended as a guide only, to provide a representative, comparative view across options. However, it did give some useful insights in terms of the potential cost to deliver all options.

If we were to implement all 34 options recommended by the panel, straight away, the capital cost commitment could be upwards of $4.4 billion and annual water bills for a residential owner-occupier could increase by 80% to around $1,800 per household.

It was clear that we needed to stage the delivery of these options if we were to meet our community's objectives around affordability.

"Does the solution deliver secure, affordable access to water for all (business / private / culture) and will the capital and running costs also be affordable?"

Community Panel Report #1, 21 November 2020

Insight 2

It is not possible to rely on "smarter water use" options alone

Exactly half of the 34 options recommended by the panel were smarter ways in which to use the water that we already have.

It is difficult to ascribe, with certainty, the expected long-term volume of water savings associated with options that rely on behaviour change, better design and planning or improved household water efficiency. Future human behaviour or technological advancements are inherently difficult to predict. However, our aim was to show how an option performs against the criteria relative to other options – is it much better, much worse or about the same?

As such, the information we provided to the panel to help inform their deliberations included an estimate of the volume of additional yield generated by each option. Yield is a theoretical calculation of the maximum quantity of water that can be reliably supplied from a system during a critical dry period. An increase in yield increases the ability of the system to withstand dry periods and continue to reliably meet the water needs of its community.

If we were to implement only the 17 "smarter water use" options recommended by the panel, our estimates of the additional yield gained by the system would be about one third of the 50,000 million litres/year required for the Geelong, Golden Plains, Bellarine and Surf Coast system over the next 50 years. Even more water is required to meet environmental and Traditional Owner water needs.

It was clear that we need to both save water through smarter water use and find new sources of water, even allowing for potential imprecision in our estimates of additional yield from smarter water use.

"To what extent and in what ways does this proposal, both in planning and in regular use, encourage water savings practices and initiatives?"

Community Panel Report #1, 21 November 2020

Insight 3

Large-scale "find more water" options play a critical role in achieving the volumes of water required

Of the 17 options to find more water that were suggested by the panel for further consideration, over 70% were climate independent sources of manufactured water such as desalination, recycled water or treated stormwater.

Traditional climate-dependent options to find more water, such as building dams to hold back water flowing down rivers, were not supported by the panel. Our own analysis, over many years, also shows that new dams are not a feasible source of large-scale supply (see next page).

Desalination accounted for the majority of the additional yield offered across all of the options recommended by the panel – 65,000 million litres/year out of a possible 108,000 million litres/year. This is because desalination can be readily scaled to produce large volumes of water at high reliability. Desalination is therefore critical to achieving the 50,000 million litres/year required for the Geelong, Golden Plains, Bellarine and Surf Coast system over the next 50 years – without it, there is simply not enough water amongst the other options recommended by the panel.

Over time, climate independent sources of water can not only help to meet our growing water needs, but also reduce our current reliance upon traditional supplies that are dependent on rainfall, such as rivers and dams that largely reduce the biodiversity and other environmental benefits of seasonal flooding. Implementing climate independent options to meet urban water needs then provides the opportunity to return water we currently take from rivers to the environment and Traditional Owners.

Recycled water can be used for a range of purposes. Using recycled water in our drinking water supply is not currently a permitted use under Victoria's Recycled Water Guidelines and would require time to demonstrate the safety and effectiveness of treatment processes and work with environmental and health regulators to obtain the necessary approvals. It would also involve extensive engagement with the community that would likely take many years.

It was clear that consideration of climate independent sources would be critical to both meeting the challenge of the Geelong, Golden Plains, Bellarine and Surf Coast system's growing water needs and delivering the community's vision for a future where "our rivers flow".

"Is this option vigilant and proactive to adapt to climate change?... Does this option offer flexibility in water supply in response to population change and to fluctuating rainfall, environmental and weather conditions?"

Community Panel Report #1, 21 November 2020

Insight 4

Understanding our preferred long-term solution can help to guide efficient investments in the short-term

Given the need for multiple options, and the importance of a new, climate independent source of water, we constructed different portfolios of long-term options. Using a bespoke economic appraisal model, we evaluated the community costs and benefits of each portfolio.

Our bespoke economic appraisal model showed that accessing a share of the State's next major water supply augmentation would cost less and offer greater community benefit than indirect potable reuse.

The objective of the analysis was to identify a preferred long-term solution, based on our current understanding of options. We also wanted to gain an insight into the value of any water that can be saved in the meantime, by calculating the long-run marginal cost of water supply (i.e. the $ benefit of deferring our preferred long-term solution by saving water in the short-term). This figure will then help to guide our efficient investment in smaller, localised options in the short-term.

The four portfolios we tested using the bespoke model are summarised below. Each option had to be capable of providing at least 50,000 million/litres over the 50-year planning horizon of the model. Options are listed in the order of implementation. Some options were excluded on the basis that they would be common across all portfolios, and so, would not provide any insight into differences between the relative portfolios (e.g. sustainable water use program, recycled water program and integrated water management initiatives). Similarly, the proposed return of water to the Moorabool River (in the next five years) and both the Moorabool and Barwon Rivers (over the next 50 years) would be common across all portfolios and so, was explored via sensitivity analysis.

Base Case	**Local desalination plant, now**
Option/s	**1.** Build a local desalination plant sized at 50,000 million litres/year, for use by Barwon Water only, to be constructed in two stages: • Stage 1 = 20,000 million litres/year • Stage 2 = +30,000 million litres/year
Rationale	Represents a traditional engineering approach to augmenting water supply. Addresses panel interest in a desalination plant that "prioritise(s) control, autonomy and accessibility for Barwon Water".

Portfolio 1	**Local desalination plant, later**
Option/s	**1.** Extend the reach of the Melbourne-Geelong Pipeline, so that it can supply more of Greater Geelong, Bellarine and Surf Coast, together with a small increase to Barwon Water's share of water from Melbourne. **2.** Build a local desalination plant sized at 50,000 million litres/year, for use by Barwon Water only, to be constructed in two stages: • Stage 1 = 20,000 million litres/year • Stage 2 = 30,000 million litres/year
Rationale	Tests the relative value of waiting to build a local desalination plant through a small-scale supply augmentation, rather than building one now. Again, addresses panel interest in a desalination plant that "prioritise(s) control, autonomy and accessibility for Barwon Water".

Portfolio 2	Share of State's augmentation
Option/s	**1.** Extend the reach of the Melbourne–Geelong Pipeline, so that it can supply more of Greater Geelong, Bellarine and Surf Coast, together with a small increase to Barwon Water's share of water from Melbourne. **2.** Access a small share of the next major water supply augmentation/s constructed to benefit Melbourne and its surrounds. Any decision about the type and timing of such an augmentation would be a matter for the State Government and no such decision has been made. However, for the purpose of this exercise, it was assumed that additional supply would be made available to Melbourne in the order of an additional 50,000 million litres/year every 5 years
Rationale	Tests the relative value of waiting to access a share of a State-based major water supply augmentation, rather than building a local desalination plant, either now or later.

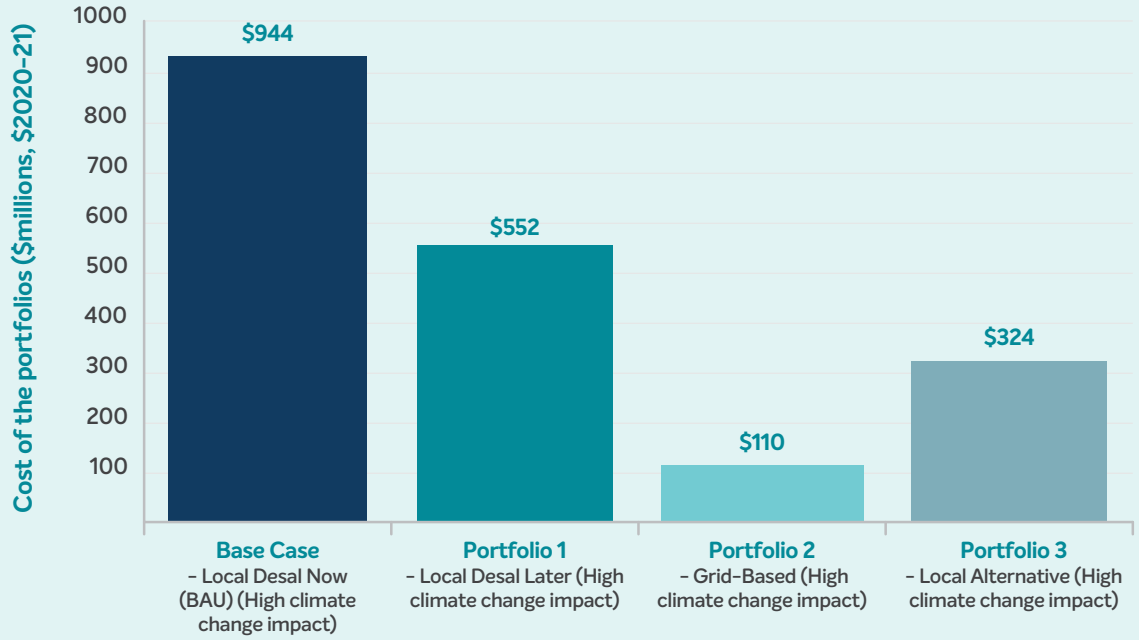
* Original indirect potable reuse option considered by the panel comprised Stage 1 only (Option 27); later Stages 2 and 3 would involve transfer direct to Wurdee Boluc reservoir, which share similarities with the direct potable reuse option considered by the panel (Option 26)

Portfolio 3	Local alternative water
Option/s	1. Extend the reach of the Melbourne–Geelong Pipeline, so that it can supply more of Greater Geelong, Bellarine and Surf Coast, together with a small increase to Barwon Water's share of water from Melbourne. 2. Enable indirect potable reuse by transferring highly treated recycled water from Black Rock to Wurdee Boluc reservoir (via an initial aquifer storage and recovery scheme at Anglesea), to be constructed in stages: • Stage 1 = 7,500 million litres/year* • Stage 2 = +9,500 million litres/year • Stage 3 = +17,500 million litres/year 3. Transfer stormwater collected from the Northern and Western Geelong Growth Areas to Wurdee Boluc reservoir.
Rationale	Tests the relative value of utilising local alternative water sources, rather than accessing a share of a State-based major water supply augmentation or building a local desalination plant, either now or later.

Key results of the economic analysis are summarised below.

Each portfolio can meet demand over the modelling period. However, meeting demand can come at a significant cost.

The Base Case appears to be the most expensive portfolio in a strict financial cost sense (in Present Value terms). However, this doesn't include other relevant costs and benefits, such as the cost of water restrictions and the cost imposed on the Melbourne system (of Barwon Water accessing more water from Melbourne).



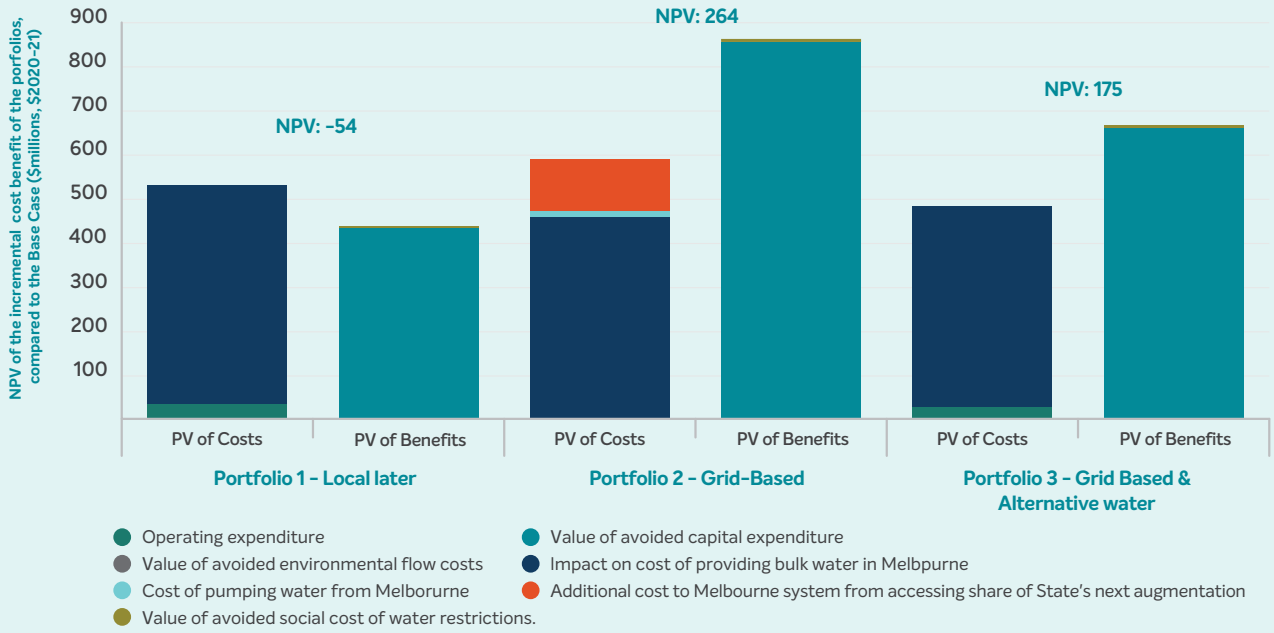
When taking a broader suite of costs and benefits into account, Portfolio 2 generates the greatest benefit to the community.

The graph shows the net present value of the incremental costs and benefits of each portfolio relative to the Base Case, from a whole-of-community perspective. Although Portfolio 2 has the highest incremental cost of all portfolios, it also has the highest incremental benefit. The net result is that Portfolio 2 offers $264M worth of benefit relative to the Base Case, whereas Portfolio 3 only offers $175M of benefit and Portfolio 1 actually increases cost by $54M relative to the Base Case.

The largest benefit is cost savings associated with reduced capital expenditure under Portfolios 1–3, compared to the Base Case. This highlights the value of increasing access to existing sources of water (e.g. the Melbourne–Geelong Pipeline) or accessing a share of a new State desalination plant, rather than investing in infrastructure to supply Barwon Water alone.

While there is an additional cost imposed on the Melbourne system as a result of Barwon Water accessing increased volumes of water from Melbourne, this is not sufficient to offset the significant capital cost savings.

Portfolio 2 offers the largest net benefit compared to the Base Case, when considering whole-of-community costs and benefits.



Other insights gained from the economic analysis include:

Cost at which water efficiency and fit-for-purpose recycled water initiatives make economic sense

- The model shows that the long run marginal cost of bulk water supply varies between $1.07/kL and $2.68/kL (Portfolios 2 and 1 respectively). This provides a useful benchmark with which to compare the costs and benefits of water efficiency and fit-for-purpose recycled water initiatives that reduce demand on potable water supplies. It means that, for every kL of water saved through these initiatives, there is an overall economic benefit of between $1.07 and $2.68 due to the ability to defer investment in water supply options. We will use this benchmark to help guide our investment in water efficiency and recycled water program over the next five years, recognising there are also a range of other benefits that can also be derived from these initiatives (and so, investments in excess of this benchmark can also be justified on a case-by-case basis).

Returning water to rivers imposes a net cost on the community, which is offset by environmental and cultural benefits

- We can contemplate using climate independent sources of water to not only meet our growing urban water demand, but also reduce our current reliance on surface water supplies. Doing so brings forward the timing of our investment in options under every portfolio. The effect of this is that we need to spend more, earlier, to meet our growing urban water demand if we are also to return water to rivers.
- The economic appraisal model does not reflect the value of a change in waterway health, or other environmental or cultural benefits, as a result of returning water to rivers, since these intangible benefits are inherently difficult to quantify in monetary terms. However, these benefits are real even if they are difficult to quantify. The model confirms that Portfolio 2 remains the preferred portfolio if water is returned to rivers. It also shows that it is estimated to cost $100M to $360M, depending on the volume of water returned, to achieve the significant environmental and cultural benefits of returning this water to rivers.

Climate change is highly uncertain, but very important

- The timing of options, and thus the overall cost of portfolios, is materially different under different climate scenarios (i.e. high climate change scenario compared to median climate change scenario). Given the uncertainty around climate change, the more flexible portfolios perform better as they offer the opportunity to respond to change. For example, there is little variation in total costs for the Base Case under different climate scenarios (~10%) but the total costs for Portfolios 1 and 2 are very different (>50% and >40% respectively). Portfolio 2 is the preferred portfolio under both high and median climate change scenarios.

"Cost benefit analysis of projects must be justifiable and transparent in the short, mid and long term to cover the expenditure and shared in a fair and balanced way."

Community Panel Report #1, 21 November 2020

Why not build a dam?

The idea of building new dams reflects a traditional approach to securing urban water supplies. It is a solution that, in the past, has served us well and been the foundation of water supplies everywhere. However, we also know that much has changed since a dam was last constructed in our region.

Changing community preferences

A desire to better protect our environment has been a strong and common theme across all aspects of our community engagement.

More than 1,000 members of our community were surveyed by independent research consultants in 2020. Of these, 85% supported waterway and catchment health and 77% preferred there to be more emphasis on maintaining the health of our rivers, by extracting less water from them and instead recycling, purifying or creating more water . Only 16% preferred more emphasis on maintaining affordability by taking water from our rivers, rather than these other, more expensive options.

In our own conversations, we have consistently heard that restoring flows to our rivers – and not taking more water from the environment than we are entitled to – is an important priority for our community. The value of water to support healthy rivers, waterways and the environment (32%) was considered second only to its value as being good for human health (38%) by over 3,700 community members with whom we engaged in late 2019 and early 2020. Over 500 of these community members also completed a quick "pulse check" online survey, where 78% expressed a preference for a water future where our water comes from lots of different sources, rather than mainly relying on rainfall and rivers.

In community workshops, stakeholder forums and advisory committee meetings, the message has been clear – "We can't take more water from our wetlands and rivers".

No viable options

Weighing up a choice to take more water from our rivers also presumes that this water is available. In most instances, it is not.

Under Victoria's framework for sustainably sharing the state's water resources, there is very little water that is not already allocated for use, including for environmental flows. This means that, should we pursue a new dam, we would most likely be taking water away from someone else, whether an existing user, for environmental flows, or Traditional Owner values. In our region, there is only 1,000 million litres of unallocated water in the Gellibrand River catchment.

Over time we have investigated many potential sites for a new dam, but none can provide a significant yield. The most prospective, assuming it were feasible, would be a theoretical maximum yield of 9,000 million litres from a 22,000 million litre capacity dam on Lardners Creek, in the Gellibrand River catchment.

This is far less than our forecast needs to 2050 and far more than the volume of unallocated water in this catchment. Other, smaller options on the Barwon River or its tributaries offer a theoretical maximum yield of 1,500 to 3,000 million litres, which again is far less than our needs.

We are privileged to help manage a natural environment in our region that is amongst the most pristine and special in Victoria. Construction of a new dam would inevitably involve changes to this environment, through the clearing and flooding of land and further disruption to the natural flow of rivers. Construction of a new dam would, rightly, impose significant regulatory barriers and costs (even before understanding whether necessary approvals would be forthcoming).

Uncertain supply

Even if we could overcome regulatory barriers and identify a suitable site with access to unallocated water and acceptable environmental impacts, uncertainty about our future climate is another major risk associated with building a new dam.

The economic benefit of a dam is based on the expectation that it will reliably provide water over the long life of the asset, typically with low operating costs once the very high cost of building the dam has been incurred. However, climate change means that we cannot reliably predict the future yield of a dam that we would expect to operate for up to a hundred years or more. By 2065, it is estimated that streamflows in our region will reduce by up to 45.6% in the Moorabool system, 47.6% in the Barwon system and 41.9% in the Otway Coast systems compared to 1995, under a high climate change scenario[15].

Evidence points to climate change reducing the amount of water available in our rivers and catchments in the future. Changes already experienced in Perth, Western Australia have meant that dams can now only support 15% of their urban water needs, compared with 88% in the 1960s . Rainfall can simply no longer be relied upon to fill existing dams. This exemplifies the risk that a new dam in our region would potentially become a 'sunk cost' that fails to deliver the benefit we would expect.

Some analysis suggests a new dam may appear to have lower costs per volume of water than desalination or recycled water . However, this analysis often cannot adequately account for the environmental, social and other costs of new (since these costs are inherently difficult to quantify) and is entirely dependent on an expectation of reliable future yield. Reliability cannot be guaranteed for a new dam – and in fact is a major risk because of climate change – compared with the secure supply of climate-independent sources. These are critical considerations when comparing the relative costs of options.

[15] DELWP 2020, Guidelines for Assessing the Impact of Climate Change of Water Availability in Victoria, November 2020.

Why not drink recycled water?

Our research shows 57 per cent of the community support the idea of drinking recycled water. As part of our process, we explored this concept and found that:

- for our region, the economic cost of drinking recycled water would be higher than accessing a share of the State's future major water supply augmentations
- like seawater desalination, advanced recycled water treatment technologies are energy intensive and have a brine waste stream that is discharged to the ocean which is highly regulated. Research is underway by the EPA and the water sector to improve our understanding of emerging contaminants in our recycled water and its associated waste streams so that they can be effectively regulated and risks minimised to prevent harm to human health or to the environment if it enters the ocean.

Recycled water is currently not a permitted source of drinking water in Victoria. We cannot therefore rely on being able to implement this in the short to medium term.

There remain differing views about the acceptability of recycled water for drinking. The idea of introducing recycled water into our drinking water supplies is difficult for some people to accept. Our survey results showed 20 per cent of people would be uncomfortable with drinking recycled water.

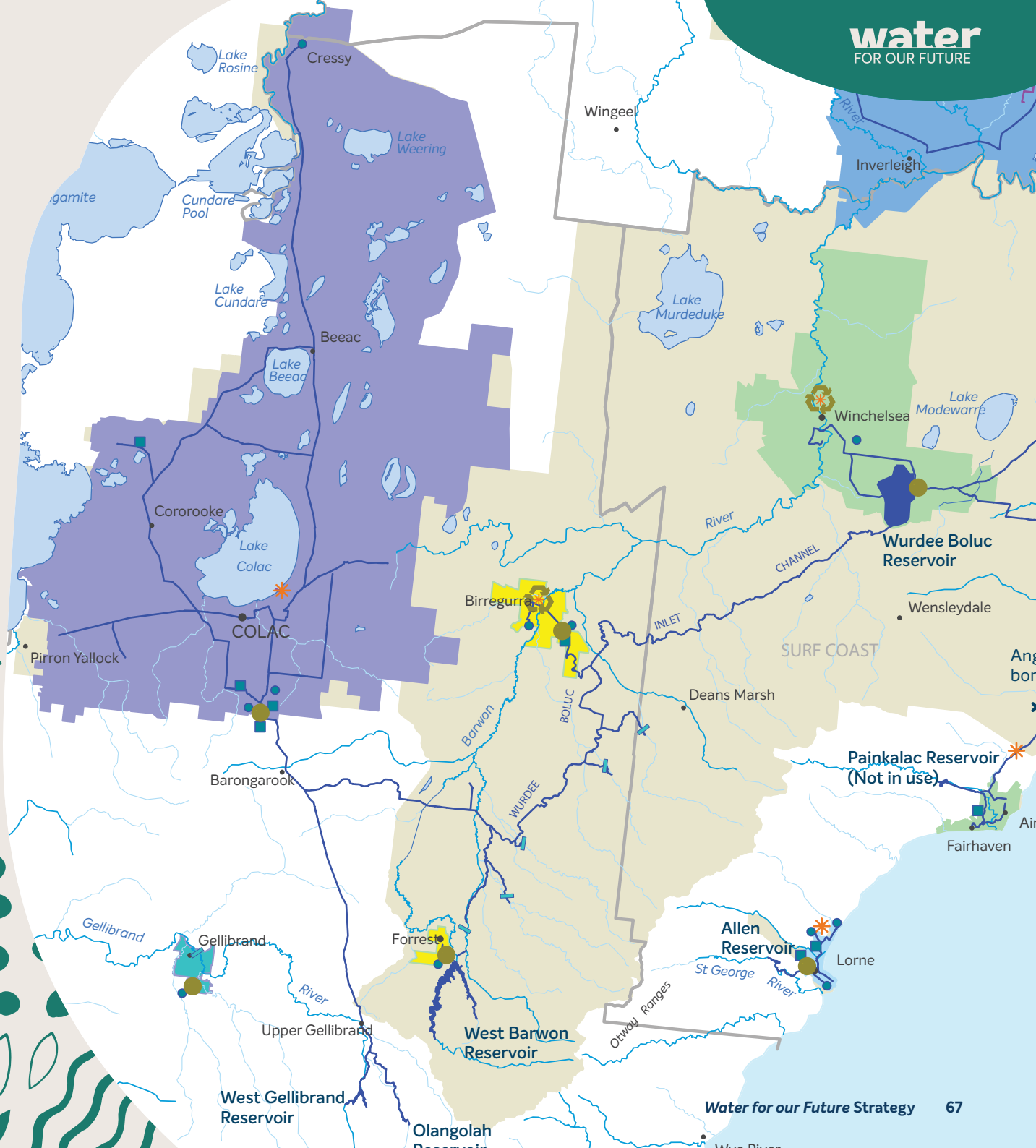
We have no immediate plans to introduce recycled water to our drinking water supply. We would only do so when it is supported by Victorian Government policy, approved by relevant agencies, is economically viable and has the support of our customers.

We will however, continue to pursue our ambitious goal of 100 per cent productive use of recycled water through uses such as:

- agriculture
- irrigation of sporting fields, and public open spaces
- residential and commercial purposes (via purple pipe schemes) or industrial processes
- supporting biodiversity.

Colac

Colac system map



Our system

How does the system work?

Country

Our Colac system is located on the Traditional Owner land of the Eastern Maar.

Urban water demand

The Colac area has a population of approximately 14,300, projected to increase to around 24,000 by 2065.

The Colac water supply system currently services an annual demand of around 3,000 million litres per year and includes a range of industrial and agricultural uses. The future of industry and agriculture in Colac will likely be more influential on water demand than residential population growth. Timber processing, abattoirs and dairy processing are examples of important local industries that are supported by our water and wastewater services.

Surface water supplies

Colac's water is sourced from the protected catchments of the Gellibrand River and Olangolah Creek in the Otway Ranges, noted for their high environmental value.

Under the bulk entitlement issued to Barwon Water under the Water Act 1989, we are entitled to a maximum of 5,400 million litres/year. Although the catchments generally receive good rainfall, the West Gellibrand and Olangolah Reservoirs have limited storage capacity. This means that there is a limit to the amount of water that can be stored during wetter times to then draw upon during drier periods.

In 2017 Colac was connected to the Geelong, Golden Plains, Bellarine and Surf Coast system, which diversified Colac's water supply and provides an 'insurance policy' during prolonged dry conditions or if water from the Gellibrand system is unavailable (for example, due to bushfire or other emergencies). The pipeline connecting Colac to one of Geelong's major water sources – the West Barwon Reservoir – can transfer the equivalent volume of close to Colac's annual water demand from the Barwon River system.

Groundwater supplies

No groundwater is used to supply Colac.

Wastewater

The Colac Water Reclamation Plant is located on the north eastern edge of the town and treats approximately 2,000 million litres of wastewater each year from homes, businesses and industries.

An upgrade of the Colac WRP is currently underway and scheduled for completion in 2023. The upgrade will increase existing capacity by 70 per cent, sufficient to meet forecast inflows for around the next thirty years.

We are also transforming organic waste into a valuable resource. The Colac Renewable Organics Network will help our water reclamation plant run on clean, green and low-cost energy. By partnering with Colac Otway Shire and major businesses, the Australian Lamb Company and Bulla Dairy Foods – we are taking organic trade waste and converting it to produce enough renewable electricity to completely power the Colac plant.

All discharges are governed by Environment Protection Authority (EPA) licensing requirements.

Recycled water use

A small proportion of the Class C recycled water produced by the plant is reused onsite, with the remainder being discharged to Lake Colac.

Our challenge

How has the system performed?

Although historically reliable, changes to rainfall patterns in the Otway Ranges had meant that Colac's water supply system was vulnerable to the timing of seasonal rainfall and inflows. This was exemplified in 2015–16, which included some of the driest months ever recorded. Storage levels for Colac fell from above 90 per cent in December 2015 to just 24 per cent by April 2016. Stage 3 restrictions were triggered until autumn rainfall arrived and rapidly restored storage levels.

This experience highlighted the challenge of relying on seasonal rainfall and the limitations of available storage capacity. In most years Colac's traditional water sources will continue to provide a reliable supply, but a connection with the Geelong, Golden Plains, Bellarine and Surf Coast system now provides the operational flexibility to ensure that Colac's water supply is secure in even the driest years.

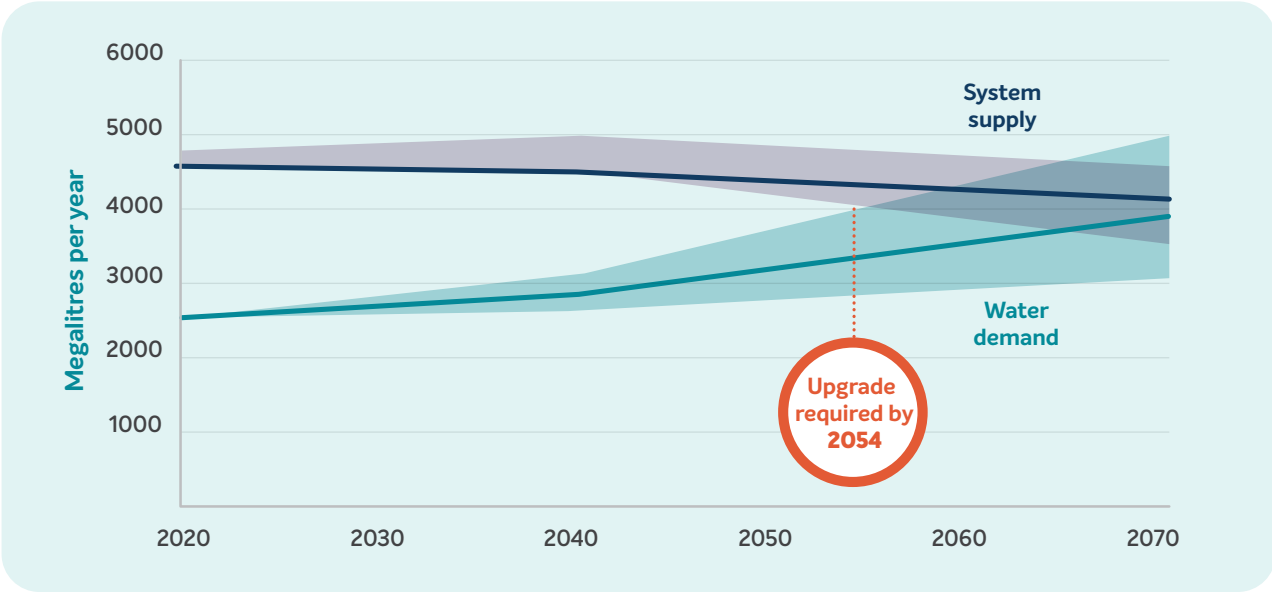
Lake Colac largely dried out during the Millennium Drought and again during 2015–16. Discharges from the Colac Water Reclamation Plant are important as one of the major sources of water for the lake during dry periods, and will become increasingly important under a hotter, drier climate in future.

What is the scale of the challenge?

Connection of the Colac system to the Geelong, Golden Plains, Bellarine and Surf Coast system in 2017 means that Colac's water supply is secure for at least the next 30 years.

The graph shows an upgrade is not required until 2054 under a high climate change scenario. The table shows the extent of the gap between supply and demand from then on (in millions of litres of water per year).

Colac supply and demand forecast



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2040	2050	2060	2070
Median Growth / Median Climate Change	1,700	1,700	1,600	1,600	1,600	1,600	1,600	1,600	1,500	1,400	1,000	600	200
High Growth / High Climate Change	1,600	1,600	1,600	1,600	1,500	1,500	1,500	1,400	1,400	1,100	400	-400	-1,300

Our response

What do we propose to do?

The long-term option to maintain Colac's water security is most likely to be optimisation of the existing connection to the Geelong, Golden Plains, Bellarine and Surf Coast system. This will continue to provide flexibility and reliability for Colac when current arrangements can no longer maintain levels of service.

In the meantime, our efforts in the next five years will focus on ensuring that we are continuing to make best use of our available water sources.

In the next 5 years:

Smarter water use

C1 Work with customers to help them use water more efficiently

C2 Build a new underground pipeline to connect Birregurra to the Colac system

Integrated water management

C3 Work with Colac Otway Shire to progress localised integrated water management opportunities

Over the next 50 years:

Find more water

Continue to support uptake of alternative water sources

Monitor the requirement for an upgrade, most likely to be an enhancement to the existing connection to the Geelong, Golden Plains, Bellarine and Surf Coast system

Integrated water management

Adopt an integrated water management approach when planning new urban development, in partnership with the Colac Otway Shire

Continue to work with customers to encourage sustainable water use, including through innovative technologies

During drought or emergency:

Find more water

Further utilise the connection to the Geelong, Golden Plains, Bellarine and Surf Coast system to increase water supply

Smarter water use

Implement water restrictions to curb demand, if total system storage levels fall below defined trigger points

The status of the Colac system provides an illustration of the dynamic process of monitoring and responding to water security over time. Prior to the construction of the pipeline connection to the Geelong, Golden Plains, Bellarine and Surf Coast system, Colac's level of service was at risk because of limitations in our infrastructure. With the benefit of the upgrade, the Colac system is now secure for many years to come.

Our actions in the next five years reflect Colac's current high level of water security. As a result, we expect water restrictions will be very rare in Colac over the next five years (<1%, or 3 weeks out of 5 years).

Restrictions likelihood

Action C1

Work with customers to help them use water smarter

We will maintain our efforts to improve community understanding and awareness about the importance of water efficiency. Customers in Colac will have access to the same suite of initiatives under our sustainable water use program as those in Geelong, Golden Plains, Bellarine and Surf Coast.

Even though the Colac system will not require an upgrade for many years, saving water through a permanent change in behaviour or water use will ensure this remains a very distant prospect, as well as potentially contribute to lower operating costs in the meantime and reduce the amount of water that needs to be transferred to the Colac system from the Geelong, Golden Plains, Bellarine and Surf Coast system.

Action C2

Build a new underground pipeline to connect Birregurra to the Colac system

Despite being geographically closer to Colac, Birregurra's water is currently supplied from the West Barwon Reservoir, which also services Geelong. Water is diverted from the open Wurdee Boluc inlet channel, and stored in open basins prior to being filtered and disinfected at a local treatment plant.

During recent summers, we have faced challenges in meeting demand due to the treatment plant being at capacity. At times, we have needed to cart water by truck to the town to ensure supply. We weighed up the pros and cons of a treatment plant upgrade versus a new pipeline and found a pipeline would offer many benefits to customers, community and the environment:

- Increased water security for Birregurra, without impacting Colac's water security – the annual demand for water in Birregurra is less than 2.6% of that already available in Colac
- Reduced greenhouse gas emissions – the pipeline is expected to reduce carbon emissions by 87 tonnes a year, because the Colac Water Treatment Plant is more efficient and does not require the energy intensive specialised treatment required at the current Birregurra treatment plant, plus gravity will transfer the water from Colac reducing the need for pumps that require energy to operate
- Reduced water losses – the pipeline is expected to save approximately 51 million litres of water a year by reducing losses from evaporation in the Birregurra storage basins, particularly during summer, and through other system efficiency improvements

The underground pipeline will also improve bushfire resilience, address water quality risks and offer improvements to water pressure. It will also result in lower operating costs and increased efficiencies, which will help to keep customer bills affordable.

Site investigations are currently underway, including cultural heritage and flora and fauna assessments, service proving, geotechnical and land surveys in consultation with landowners. Construction of the pipeline is expected to begin in mid–2023 and be completed by mid–late–2024.

Action C3

Work with Colac Otway Shire to progress localised integrated water management opportunities

The Integrated Water Cycle Management Plan developed by the Colac Otway Shire in 2014 identified the upgrade of the Irrewillipe Road Stormwater Retarding Basin as its highest priority project.

Functional design of the project – also known as Elliminyt Wetlands – has now been completed. The capture and treatment of stormwater via wetlands will deliver multiple benefits, including:

- Wetlands will deliver much needed amenity and recreational values as a more natural park land setting for surrounding residents
- Improved quality of stormwater leaving the urban environment will be beneficial to local receiving waterways, Deans Creek and Lake Colac
- Improved flood retention will unlock land to create approximately 300 new residential lots in the area upstream of the basin
- The potential for treated stormwater will be suitable for reuse at the nearby Colac Golf Course, Colac Racecourse and Elliminyt Recreation Reserve, some of Colac's largest water users, resulting in less use of potable water

Through our leadership of the Barwon Integrated Water Management Forum, we will continue to work with Colac Otway Shire to help progress funding opportunities for this project, and support its implementation. We will also continue to work with Colac Otway Shire to identify new opportunities for wider use of fit-for-purpose recycled water, stormwater and rainwater in Colac, including in areas of new urban and commercial development.

Why do we propose to do it?

The Colac system can maintain service levels for much of the planning horizon under the range of forecast future conditions.

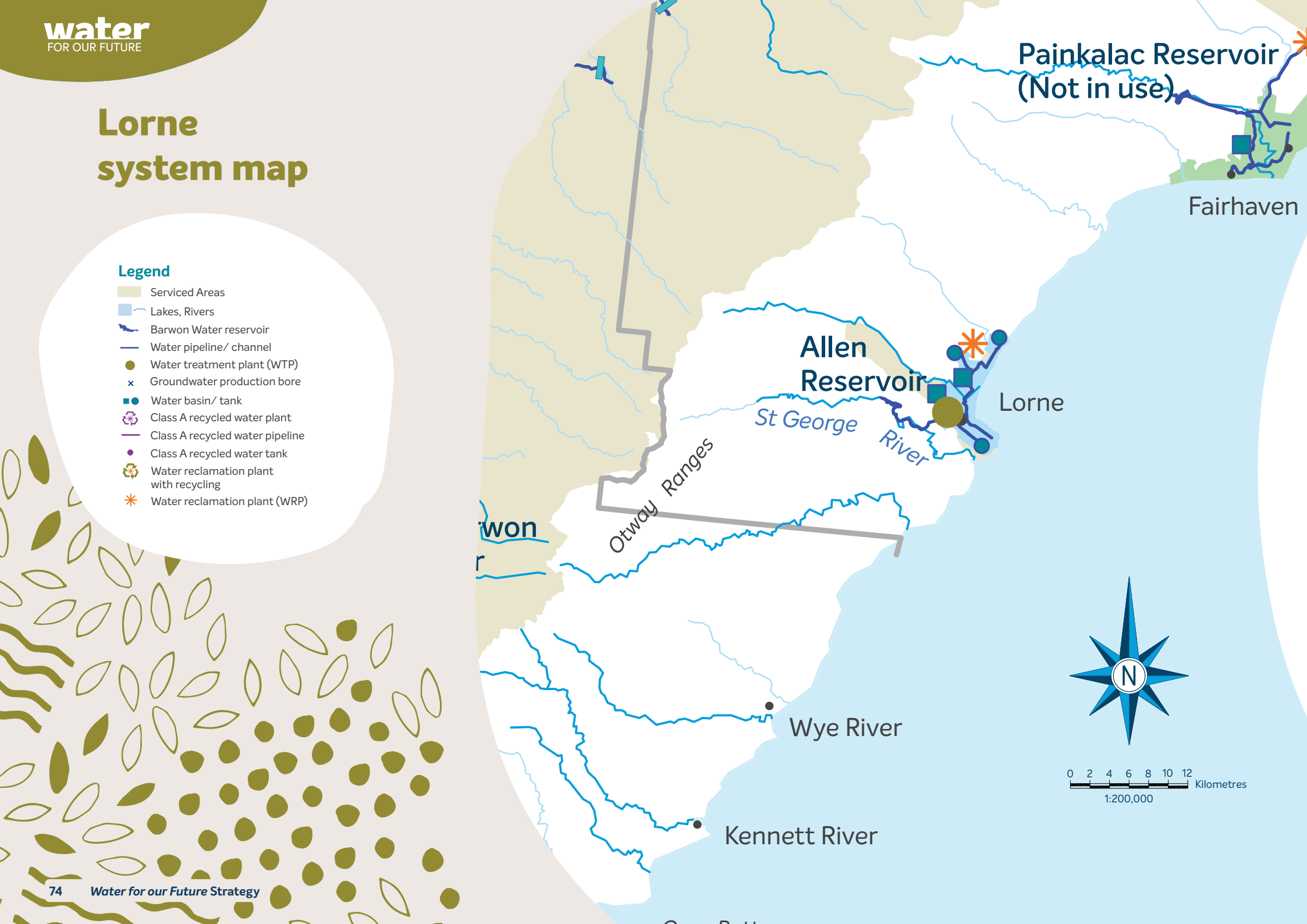
If we do need to find more water for the system within the next 50 years, it is most likely that it will not be for some decades. This means we can revisit the need for large-scale action, and confirm the nature of such action, in subsequent iterations of the *Water for our Future* strategy.

Our adaptive pathway provides for this strategy to be updated every five years, as new and better information comes to hand.

At this stage, we consider that optimising the operation of the existing connection to the Geelong, Golden Plains, Bellarine and Surf Coast system is likely to be the most feasible large-scale action in future. This places less emphasis on needing to explore other alternatives for Colac in the meantime. Instead, we will focus on any opportunities to work with the local community to achieve smarter water use and deliver integrated water management outcomes as the town grows, to push out the need for any large-scale action as far into the future as possible and reduce the volume of water that needs to be transferred to the Colac system from the Geelong, Golden Plains, Bellarine and Surf Coast system, which would negatively impact the yield of this system.

Lorne

Lorne system map



Our system

How does the system work?

Country

Our Lorne system is located on the Traditional Owner land of the Eastern Maar

Urban water demand

As a popular holiday destination, Lorne's permanent residential population of around 1,750 people swells to up to 18,000 each summer. This means that water demand is at its peak each year during the months when rainfall and streamflows tend to be lower.

Surface water supplies

Lorne relies solely on water sourced from the Allen Reservoir, which is located on the St George River in the Otway Ranges. Under the bulk entitlement issued to Barwon Water under the Water Act 1989, we are entitled to a maximum of 510 million litres/year.

The unique geography of Lorne's coastal location and mountainous surrounds make connections to any other water supply systems across the region challenging. The town therefore depends on its 'seasonal' storage, which is drawn down over the peak summer months and recovers during winter and spring.

Although Lorne's average annual demand of 340 million litres exceeds the 215 million litre capacity of Allen Reservoir, high and reliable rainfall as well as a steep catchment generally mean that storage levels replenish quickly in the wetter months.

Groundwater supplies

No groundwater is used to supply Lorne.

Wastewater

We treat approximately 300 million litres of wastewater annually at the Lorne water reclamation plant. The plant treats wastewater from residential and commercial customers in the area to a Class C recycled water standard.

The main challenge for wastewater management in Apollo Bay is the seasonal fluctuation in flows, which increase substantially over summer, as population swells. Flows into the plant are typically 0.6 ML/d during the year and up to 3.5 ML/d over summer. To manage this, wastewater is treated via an Intermittently Decanted Extended Aeration (IDEA) process which can operate using one or two aeration and selector tanks to cater for seasonal variation in flows and loads.

The Lorne water reclamation plant has sufficient capacity to meet the modest growth that is forecast over the next fifty years (recognising the constraints on available land that will be a barrier to more rapid growth).

While the plant has been designed to cater for peak inflows associated with major population influx over holiday periods, there is a surplus of capacity for much of the year. The existing design is still capable of meeting projected increases in peak inflows for the foreseeable future.

All discharges are governed by Environment Protection Authority (EPA) licensing requirements.

Recycled water use

A small proportion of the Class C recycled water produced by the plant is reused onsite, with the remainder being discharged to the ocean.

Our challenge

How has the system performed?

Historically, Lorne's water supply system has demonstrated a high degree of security because of the reliability of rainfall and inflows in the catchment. Even during the Millennium Drought, which resulted in water restrictions across so much of Victoria, the catchment received sufficient rainfall to maintain unrestricted supply to the town.

However, conditions in the Otway Coast area over the summer of 2015–16 were unlike anything ever experienced before, with nowhere more severe than around Lorne. Although storages were almost 100 per cent full heading into summer, by early 2016 the Allen Reservoir had dropped to its lowest level on record. Extremely dry catchments and rainfall 50 per cent below the 10-year average led to historically low inflows, while high summer demand contributed to the storage levels falling rapidly.

Stage 3 water restrictions were triggered, and, for the first time, water was carted from the Geelong, Golden Plains, Bellarine and Surf Coast system to top up dwindling local supplies. These measures ensured supply was maintained until rainfall returned and rapidly restored levels in Allen Reservoir.

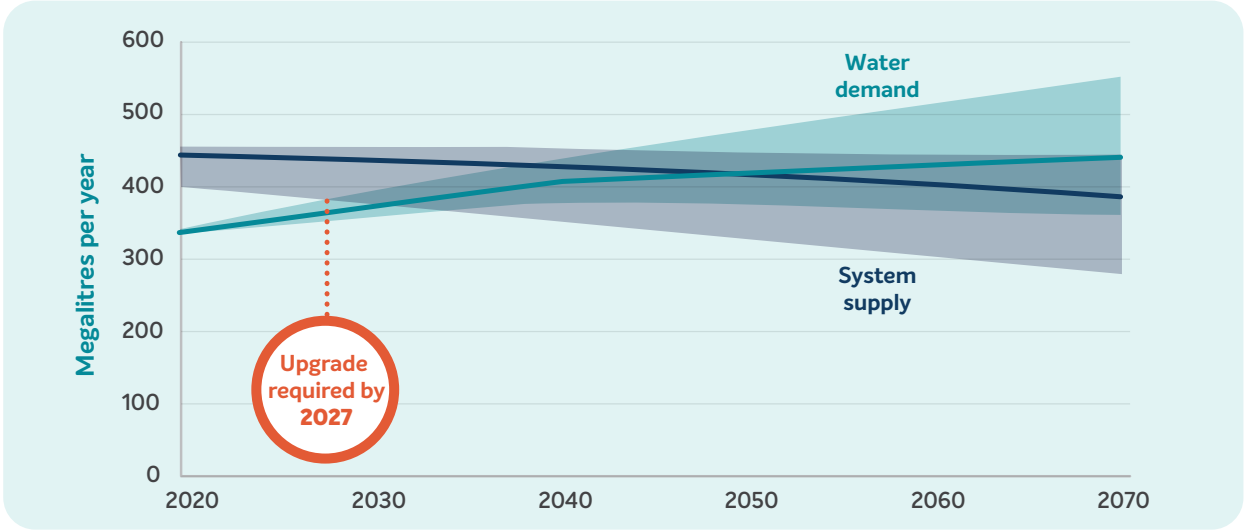
In 2018 we completed dam safety works at Allen Reservoir, which increased its storage capacity by 19 million litres (or close to 10 per cent). While the ability to store more water will help to meet peak summer demand, the fundamental characteristics of the system present a challenge for the management of short-term climate extremes. On these rare occasions, water restrictions may continue to play a critical role in helping to navigate these conditions.

What is the scale of the challenge?

Recent experience of especially dry periods has highlighted the challenges we face in our coastal, seasonally dependent water supply systems. As summer demand increases with Lorne's popularity as a holiday destination, and climate change impacts the reliability of surface water catchments, the key challenge is ensuring continuity of supply during the driest periods.

Under the most severe conditions of demand growth and climate change, the graph shows that we may be unable to reliably meet the peak demands of customers in Lorne by 2027. This does not mean that Lorne is at risk of running out of water, but that over time there will be an increased probability of longer, harsher and more frequent water restrictions to manage drier periods. The table shows the gap between supply and demand (in millions of litres of water per year).

Lorne supply and demand forecast



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2040	2050	2060	2070
Median Growth / Median Climate Change	96	92	88	84	80	76	72	68	64	23	-3	-29	-55
High Growth / High Climate Change	42	35	27	20	13	5	-2	-9	-17	-90	-151	-212	-272

Our response

What do we propose to do?

We will need to act within the next decade to maintain a reliable supply of water in Lorne over time.

Our actions over the next five years will focus on incrementally saving or sourcing more water to help delay a major upgrade, which will also give us greater flexibility to respond to evolving conditions, as part of an adaptive planning approach.

In the next 5 years:

Find more water

L1 Engage with the Lorne community to help identify a preferred long-term option, so we can continue planning and be ready to implement when required

Smarter water use

L2 Pursue greater efficiency at our water treatment plant

L3 Explore potential water treatment upgrades to maximise the efficient use of water in storage

L4 Work with customers to help them use water smarter

Integrated water management

L5 Work with Surf Coast Shire to progress localised integrated water management opportunities and support uptake of alternative water sources, where efficient

Over the next 50 years:

Find more water

Be ready to implement a further augmentation, whether:

- Small local desalination plant connected to existing water infrastructure
- Greater use of surface water within existing entitlements

Continue to support uptake of alternative water sources

Smarter water use

Continue to work with customers to encourage smarter water use, including through innovative technologies

Integrated water management

Adopt an integrated water management approach when planning new urban development, in partnership with the Surf Coast Shire

During drought or emergency:

Find more water

Water carting to maintain water supply

Smarter water use

Implement water restrictions to curb demand, if storage levels at Allen Reservoir fall below defined trigger points

Restrictions likelihood

The actions we propose over the next five years in Lorne are focused on optimising current arrangements, maintaining a preparedness to respond to emergency and future conditions, and preparing for a future upgrade, given that it will take time to ensure we are ready to implement a preferred solution when it is required.

With these actions in place, we expect water restrictions will be rare over the next five years <5%, or 3 months out of 5 years.

Action L1

Engage with the Lorne community to help identify a preferred long-term option

In the short term (the next five years), we will improve and optimise existing water infrastructure in Lorne. This work will ensure it will be some time before a major upgrade of the water system in Lorne is required.

So while water supplies are secure for the short to medium term, we will commence planning and community conversations in 2023 to discuss long-term water supply upgrade options so that we are ready to implement an upgrade when the time comes.

The 2027 Urban Water Strategy will be guided by this process and will subsequently include more specific actions to be implemented so that Lorne is water secure well into the future.

Action L2

Pursue greater efficiency at our water treatment plant

Water from Allen Reservoir passes through our water treatment plant to ensure the high-quality drinking water we deliver to Lorne is safe and complies with guidelines for drinking water quality. Processes at the treatment plant use water to clean (or backwash) the filters to guarantee the safety and quality of the water we deliver.

Whilst we use a minimal amount of potable water to do this, we think there are further changes we can make to our water treatment plant that can improve its efficiency. These changes will never compromise the quality of drinking water we provide, which remains the plant's critical function. However, every litre we can save as part of the process helps us to delay the need for bigger, more costly upgrades to the Lorne system in the future. Efficiency improvements could help save as much as 25 million litres each year. We will thoroughly investigate and implement these changes over the next five years.

Action L3

Maximise the efficient use of water in storage

There may be an opportunity to make better use of the water held in storage.

Our current operating practices avoid accessing water at lower storage levels due to poorer water quality. However, by improving the water quality at the reservoir or with implementation of supplementary water treatment processes, we may be able to access more water without compromising the quality of drinking water provided to customers. This would improve both the water security and resilience of the system, as it would allow us to use more of our stored water during dry times.

There is more work to be done to fully understand this concept. Early estimates suggest it could improve water security by up to 28 million litres each year. We will thoroughly investigate the feasibility of this concept over the next five years, so we are ready to implement if required after that.

Action L4

Work with customers to help them use water smarter

We will maintain our efforts to improve community understanding and awareness about the importance of water efficiency. Every litre that is saved through a permanent change in behaviour or water use will help defer the need for more significant measures.

The actions that we are committed to in the Geelong, Golden Plains, Bellarine and Surf Coast system to drive sustainable water use are equally applicable across the region. We will deliver these programs in each system, targeting high water using residential and non-residential customers, but the savings we can expect to make will be in proportion to the population.

Action L5

Work with Surf Coast Shire to progress localised integrated water management opportunities and support uptake of alternative water sources, where efficient

Through our leadership of the Barwon Integrated Water Management Forum, we will work with Surf Coast Shire to identify new opportunities for wider use of fit-for-purpose recycled water, stormwater and rainwater in Lorne.

Greater use of alternative water sources could help reduce demand for drinking water. Some of the ideas that have been identified that could be explored further include:

- using fit-for-purpose recycled water to irrigate sites such as the Lorne recreational reserve, golf course and caravan park
- harvesting stormwater for irrigation of public open space
- supplying fit-for-purpose recycled water for non-potable use to areas of new urban development

The costs and benefits of each of these opportunities would need to be explored further. They could also be complemented by efforts to greater uptake of rainwater tanks and onsite greywater treatment and reuse in new development.

We will fully investigate the feasibility of these options over the next five years, so we are ready to implement if required after that.

Why do we propose to do it?

Making best use of existing water resources in Lorne will ensure that current system arrangements continue to serve the town's needs as long as possible.

By focusing on reducing our use of drinking water wherever possible, whether through greater efficiency or use of alternative water sources, we can defer the need for further system upgrades. This gives us the flexibility to adapt our plans to best meet future conditions.

The readiness actions we will take over the next five years, such as Actions L3, L4 and L5, may identify additional opportunities to optimise our existing infrastructure and current system arrangements in years to come.

At the same time, we need to look ahead to understand how we can potentially meet the town's needs over the next fifty years. Even if we do everything we can to optimise the existing system and reduce use of drinking water, we will likely still need to find more water for the town in the future.

The potentially feasible options that could deliver a significant volume of additional water for Lorne are summarised in the table below.

Option	Yield (ML per year)
Small increase in the capacity of Allen Dam	62.5
Small local desalination plant	240*
Pipeline between Aireys Inlet and Lorne	240*
New river diversions^^	240*

*Could be designed to meet various requirements

^^Options include Erskine, Cumberland and West Barwon Rivers, noting that Barwon Water has an existing 1.4 ML/d entitlement in Erskine River (yield tbc)

We could further optimise existing infrastructure to enable greater use of surface water under the conditions of our existing bulk entitlement. Currently, the limited storage volume of Allen Reservoir means that we rely on seasonal flows in the St Georges River to meet demand each year. Unlike the Geelong, Golden Plains, Bellarine and Surf Coast system, we cannot take advantage of periods of higher river flows to store more water to meet demand over multiple years.

Increasing the capacity of Allen Reservoir would enable us to store more of the water we are permitted to access under the conditions of our existing bulk entitlement. The volumes and conditions of our bulk entitlements are based on sustainable use of the resource over time.

By contrast, diversions from other rivers would mean seeking additional entitlement. Whilst not impossible, we expect that this would be challenging for reasons like those associated with considering a new dam:

- unallocated water may not be available and would therefore involve taking water from other users
- taking more water is contrary to the preferences of Traditional Owners and the community
- the significant environmental values in the area are a barrier to the construction of new infrastructure.

Compared with the potential to make best use of our existing entitlement, we anticipate that seeking to divert water from other rivers in the region is unlikely to be supported. However, at this early stage of planning, we will retain all options for the community's consideration and input.

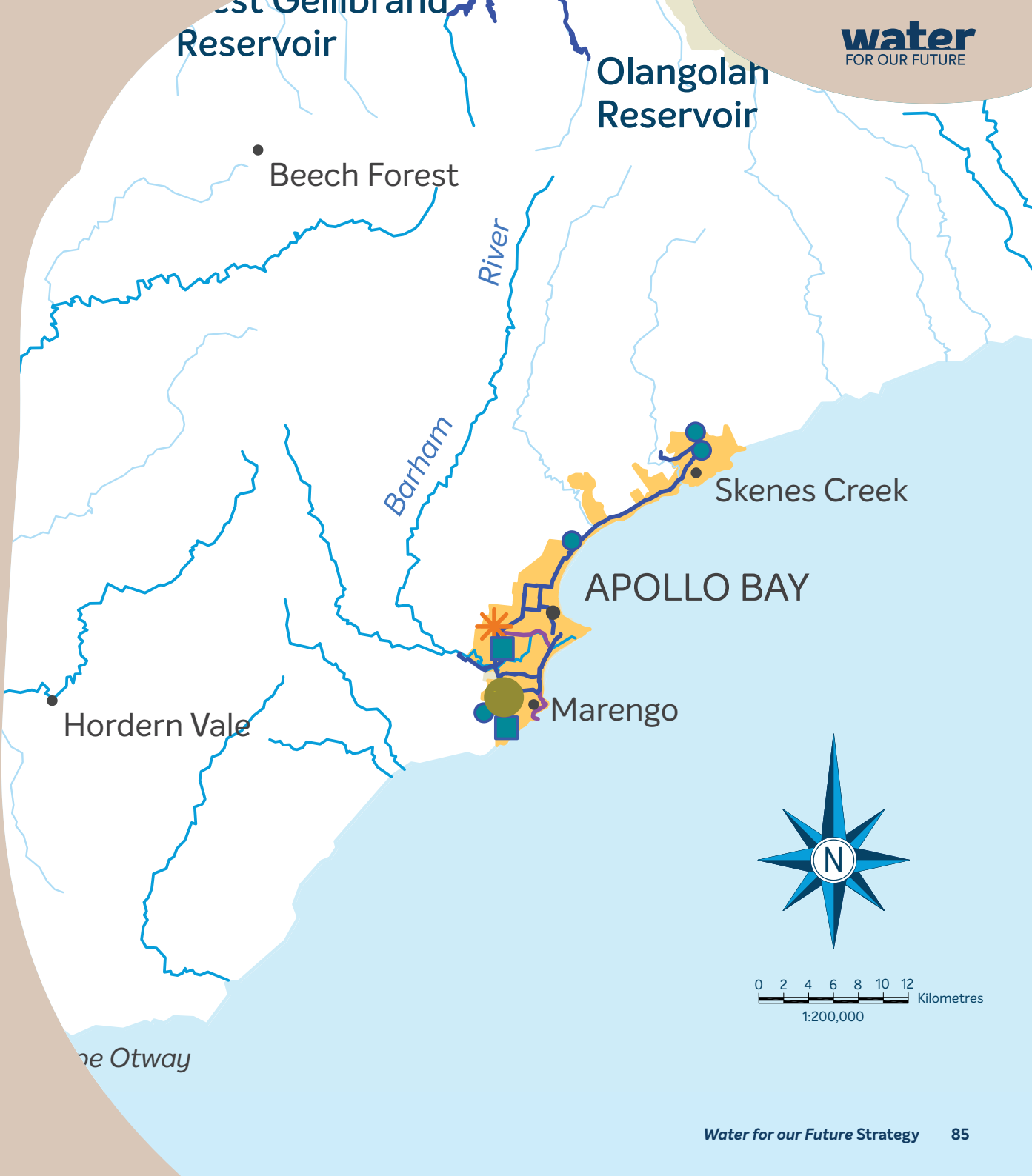
The remaining options also have significant trade-offs. We know that desalination has environmental implications that can be managed through appropriate site selection and design, in consultation with Traditional Owners, and the use of renewable energy. Finding an appropriate site in Lorne may be challenging, but a small modular desalination plant able to produce 2ML/day would require a site footprint less than the size of a standard residential block (<500m^2). It could be located inland, rather than on the foreshore, and potentially co-located with other existing water infrastructure in Lorne.

We expect our next *Urban Water Strategy*, in 2027, will provide the opportunity to establish the specific actions we will take to deliver a major upgrade in the future.

Our focus in the next five years will be to progress a discussion about the options with the Lorne community, so we have a better understanding of the action we will be most likely to pursue. This will ensure we are then ready to act when required to secure Lorne's water future.

Apollo Bay

Apollo Bay system map



Our system

How does the system work?

Country

Our Apollo Bay system is located on the Traditional Owner land of the Eastern Maar.

Urban water demand

Like Lorne, the coastal towns of Apollo Bay, Marengo and Skene's Creek experience an influx of visitors during summer, which temporarily swells the population ten-fold to around 20,000. The permanent population is around 2,000 and expected to grow towards 3,000 by 2065.

Apollo Bay's average annual water demand of 390 million litres is primarily residential use. Daily demand is substantially higher over the summer months, with the influx of visitors, along with higher water use to maintain gardens, public open space and other irrigated areas such as the golf course.

Surface water supplies

The Apollo Bay system relies solely on the nearby Barham River. Under the bulk entitlement issued to Barwon Water under the Water Act 1989, we are entitled to a maximum of 800 million litres/year.

The system has two small, off-stream storages that are filled directly from the river, mainly in winter and spring, then drawn down over summer. To protect the environment there are also strict limitations on how much water can be extracted from the river in the summer months, so this limits the ability to maintain storage levels during the time of year when demand is at its greatest.

Apollo Bay's storages have a total capacity of 375 million litres, meaning they do not have the capacity to store water for multiple years of annual demand of about 390 million litres. Each year, the amount of water available to meet peak summer demand in Apollo Bay depends on the reliability of rainfall and flows in the river the preceding winter and spring.We constructed the second storage at Apollo Bay in 2014, after our bulk entitlement was amended to make provision for new infrastructure, as well as the needs of the environment through passing flows. Prior to the second storage's construction, Stage 2 restrictions were in place every summer (November to March) between 2001 and 2014 in Apollo Bay. The additional 250 million litre capacity of the second storage has enabled more water to be harvested during periods of higher winter and spring flow in the Barham River.

Groundwater supplies

No groundwater is used to supply the Apollo Bay system.

Wastewater

Approximately 400 million litres of wastewater is treated annually at the Apollo Bay water reclamation plant. The plant treats wastewater from residential and commercial customers and produces Class C recycled water. Three per cent of this is reused on-site at a nursery, with the remainder being discharged to the ocean via a 4.5km outfall pipeline as there is currently no large-scale productive use of recycled water in Apollo Bay.

The main challenge for wastewater management in Apollo Bay is the seasonal fluctuation in flows, which increase substantially over summer, as population swells. To manage this, wastewater is treated via an Intermittently Decanted Extended Aeration (IDEA) process which can operate using one or two aeration and selector tanks to cater for seasonal variation in flows and loads.

Some minor changes to existing infrastructure are currently underway to manage peak flows, but no major augmentation is required in the near future as the plant has sufficient capacity to cater for forecast growth in the coming decades.

All discharges are governed by Environment Protection Authority (EPA) licensing requirements.

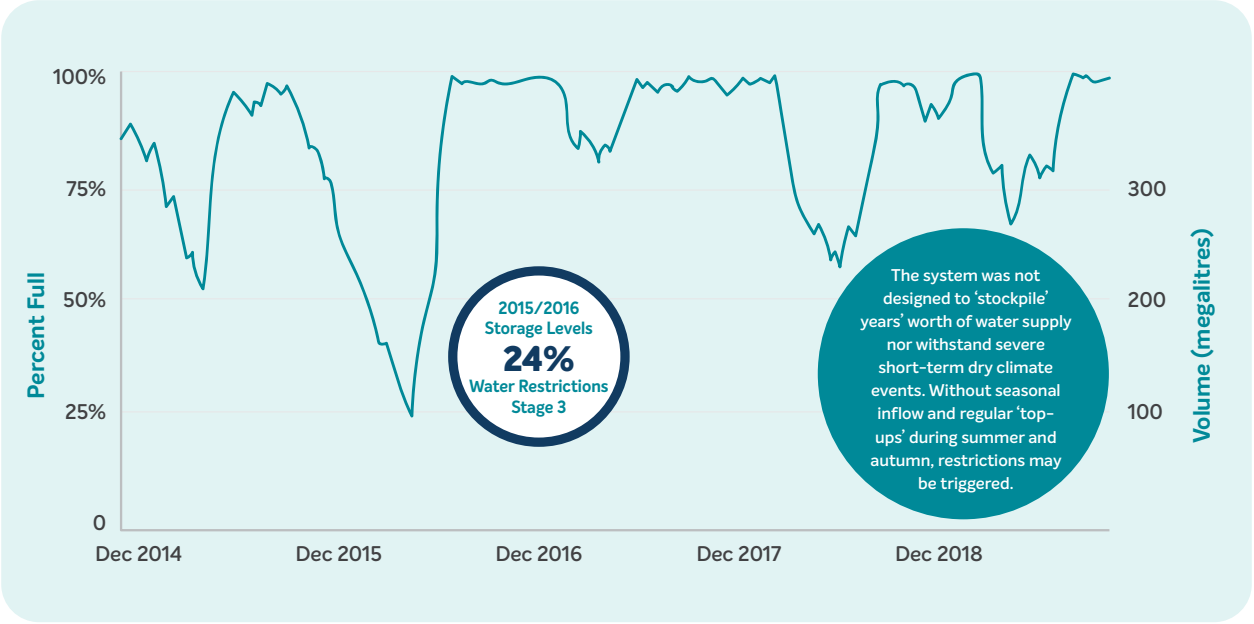
Recycled water use

3% of the Class C recycled water produced by the plant is reused onsite, with the remainder being discharged to the ocean as there is currently no large scale productive use of recycled water in Apollo Bay.

Our challenge

How has the system performed?

In 2015–16 the Barham River catchment experienced its driest conditions on record, resulting in flows in the river up to 80% below average. With very little water in the river to harvest, the Apollo Bay storages rapidly declined as low as 24 per cent, before recovering again with winter flows. The graph below illustrates the impact of this short-term, extremely dry climate event, when storages declined far more severely than in average years. Level 3 water restrictions were introduced to preserve water and slow the rate of decline in storage levels, ensuring Apollo Bay did not run out of water before rainfall returned.



What is the scale of the challenge?

The experience of 2015–16 highlights the challenge for the Apollo Bay system. Like Lorne, this system is relatively isolated because of its location and geography, so that a connection to other systems (like the Geelong, Golden Plains, Bellarine and Surf Coast system) is challenging. The limited storage capacity in the system means that it is highly dependent on seasonal climate patterns, with the ability to meet peak summer demand reliant upon rainfall in the preceding winter and spring.

We know that the variability in our climate is becoming more extreme with the impacts of climate change. We can expect, and need to plan for, the potential that events such as that of 2015–16 (or worse) will occur again in the future.

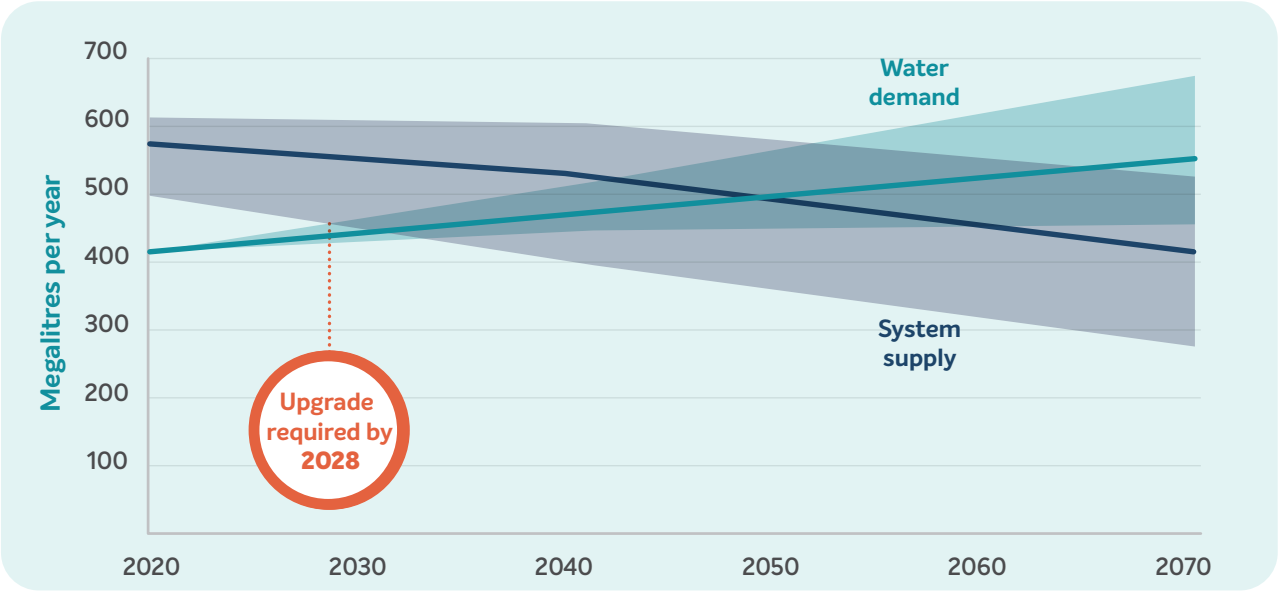
Under the most severe conditions of demand growth and climate change, the graph shows that we may be unable to reliably meet the peak demands of customers in Apollo Bay by 2028. The table shows the gap between supply and demand (in millions of litres of water per year).

This does not mean that Apollo Bay will run out of water, but that there is a higher probability of more frequent, severe, and longer water restrictions. Between now and 2028, there remains a chance of water restrictions in the event of a very dry year, in line with our agreed level of service – that is, restrictions no more than 5% of the time over a 50-year planning horizon. Based on observed historical records and possible climate change scenarios, restrictions could be expected in two out of every 100 years.

The decline in level of service is only associated with worst case conditions, so the experience for customers in Apollo Bay in the near term will continue to be dependent on the climate variability that eventuates. For example, under a scenario of median climate change and population growth, existing levels of service would be maintained for some time yet.

Regardless, the attributes of the Apollo Bay system, combined with forecasts of possible future scenarios, demonstrate the need to find or save more water. As much as an additional 400 million litres per year may be required by 2070.

Apollo Bay Supply and Demand Forecast



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2040	2050	2060	2070
Median Growth / Median Climate Change	144	139	134	129	124	118	113	108	103	52	-11	-74	-137
High Growth / High Climate Change	60	50	40	31	21	11	1	-8	-18	-115	-209	-303	-397

Our response

What do we propose to do?

While the existing Apollo Bay system can continue to meet service levels in coming years, we will need to act within the next decade to maintain a reliable supply of water over time.

Over the next five years we will focus on the immediate actions we can take to optimise existing arrangements, while preparing for the larger scale augmentation that may be required in the future.

In the next 5 years:

Find more water

AB1 Engage with the Apollo Bay community about a preferred long-term option, as part of planning to be ready to implement it when required

Smarter water use

AB2 Upgrade our infrastructure to maximise efficient production and storage of water

AB3 Research use of modular floating covers to reduce evaporation losses

AB4 Work with customers to help them use water smarter, such as digital meters to target leakage reduction, and minimise leakage across our network

Integrated water management

AB5 Work with Colac Otway Shire to progress localised integrated water management opportunities and support uptake of alternative water sources, where efficient

Over the next 50 years:

Find more water

Be ready to implement a further augmentation, whether:

- Small local desalination plant connected to existing water infrastructure
- Greater use of surface water within existing entitlements

Continue to support uptake of alternative water sources

Smarter water use

Continue to work with customers to encourage smarter water use, including through innovative technologies

Integrated water management

Adopt an integrated water management approach when planning new urban development, in partnership with the Colac Otway Shire

During drought or emergency:

Find more water

Water carting to maintain water supply

Smarter water use

Implement water restrictions to curb demand, if total system storage levels fall below defined trigger points

Restrictions likelihood

Actions proposed in the next five years are focused on making best use of water delivered by our existing system in Apollo Bay, as well as establishing what we will do to secure water for the longer-term.

With these actions to optimise our system in place, we expect that water restrictions will be rare in Apollo Bay over the next five years (<5%, or 3 months out of 5 years).

Action AB1

Engage with the Apollo Bay community about a preferred long-term option, as part of planning to be ready to implement it when required

While we can act in the next five years to incrementally improve the system's yield and give us more time to find additional water, the need for a further upgrade at some time in the future will remain.

As is the case in Lorne, the options for a further upgrade are relatively few, will have different trade-offs, and will all take many years to prepare for and deliver. To ensure we are ready to implement a further upgrade when it is required, we will focus on engagement with the Apollo Bay community to identify a preferred long-term solution. Consistent with our adaptive approach to monitoring conditions and the timing and prioritisation of actions each year, we may also need to progress some planning activities over the next five years, so we are ready to act when required.

We expect the timing and details of this upgrade to be developed further as part of our next *Urban Water Strategy* in 2027.

Action AB2

Upgrade our infrastructure to maximise efficient production and storage of water

Operation of the Apollo Bay system must balance several factors, including pumping arrangements, storage levels, flows in the Barham River and the conditions of our bulk entitlement.

We are currently exploring how we can maximise the system's storage capacity through increasing the usable volume and/or reducing evaporation losses at the existing storage basins, to make the best use of water we can access within the existing limits of our bulk entitlement. We are also investigating how improving processes at our water treatment plant could reduce losses.

Subject to further technical work, we expect that these actions will increase system yield enough to defer the need for any further augmentation by several years.

As such, we expect to investigate and implement some infrastructure efficiency actions within the next five years, such as increasing the usable volume of the storage basin. Other actions we will thoroughly investigate over the next five years, so that we are ready to implement if required after that.

Action AB3

Research use of modular floating covers to reduce evaporation losses

Floating modular covers consist of individual floating units that float on the surface of a water storage and reduce evaporation losses.

Based on a reduction in evaporation of 80%, it is estimated that (on average) up to 28 million litres of water over the summer months (December to April) could be saved through the use of floating modular covers at Apollo Bay.

However, operational experience with floating modular covers for drinking water storages in Australia is limited. One example is East Gippsland Water's installation of such covers at their Omeo raw water storage to manage algae blooms and birdlife accessing the storage.

Whilst there are already some learnings from recent experience, we will sponsor a specific research project to explore the use of modular floating covers in a local context at Apollo Bay, including potential water quality implications. This research, to be conducted over the next five years, will help us to better understand the feasibility of this option if required after that.

Action AB4

Work with customers to help them use water smarter, such as digital meters to target leakage reduction

The actions that we are committed to in the Geelong, Golden Plains, Bellarine and Surf Coast system to drive smarter water use are equally applicable across the region. We will deliver these programs in each system, targeting high water using residential and non-residential customers. The savings we can expect to make will be in proportion to the population and its water use.

We are planning a specific program of works in Apollo Bay using smart networks to improve the efficiency of water distribution infrastructure. The Apollo Bay system has the highest rate of water loss across all of our systems, with 24% of the water that leaves our treatment plant lost before it reaches customers.

The Apollo Bay Smart Networks Project is an action learning exercise that leverages new digital metering and analytics technology to help find and fix leaks faster both in the home and in the network, saving water and money for customers. The initial small scale pilot will target the Marengo area of the Apollo Bay system and will help us learn how to operate and manage the new devices and software before we implement in other areas. By fixing leaks faster on both sides of the meter, an estimated 23 million litres annually may be saved across the entire system.

Smart networks could also help to complement our sustainable water use plan in Apollo Bay program, like helping customers and tourists understand the value of saving water during summer and fixing leaks or replacing showerheads at tourist accommodation.

We will maintain our efforts to improve community understanding and awareness about the importance of water efficiency. Every litre that is saved through a permanent change in behaviour or water use will help give us more time to find new sources of water.

Action AB5

Work with Colac Otway Shire to progress localised integrated water management opportunities and support uptake of alternative water sources, where efficient

Through our leadership of the Barwon Integrated Water Management Forum, we will work with Colac Otway Shire to identify new opportunities for wider use of fit-for-purpose recycled water, stormwater and rainwater in Apollo Bay.

Greater use of fit-for-purpose alternative water sources could help reduce demand for drinking water. One idea currently under consideration is the use of recycled water from the Apollo Bay Water Reclamation Plant to irrigate the Apollo Bay golf course, which would free up the drinking water currently used for irrigation. Other ideas that could be explored further include harvesting stormwater for irrigation of public open space or supplying recycled water for other non-potable uses.

We will fully investigate the feasibility of these ideas over the next five years, so we are ready to implement if required after that. This will ensure that we have the information available to ensure we can act to secure Apollo Bay's water future in the most cost-effective way.

Why do we propose to do it?

Our ability to meet increasing demand in Apollo Bay over time is primarily constrained by the limitations of our existing infrastructure. Optimising current system arrangements therefore provides the most immediate and efficient opportunity to incrementally increase the system's yield.

We can also aim to reduce demand for drinking water by pursuing greater use of alternative water sources, such as fit-for-purpose recycled water, or working with the community to use water more efficiently.

The greater these incremental gains, the further into the future we can defer the need to find a significant new source of water or undertake further system upgrades. Incremental gains in the short-term will also provide us with greater flexibility to adapt our long-term plans to best meet future conditions. This is particularly important for Apollo Bay, since all of the potential large-scale, long-term options suitable for this system will involve trade-offs and take time to implement.

The potentially feasible options that would deliver a significant volume of additional water for Apollo Bay are summarised in the table below.

Option	Yield (ML per year)
Further optimisation of existing infrastructure	72
New off-stream storage	180
Small local desalination plant	220*
Supply from West Barwon or West Gellibrand	500*

*Could be designed to meet various requirements

The readiness actions we will take over the next five years, such as Actions AB2, AB3, AB4 and AB5, are expected to identify opportunities to further optimise our existing infrastructure and current system arrangements in years to come. There is the potential for significant improvements to system yield from these opportunities.

We expect our next *Water for our Future* strategy, in 2027, will provide the opportunity to establish the specific actions we will take to deliver a further upgrade in the future. Over the next five years we will clarify further system optimisation opportunities and progress a discussion about the options with the Apollo Bay community, so we have a better understanding of the long term action/s we will be most likely to pursue.

Apollo Bay is relatively isolated and surrounded by terrain that makes connections to our other systems challenging and costly. This places emphasis on identifying local solutions.

Given its coastal location, desalination is a feasible source of climate-independent water. We know that desalination has environmental implications that can be managed through appropriate site selection and design, in consultation with Traditional Owners, and the use of renewable energy. Finding an appropriate site in Apollo Bay may be challenging, but a small modular desalination plant able to produce 2ML/day would require a site footprint less than the size of a standard residential block (<500m2). It could be located inland, rather than on the foreshore, and potentially co-located with other existing water infrastructure in Apollo Bay.

The other major option for Apollo Bay will be continuing to make incrementally greater use of our existing bulk entitlement to water from the Barham River.

Even with optimisation of our existing storages, our ability to harvest water from the Barham River would still be well below our entitlement to 800 million litres per year. The most significant constraint would remain our ability to store water when it is available. Further increasing our storage capacity would likely meet the system's needs for decades to come.

Constructing additional storage is not necessarily straightforward, primarily because it can be difficult to find a suitable location with the right conditions. Extensive investigation of possible storage sites were conducted in the early 2000s, when plans for Apollo Bay's second storage basin were developed. A very limited pool of potential sites were identified, due to the challenging geological and topographical conditions at Apollo Bay.

While we may expect that additional system storage shapes as the most logical solution for Apollo Bay over the next fifty years, we need to confirm this approach with the community. Each of the potential longer-term options has different trade-offs, which we will need to explore in a transparent and timely way. Progressing this over the next five years will ensure we are ready to act when required to secure Apollo Bay's water future.

Gellibrand

Our system

Our smallest independent water supply system services the small township of Gellibrand.

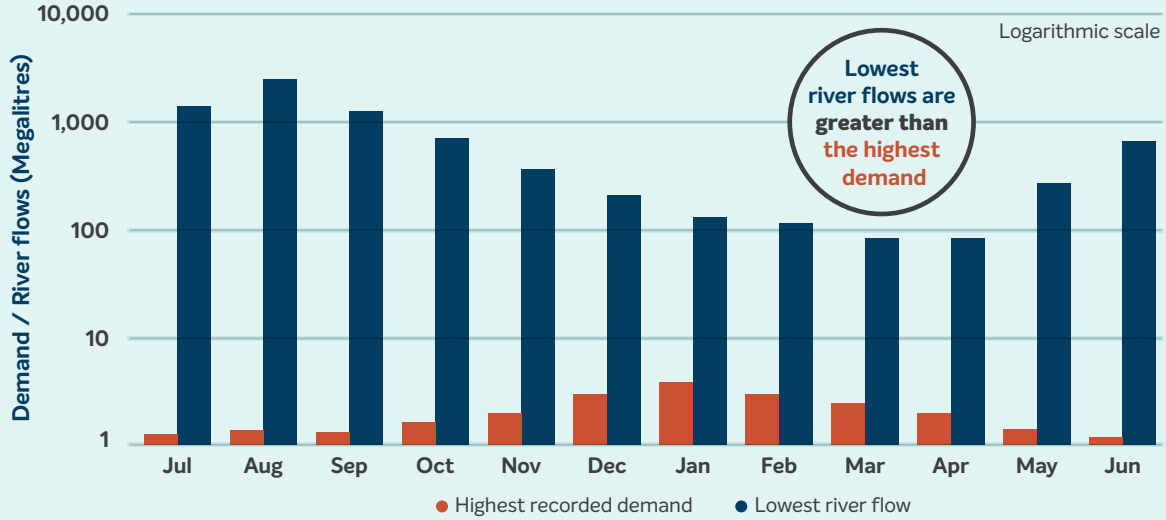
Gellibrand is located approximately 25km south of Colac in the Otway Ranges, on the Traditional Owner land of the Eastern Maar. Water is sourced from Lardner Creek, which has reliable flows year-round that mean the system does not require any substantial storage.

The Gellibrand system has not faced the threat of water shortage in even the driest historical conditions.

Our challenge

Year-round flows in Lardner Creek are so much higher than the town's water demand that even the forecast impacts of a drier future do not impact reliability.

The primary risk for the system is the impact of events such as bushfire, or prolonged dry conditions that cause a deterioration in water quality.



Our response

The very small scale of the system means that short-term impacts or changes in conditions can be easily managed.

If supply to the town is threatened through bushfire or drought, the town can be readily supplied by water from Colac or the Barwon River.

No actions are planned over the next five years, due to Gellibrand's current high level of water security. We expect water restrictions will be very rare in Gellibrand over the next five years (<1%, or 3 weeks out of 5 years).

What we heard

The plans proposed for each of our water supply systems have been guided by what we've heard.

They also provided a basis for further feedback at the final Water for our Future Community Panel session in November 2021.

Engagement process

Our engagement process is illustrated in in the diagram to the right and summarised in the tables overleaf.

We partnered with our Traditional Owners throughout our engagement process and the development of this draft *Water for our Future* strategy.

We met regularly with the Wadawurrung's dedicated Water Officer to discuss the program as it unfolded, and worked together with the Corangamite Catchment Management Authority to understand challenges and opportunities for both the Barwon and Moorabool Rivers. This led to the prioritisation of water recovery for the Moorabool River in the short-term, given its status as the most flow-stressed river in the State. We also met with the Wadawurrung Traditional Owners Aboriginal Corporation Board of Directors to discuss these opportunities and longer-term options being contemplated across Wadawurrung Country. Traditional Owners also generously shared their wisdom and insights with our *Water for our Future* Community Panel to help inform their deliberations.

Water for our Future **Phase One** engagement activities

Engagement activity	Output
• Online survey and ideas lab • 14 community pop-ups held across the region • Geelong Chamber of Commerce event • Online conversation kit	Community feedback and ideas gathered between August 2019 and June 2020 and summarised in a What we heard report.
Community workshops held: • Face-to-face in Torquay and Bannockburn in February and March 2020 • Online in Geelong and the Bellarine, Apollo Bay and Colac in June 2020	A record of views and ideas shared by community members and summarised in two workshop reports (Torquay and Bannockburn; and Geelong and the Bellarine, Apollo Bay and Colac.)
A regional forum of 52 leaders across the region representing business, industry, youth, community and environmental groups. Held in December 2019, the forum was hosted by Barwon Water in partnership with Deakin University and G21.	A record of views and ideas shared by forum participants and summarised in a regional forum report.
Formal research to further explore the views and preferences of more than 1000 residential and business customers, conducted via focus groups and an online survey in March 2020, and an additional online survey in August 2020.	A Community Preferences report.

Water for our Future **Phase Two** engagement activities

Engagement activity	Output
Community feedback gathered online in December 2020 and January 2021 about 11 high-level options for our water future.	What we heard phase 2 report.
An online forum held in December 2020 with 37 leaders across the region, including local councillors, young people and representatives from businesses and environmental groups. Leaders were asked to discuss the results and implications of the community panel's vision and criteria and provide insights about options.	A record of views shared by forum participants and summarised in a regional forum phase 2 report.
An online workshop held in November 2020 with 27 community representatives from Barwon Water's customer and environmental advisory committees. Members explored 11 high-level options for our water future and shared, from their perspective, what they would like the community panel to know about each theme.	An Advisory Committee report summarising feedback shared.
An online workshop held in October 2020 with members of the *Water for our Future* Council Working Group – a group of council officers that provide ongoing advice to the *Water for our Future* program. They were joined online by other council officers from planning, environment and engagement departments to provide feedback from a local perspective and technical input into the 11 high-level options for the future.	A council workshop report summarising feedback shared.

Water for our Future **Phase Three** engagement activities

Engagement activity	Output
Our community was invited to visit the Water for our Future website to review the draft Water for our Future Strategy and provide feedback. There was a survey for each supply system to understand levels of comfort with the 5 year, 50 year and drought response actions proposed. There was also an opportunity to provide a written submission about the draft. A quick poll question also asked "what's your level of comfort with the process we've followed?"	What we heard phase 3 report.
An online forum held in November 2021 with 33 leaders across the region, including local councillors and representatives from businesses and environmental groups. Leaders were asked to discuss the draft Water for our Future Strategy.	A record of views shared by forum participants and summarised in a regional forum phase 3 summary report.
Online briefings in October 2021 with representatives from Barwon Water's customer and environmental advisory committees. Members provided feedback on the draft Water for our Future Strategy.	Advisory Committee meeting minutes outlining feedback

Key insights

We have heard and learned a lot from the thorough engagement with our community over the past two years or so. The reports that accompany some of the engagement activities we undertook provide a comprehensive account of the input we received. It's challenging to summarise the rich and diverse views we heard, but there are some key themes that emerge.

We need to reduce our dependency on traditional supplies

Our existing water supplies are almost entirely dependent on rainfall, which feeds the rivers that fill our storages. During the Millennium Drought we also relied heavily on groundwater, which is also dependent on rainfall (often over different time horizons).

These traditional supplies will remain the foundation for our urban water needs for the time being. However, as demand increases with a growing population, and climate change leads to drier conditions, we will need to diversify our water supplies and rely less upon climate-dependent sources.

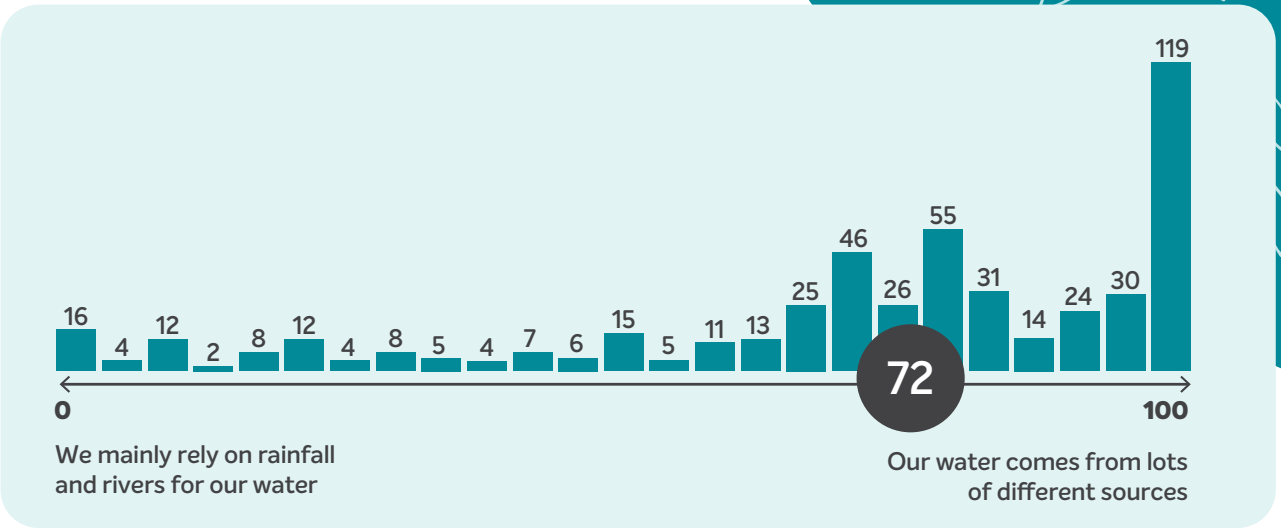
We have heard this from scientists and water resource experts, but also from the community. There is an appreciation of the impact that our water use has on the environment, and a strong desire to see that impact reduced over time. We can achieve this by transitioning to greater use of other sources of water, including climate-independent supplies such as fit-for-purpose recycled water and desalination.

"With a growing population it is critical that we effectively re-use water and find alternative sources."

"Utilise stormwater, grey water, recycled water and other sources in households, businesses and across the community so that potable water is only used for drinking and cooking, and non-potable water is used for everything else."

"We seriously need to start the conversation around Class A potable re-use. It's a long journey but the sooner we start the sooner we get there."

Responding to a question about where we should source our water from in the future, participants in our survey strongly favoured moving towards greater diversity.



Making best use of our traditional supplies is not enough

One obvious solution is to try to make the most of the water that we do have available. With greater awareness – and, at times, out of necessity – we have become much more efficient with our water use compared with decades past.

The message we have consistently heard from our community is that this should continue to remain a focus. Many of the ideas identified, and the options preferred by our community, relate to using water wisely. This includes direct efforts to improve efficiency, raising awareness to change behaviour, and better design and planning as part of urban development.

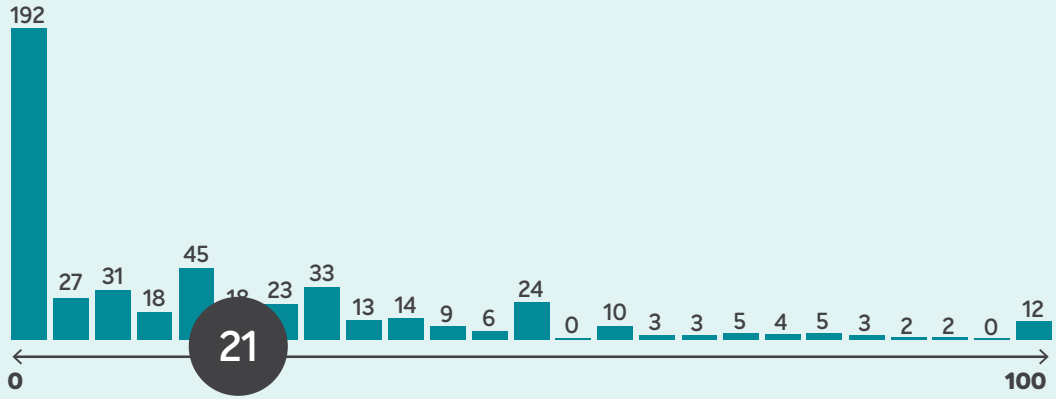
"(We should) encourage people to use water more responsibly and efficiently."

We have always been driven to improve the efficiency of water use to help manage demand. This will continue to be core business.

However, we also know that there are natural limitations to the water savings that can be achieved. Although technology is always changing, further water efficiency becomes incrementally more difficult to realise over time.

For example, our technical assessment of water efficiency options in the Geelong, Golden Plains, Bellarine and Surf Coast system suggests that – even if we did everything we could – we might save around 16,500 million litres per year. While this would make a sizeable contribution, it is a long way off the additional 50,000 million litres the system likely needs over the next fifty years.

Responding to a question about where we should source our water from in the future, participants in our survey strongly favoured moving towards greater diversity.



Our community is engaged and willing to do their bit to contribute to the vision

There is a greater appreciation than ever of the value of water. Our engagement has demonstrated that the people of our region are acutely aware of the importance of managing this precious resource accordingly.

They also understand that this responsibility falls upon everyone. We consistently heard interest in ensuring that using water efficiently extends to every household and business, as well as maximising the use of alternative water sources such as stormwater and fit-for-purpose recycled water.

Our community is open-minded about how we might use different sources of water in the future, including recycled water.

"Aquifer recharge with recycled water is now happening in Perth and has been in Orange County in California for decades. The same could be happening with water [from] Black Rock and other wastewater plants in the region."

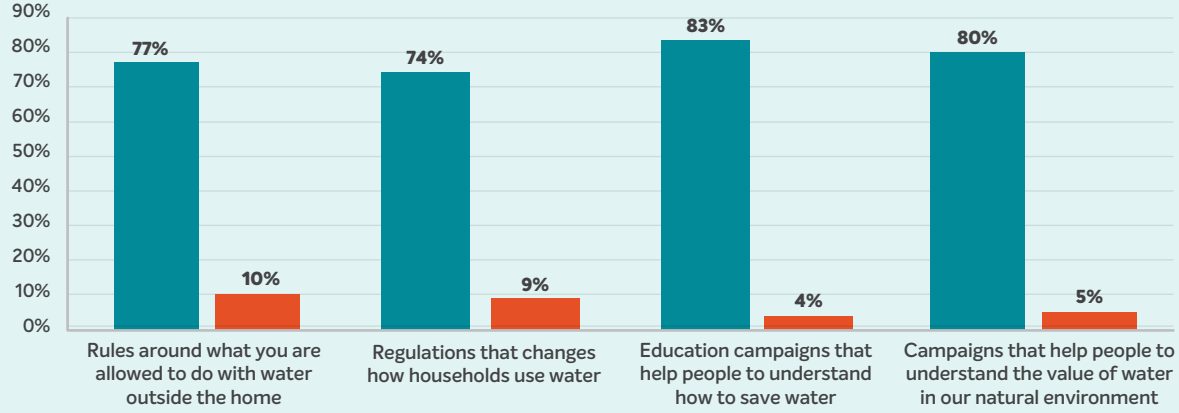
We also heard support for the infrequent use of water restrictions to help manage the more severe extremes of our variable climate.

Overwhelmingly, we have been encouraged by the considered, informed and forward-thinking views that our community has contributed. It gives us confidence that our region understands and is willing to partner in the shared responsibility of managing our most precious resource.

"Education (about water conservation) must be constant and start in schools... the conservative use of water needs to become the normal way to use water - a lifelong way of living"

"Previously the State Govt had a target of 155L per person per day during the last drought. It would seem beneficial for this to now be a permanent target in today's climate and put a friendly reminder to consumers each bill."

Most people indicate a high degree of comfort with measures we might take to encourage people to use water more efficiently.



We need to support the needs of the environment and cultural values of our Traditional Owners

We have heard from both experts and the community about the need to better support the waterways in our region. We know that continuing to take water from our rivers at historical levels will only see their health decline further. Science is helping us understand what we need to do in response, including in a future impacted by climate change.

The health of the waterways in our regions is also intrinsically linked to cultural values and aspirations for Traditional Owners. We have clearly heard from Traditional Owners and the community the importance of restoring our waterways as close to their natural state as possible.

"Rivers are already so stressed; we don't need to take any more - we should be trying to increase environmental flow."

"It feels that human use is often prioritised over the environment - yet we have nothing without a healthy environment."

"Our shared vision - All people working together to make Wadawurrung Country and Culture strong... When Country is sick, we are sick"

Paleert Tjaara Dja (Wadawurrung Country Plan)

"We look to a future in which we have secured our rightful place in society and on Country ... Where we are represented as the Traditional Owners of our lands and waters, living in harmony with the rest of society"

Meerreengeeye ngakeepoorryeeyt (Eastern Maar Country Plan)

The options identified by the community helped inform our system plans

Our engagement process has highlighted how deeply our community reflects on how we can achieve a secure water future for the region. We distilled hundreds of ideas that have been contributed over the past two years.

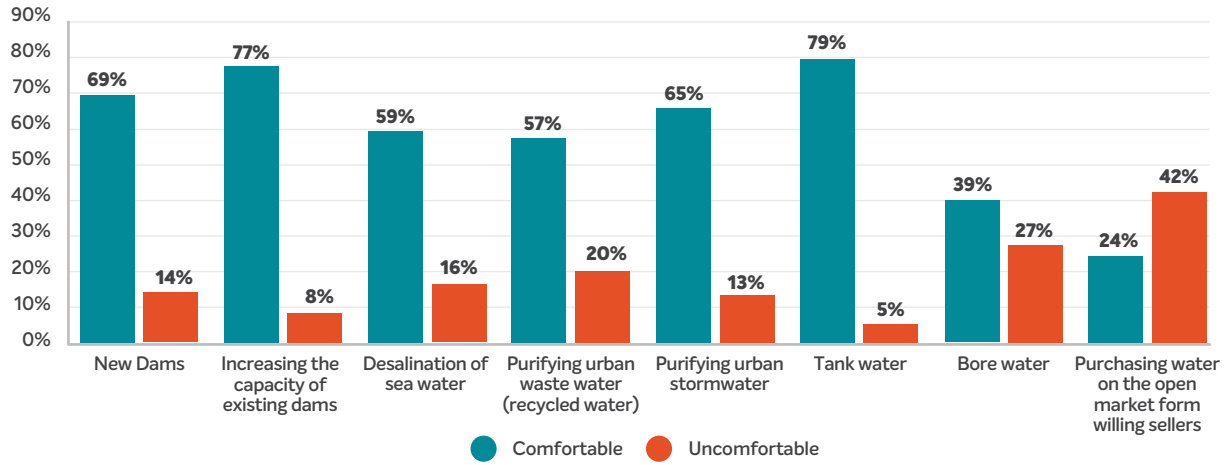
Once we consolidated these ideas into representative options, we still had more than fifty that the community helped identify. We also heard many views about the appropriateness of these options, which helped us further narrow down those we should be considering.

The identification of those options the community is comfortable with has largely guided the plans we propose for each of our water supply systems. In some instances, there were other factors we needed to consider. We we propoesd anything that appeared at odds with the prferences we heard from the community, we explained the rationale for this. For example,

- we need to align with Government policy or the strategic direction of other strategies
- preferred options alone can't ensure we can reliably and affordably secure future water supplies
- we need to make best use of our available resources in a way that is environmentally sustainable and delivers greatest customer value.

For example, the characteristics of our 'seasonal' systems in Lorne and Apollo Bay mean that we need to think differently about how we can address the challenges in these systems. We heard clearly from the community that there is not an appetite to take more water from the environment. However, optimising the systems to use water to which we are entitled (for example, with more storage that takes advantage of plentiful winter flows) may not impact the environment and be more affordable and provide greater security than other options. Decisions about these trade-offs will be made in consultation with the communities in those towns.

A survey of our customers demonstrated a high level of support for a variety of potential drinking water supplies. The exceptions being groundwater and purchasing water from willing sellers. It was also noted that there is support in the community for dams. This support is in conflict with other survey responses, which prioritise healthy rivers and waterways over human needs.



Access to water must remain affordable and fair

Whichever options we pursue to achieve a secure water future, some level of investment will inevitably need to be made. This investment is likely to be significant if forecast conditions of population growth and climate change eventuate.

Our investments are funded by customer bills, which may increase when we need to make a major investment in a new water source. We are acutely aware of the need to do everything we can to minimise any future increases in the prices customers pay.

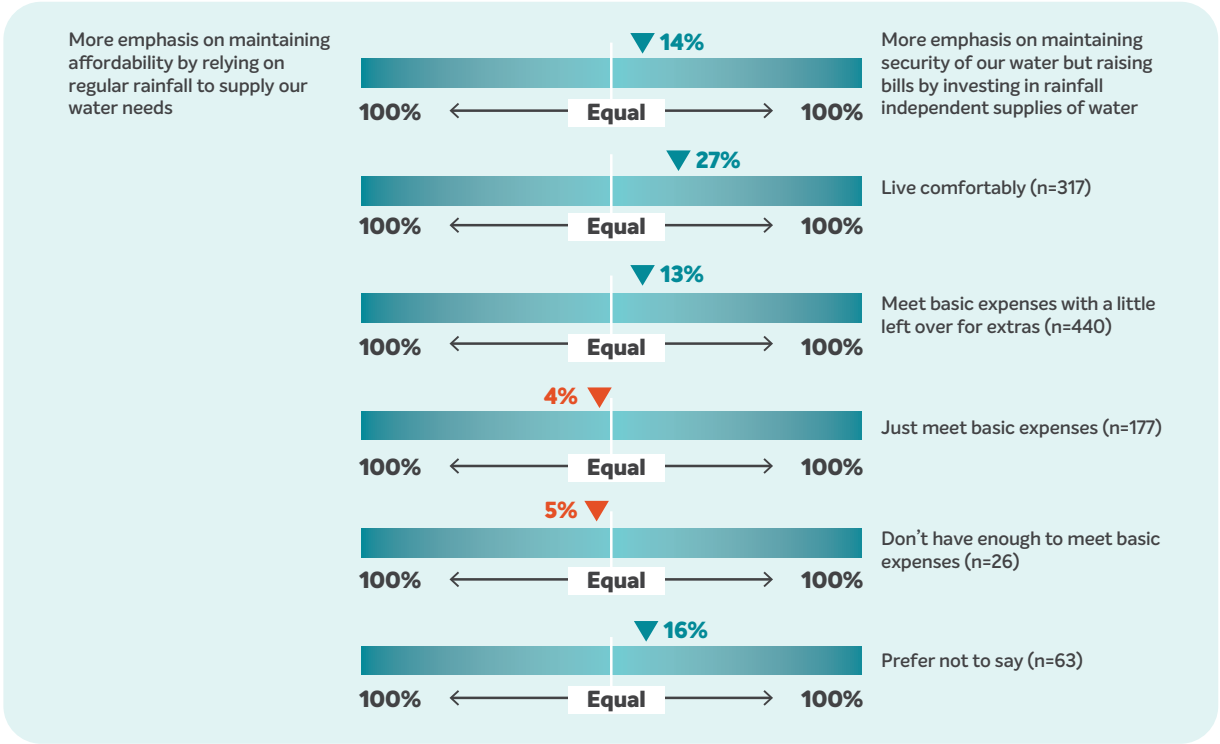
We also know that it is harder for some households than others to afford their water bills. Our community is also highly sensitive to the need to ensure fair and affordable access to water for everyone.

We have existing measures in place to support those households and businesses that are finding it more difficult to pay their water bills. We have an obligation to do this and will always continue to.

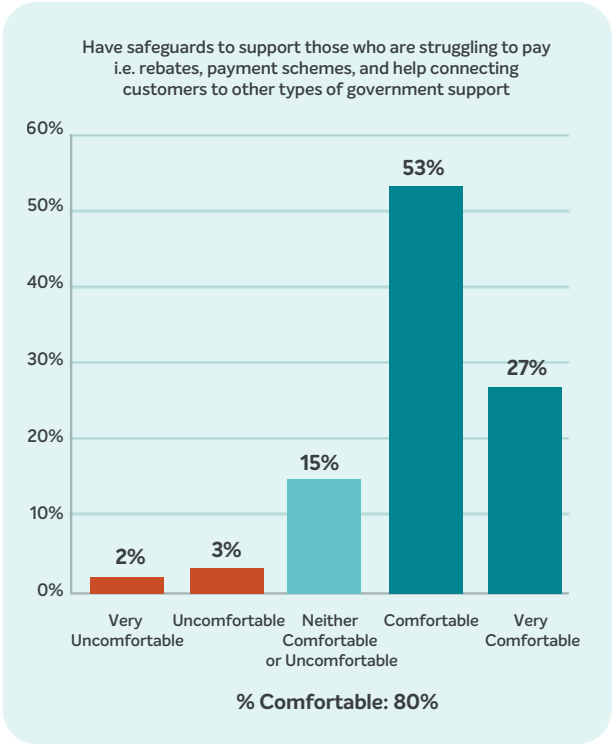
The best thing we can do to minimise impacts on customer bills is to make well-informed, timely and efficient investments that maximise customer value. Our proposed plans are informed by detailed economic modelling that will help ensure that we find the right balance between investment and levels of service.

"Water belongs to everyone, I'd hate to see poor people being unable to afford their water in 50 years' time"

Respondents to our survey who 'live comfortably' are significantly more likely to support greater emphasis on maintaining water security. Conversely, those who "just meet basic expenses" are significantly more likely to support a greater emphasis on maintaining affordability.



Participants in our customer survey showed a high degree of comfort with measures to support those who are less able to afford water.



Feedback received on the draft strategy

In late 2021, we invited the community to provide feedback on the draft Water for our Future Strategy.

An online survey for each supply system provided an opportunity for community members to have their say on their level of comfort around the 5-year, 50-year and drought response actions proposed in the draft strategy.

Overall, there was strong support for the actions proposed in Lorne and Geelong. There was support for some Apollo Bay actions but others were not supported. No feedback was received on the Colac or Gellibrand systems.

Broader feedback received during this time highlighted to us the need to continue to engage with communities in Lorne and Apollo Bay about identifying long-term supply upgrades. We have updated the strategy to reflect this and will work with these communities over the coming five years to involve them in the planning.

The strategy also was reviewed and discussed by 30 key community and regional stakeholders at our third annual Regional Leaders Forum on November 10. Participants were highly supportive of the 5-year and 50-year actions in the draft strategy (average of 4.09 and 4.10 out of 5 respectively).

The Water for Our Future Community Panel met for its final session on Sunday, November 28, to provide feedback on the draft strategy.

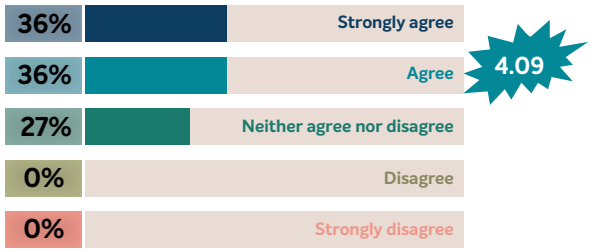
At this session, Barwon Water presented information on the costs associated with the proposed actions and how this was likely to impact the average customer.

More than 96 per cent of the panel members said they were comfortable with the average cost implications on the average customer.

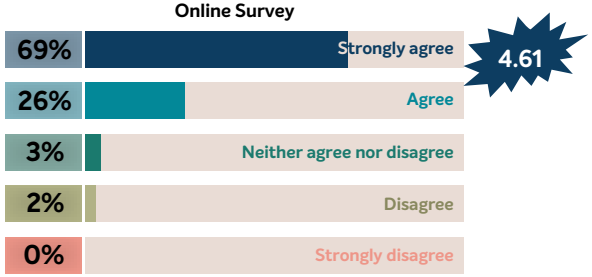
Overall, the panel members were very positive about both the 5-year and 50-year actions proposed in the draft strategy, with 60 per cent saying “Love it” and 40 per cent of participants saying “Like it” when asked if the strategy reflected the vision they had developed in November 2020.

Are you comfortable with the proposed 5-year actions?

Regional Leaders Forum

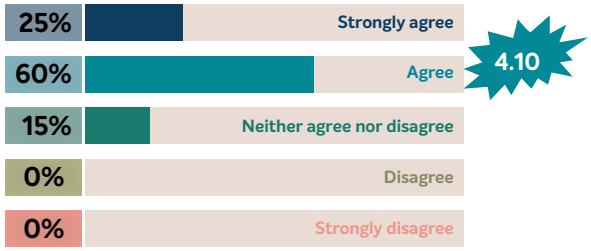


Online Survey

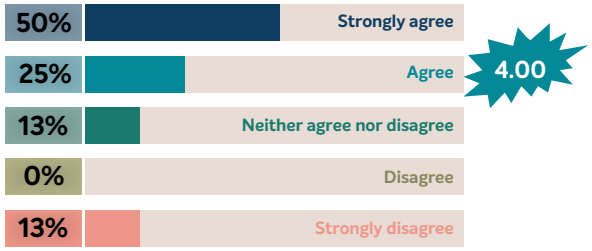


Are you comfortable with the proposed 50-year actions?

Regional Leaders Forum



Online Survey



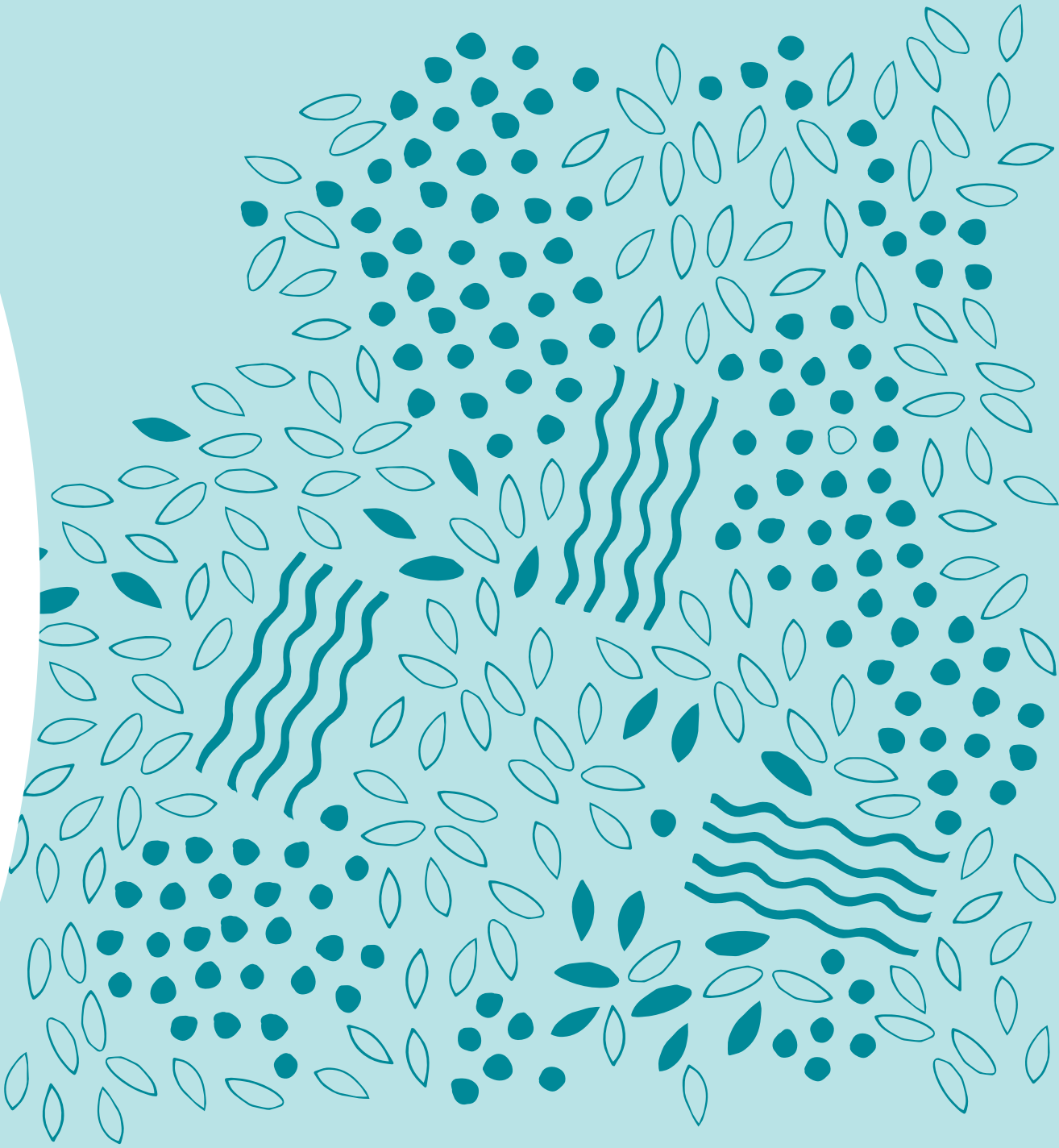
What we did

Good planning involves considering a wide range of options and future scenarios, which has been the philosophy of the *Water for our Future* program.

Exploring a range of options, from a range of different perspectives, means we can make better informed decisions.

We set out to understand and explore the full range of possible options that could help address the challenge we face. We identified hundreds of ideas that could help us find more water or use water smarter. These ideas came 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.

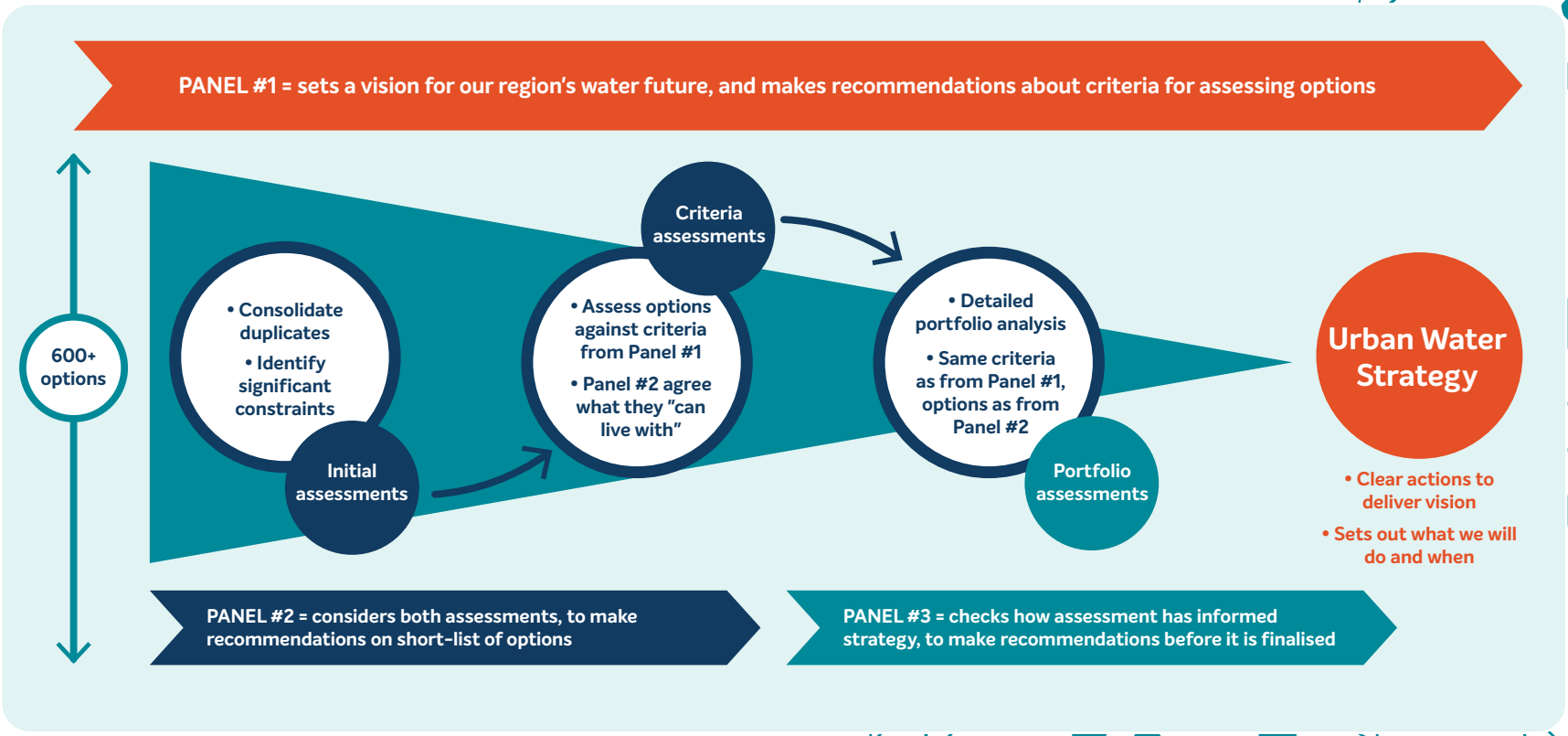


We undertook significant technical analysis to build our understanding of many ideas we heard, and the respective contribution they might make to responding to our challenge.

We adopted a scenario-based approach to understanding our challenge, enlisted the help of more than 20 independent experts across a range of disciplines, commissioned an independent global technology scan, collaborated with research partners and water industry colleagues, engaged engineering and economic consultants, developed a bespoke economic appraisal model and designed an adaptive planning approach to developing and implementing our strategy.

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 therefore designed a decision-making process that saw us partner with the community in deciding which options to implement, when and in what order.

Our decision-making process took the outcomes of our technical analysis, and the outcomes of our engagement process, to guide the evaluation and translation of a long-list of options into a robust strategy that clearly sets out the actions we will take in response to our challenge.



We followed four key steps to develop our strategy.

Step 1: Initial assessment

The first step in our decision-making process was to consolidate the long list of options by grouping ideas 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 were also highlighted at this stage.

This initial assessment refined the large number of ideas to a more workable number of feasible options for further, more detailed assessment. We undertook some preliminary technical analysis of the resulting long list of options so that they could be reasonably assessed against the criteria established by the panel.

Step 2: Criteria assessment

The second step in our decision-making process was to assess the refined list of options using the criteria that were set in support of our vision. The criteria assessment provided 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 were difficult to assess in objective, numerical terms were scored using best available knowledge, experience and judgement.

Example criteria assessments for two of the 55 representative options that were taken forward for further, more detailed assessment are provided overleaf – one "smarter water use" option (Northern and Western Growth Area Integrated Water Management Plan) and one "find more water" option (Regional desalination plant for Geelong). Criteria assessments for all 55 representative options can be found in the Background Report.

The panel assembled in February and March 2021 to review the long list of options, confirming that they were representative of all the ideas identified. They then reviewed our assessment of the options, to ensure this aligned with the intent of their criteria and supported the vision they had established.

The outcome of this step was the identification of those options that the panel agreed aligned with our vision and should be considered as part of our region's water future (and, equally, those that they preferred not to be considered further). The intention was not the identification of a single, preferred option or solution, noting that many will likely be able to contribute to achieving the vision.

The panel recommended a wide range of options for future consideration, including solutions relating to better design and planning, changing behaviours, improving efficiency and sourcing extra water for a variety of purposes through roof water, stormwater, greywater, recycled water and desalination.

The breadth of options showed that, over the next 50 years, the panel envision a secure water future with innovative, sustainable and affordable water solutions for the region and less reliance over time on traditional and rainfall dependent sources of water, like rivers and groundwater.

Options reviewed by the Community Panel

All options were forward-thinking options for implementation over the next 50 years

NO – 21 options

YES – 34 options

*For a range of fit-for-purpose uses, consistent with policy, legislative and regulatory frameworks in Victoria

Option 2: Using water smarter – Better design & planning – Urban design – **Northern & Western Growth Area IWM Plan**

Description: A water cycle masterplan developed collaboratively with project partners for a future major growth area of Geelong that will ultimately house 110,000 residents. The plan seeks to maximise net community benefit by including: recycled water supply for residential use, local industry, open spaces and environmental flows; utilising stormwater for irrigating landscapes, enhanced infiltration billabongs improving quality and quantity of runoff, and providing cooler and more liveable urban environments. The plan caters for population growth and urban development with a reduced reliance on using drinking water for purposes where a lower quality water would be acceptable.

*This option was recommended by Water for our Future Community Panel. Visit **www.barwonwater.vic.gov.au/future** to read the panel's report.*

Social Impact & Equity		
Extent of shared social benefits/costs	A	Social/recreational benefits provided to part of community, water security benefits shared across Greater Geelong water supply system – excludes smaller supply systems.
Extent of private investment required	A	Some private investment required by new customers living in these growth areas through lot price.
Community & Social Outcomes		
Bill impact - household owner/occupier	$64	
Bill impact - household renter	$21	
Bill impact - small business	$105	
Bill impact - large business	$12,510	
Health benefits	G	Provides health benefit through improved urban liveability/urban cooling associated with provision of blue-green infrastructure such as enhanced canopy from passively irrigated trees, swales and enhanced billabongs.
Social and recreational benefits	G	Naturalisation and rehabilitation of 3.7km of the concreted reaches of the Moorabool River. Revegetation and stabilisation of 15km of major waterways in the growth areas to restore waterway connectivity and enhanced biodiversity. These enhanced natural spaces will be provided for the local and regional community to enjoy.
Employment benefits	G	Provides direct employment benefit – up to 1,030 full time positions from capital investment
Environmental		
Environmental impacts – water	G	Enhances environmental water flows in the Moorabool River, restores/naturalises a section of the Moorabool that is concrete lined. Vegetation and biodiversity enhancement of Barwon, Cowies and Moorabool major waterways. Swales, passive tree irrigation and enhanced infiltration billabongs will hold more water in the landscape and will help manage stormwater and flooding while also filtering and recharging waterway base flows.
Environmental impacts – land & biodiversity	G	Limited additional construction impacts on already disturbed areas.
Zero net emissions	G	2,600 kWh/ML required to be offset - built into the cost of option.
Rainfall dependency	A	Recycled water elements not reliant on rainfall, stormwater elements reliant on rainfall.
Sustainability		
Ability to enable the sustainable use or reuse of resources	G	Promotes the use of a wasted resource.
Promotes informed water use	G	Presence of water conservation and alternate water supply infrastructure promotes awareness and understanding in residents and visitors.
Technology, Science & Innovation		
Time required to implement	5-40 years	Progressively implemented as these areas develop over the next 40 years
Regulatory, legislative or policy constraints	G	No regulatory, legislative or policy constraints – IWM supported by current planning provisions.
Near-term yield (in 10 years)	300 ML/year	
Long-term yield (in 50 years)	7,300 ML/year	Yield represents the volume of potable water being substituted with alternative water sources – significant additional volumes of alternative water is also provided for other uses such as for environmental and enhanced urban landscape purposes, which do not substitute potable water use.
Certainty of yield	G	High level of confidence in yield benefits due to the diversity of supply and conservation options.
Scalability	A	Able to scale up and apply across new urban developments, but is tied to the timing of the roll out of new development.
Finance & Economics		
Capex	$540M	
Opex	$2,226/ML	
Levelised cost	$7,947/ML	

High-level, preliminary information provided as a guide only - represents views of Barwon Water professionals and should not be viewed as definitive or exhaustive

Option 23: Finding more water – Desalination – **Regional desalination plant for Geelong**

Description: A reverse-osmosis seawater desalination plant, situated somewhere within our region's coastline that is fully offset by renewable energy sourced from the grid. This option is based on a plant capacity to produce up to 50 GL/yr but is scalable dependent on need. Estimate includes transfer infrastructure of up to 30 km, utilising existing distribution networks to reach customers. Note this hypothetical option is not currently planned, or part of government policy.

*This option was recommended by Water for our Future Community Panel. Visit **www.barwonwater.vic.gov.au/future** to read the panel's report.*

Social Impact & Equity		
Extent of shared social benefits/costs	A	Local coastal community likely to have concerns about visual amenity and some sites would be more sensitive than others, water security benefits shared across Greater Geelong water supply system.
Extent of private investment required	G	No private investment required by customers, cost of option would be passed on via Barwon Water bills.
Community & Social Outcomes		
Bill impact - household owner/occupier	$513	
Bill impact - household renter	$165	
Bill impact - small business	$839	
Bill impact - large business	$99,676	
Health benefits	A	No known health benefits or risks – beyond physical and mental health benefits of water security.
Social and recreational benefits	A	Potential negative impact on coastal recreation activities due to visual amenity but possible to ameliorate this at some sites, small potential recreational benefit from fishing at outlet.
Employment benefits	G	Provides direct employment benefit – up to 3,526 full time equivalent positions from capital investment
Environmental		
Environmental impacts – water	G	Brine discharge to high mixing zone: 60 ML/Day means impacts will not be significant, salt going back to where it came from with high dilution rate
Environmental impacts – land & biodiversity	A	Significant construction footprint in coastal area already heavily disturbed. Impacts can be offset by revegetation
Zero net emissions	G	6,373 kWh/ML required to be offset – built into cost of option.
Rainfall dependency	G	Technology is climate independent – not dependent on rainfall.
Sustainability		
Ability to enable the sustainable use or reuse of resources	A	Seawater is neither a limited resource nor a wasted resource.
Promotes informed water use	A	Plant would be largely isolated from community and visitors – opportunity for education through visitor centre.
Technology, Science & Innovation		
Time required to implement	5-10 years	
Regulatory, legislative or policy constraints	A	Given scale, a number of regulatory requirements would need to be satisfied for the project to progress - investment would need to be approved by State Government; environmental and planning regulations would need to be met and approved by State and Federal Governments etc.
Near-term yield (in 10 years)	50,000 ML/year	
Long-term yield (in 50 years)	50,000 ML/year	
Certainty of yield	G	Proven technology – high level of confidence in yield.
Scalability	G	Inlet/outlet and transfer pipelines would be sized at ultimate capacity, reverse osmosis plant can be upgraded to larger capacity over time.
Finance & Economics		
Capex	$1,900M	
Opex	$1,810/ML	
Levelised cost	$4,488/ML	

High-level, preliminary information provided as a guide only - represents views of Barwon Water professionals and should not be viewed as definitive or exhaustive

Step 3: Portfolio assessment

Combined, the 34 options recommended by the panel could find or save more than 1,000 million litres of water in the future, which is double the amount of water the region would need even under a worst case scenario. Most individual options could be implemented to different extents and in different combinations. For the Greater Geelong system, it is most likely that we would need to employ multiple options over time to meet our future needs.

The third step in our decision-making process involved grouping options from the agreed list into different portfolios. This means that, instead of each option being considered individually, the performance of different groups of options could be understood and compared.

An assessment of each portfolio using the same criteria as those applied in Step 2 was undertaken but also accompanied by a more comprehensive evaluation of relative costs and benefits using a bespoke economic appraisal model. This provided a common metric (in $ terms) to enable a more objective comparison of the performance of different portfolios.

The outcomes of each portfolio were also analysed under a range of possible futures. Because no one knows exactly what the future holds, we tested different assumptions about some of the key areas of uncertainty that will impact our region's water future. The most important parameters include the rate of population growth (which impacts future demand) and different climate scenarios (which impact water resource availability).

By testing different option combinations under a range of future conditions, portfolio analysis provides much richer insights about the outcomes we might expect over a 50-year timeframe. Assessing the performance of each portfolio in $ terms helped us identify and choose the portfolio that offers the greatest community value under the most scenarios.

The portfolio assessment process allowed us to propose an adaptive pathway 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 future may bring,

Step 4: Strategy development

The preceding stages informed the preparation of this strategy. The engagement, analytical and decision-making processes we have followed led us to the clear plan we propose for the next five years. This includes the work we will do to help us prepare for, and make decisions about, what we need to do over the longer-term horizon of the next fifty years.

The publication of the draft provided an opportunity for further engagement on our plans. Broad community feedback and the final deliberations of the community panel were considered during the finalisation of the strategy.

This final strategy has also benefited from the parallel development of the Central and Gippsland Sustainable Water Strategy that is considering water security challenges and opportunities across a broader geographic area.

Next steps

Our Water for our Future strategy responds to the challenges that we face to achieve a secure water future for our region. Our adaptive pathway seeks to balance all the needs for water in our region by finding smarter ways to use the water we already have and transitioning from climate dependent to climate independent sources of water.

However, keeping water prices affordable is important if our region is to prosper. Our region is socially and economically diverse, with some communities among the most disadvantaged in Victoria.

This means we must find the right balance. We must continue to invest to secure future water supplies in a way that respects the environment and cultural values. But we need to make sure that we do not invest too much, or too soon, because of the implications for water prices and affordability.

Our Water for our Future strategy sets out a clear plan of action for the next five years, as we begin to deliver our community's vision for our water future for the next 50 years.

These actions, together with the broader suite of strategic initiatives and investments we need to make across our business, will ultimately be reflected in our 2023 Price Submission. This submission to Victoria's economic regulator, the Essential Services Commission, is part of the process that will determine the prices our customers pay between July 2023 and June 2028.

Annual Water Outlook

Each year ahead of summer we will publish our Annual Water Outlook, a high level overview of our supply systems' capacity to provide sufficient water security in the short-term (looking ahead two years).

Appendix

Urban Water Strategy: Drought Preparedness Plan

1. Drought Preparedness

The Drought Preparedness Plan has been developed to ensure that Barwon Water will always be able to supply enough water to meet essential human needs, even during extreme events that lead to water shortages. It outlines actions Barwon Water undertakes to be prepared for drought or emergency events. The Drought Preparedness Plan describes our level of service commitment and the basis for water restrictions (informed by our Water Restriction By-Law).

It also includes a Drought Response Plan (Section 2), which details the specific steps we will take in response should dry conditions in each system occur.

1.1. Level of service

Development of Barwon Water's *Water for our Future* Strategy has involved extensive community and customer consultation, including a dedicated program of engagement conducted between July 2019 and December 2021. This has helped inform the levels of service that customers want Barwon Water to deliver in the future.

These levels of service recognise the trade-offs that are involved in balancing the reliability of water supply with other considerations, especially prices for customers. *The Water for our Future* program has established agreed levels of service that reflect our commitment to our customers. Our level of service commitment has two parts.

1. Over the next 50 years, 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.
2. We will not run out of water. At all times, even during droughts and emergencies, we will continue to supply water to meet essential human needs.

1.2. Water restriction By-Law

The Water Restriction By-Law No. 190 was approved in 2012 by the Minister for Water, as the Minster administering the Water Act 1989. The By-Law applies across Victoria. It describes the conditions under each stage of water restrictions, sets out how we can impose and lift restrictions, as well as indicating when and how we can choose not to impose or lift water restrictions.

For example, we may choose not to implement water restrictions when a drop in storage levels below the restriction rule curve appears likely to be temporary and brief, as the inconvenience restrictions may outweigh any benefit. Barwon Water also has the authority under the By-Law to continue water restrictions, where we think ongoing water savings are necessary to maintain secure supply.

The By-Law allows Barwon Water to grant exemptions for certain activities upon review of applications. Some examples of this may include watering of new turf, or irrigation of public open spaces as well as issue infringement notices if there are breaches of water restriction conditions.

1.2.1. Consideration of exemptions

Barwon Water recognises that access to key public assets – such as sports fields and public open space – is critical to the health, wellbeing and liveability of communities.

We will continue to work with local government in our region to identify priority open space assets, with the aim of ensuring they can be maintained, particularly during dry conditions. This may be through exemptions to water restrictions (with an appropriate Water Use Plan), provision of an alternative water source such as recycled water or support through water efficiency measures.

Through ongoing engagement with communities and local councils in our region – including through Integrated Water Management (IWM) Forums – we have been identifying priority open spaces that the community values highly. The IWM Forums will continue to explore opportunities for alternative water sources to support the resilience and liveability of these important community assets.

We will continue monitoring so that the highest priority spaces in our region will be exempt from water restrictions during drought, so that they can continue to function as high-value public spaces for the community during dry conditions.

1.3. Permanent Water Savings Plan

The Permanent Water Saving Plan (PWSP) contains a set of rules which are in place across Victoria every day, regardless of rainfall, weather and water storage volumes. The permanent water saving rules do not restrict water use but do encourage the efficient use of water. They are simple, common-sense measures that ensure that we are continually conserving water now and into the future. The current PWSP measures include five key rules:

- Hand-held hoses must be fitted with trigger nozzles and be free of leaks.
- Gardens and lawns may be watered with a hand held hose or watering can anytime; sprinklers and watering systems may be used after 6 pm and before 10 am.
- Public gardens, lawns and playing surfaces (ovals, pitches etc.) can be watered at any time with a hand-held hose, or using a sprinkler or water system fitted with a rain or soil moisture sensor after 6pm and before 10am.
- Fountains and water features can be used, provided they recirculate water.
- Paved areas and hard surfaces should only be washed if required after an accident, for safety reasons, to remove stains, or during building work.

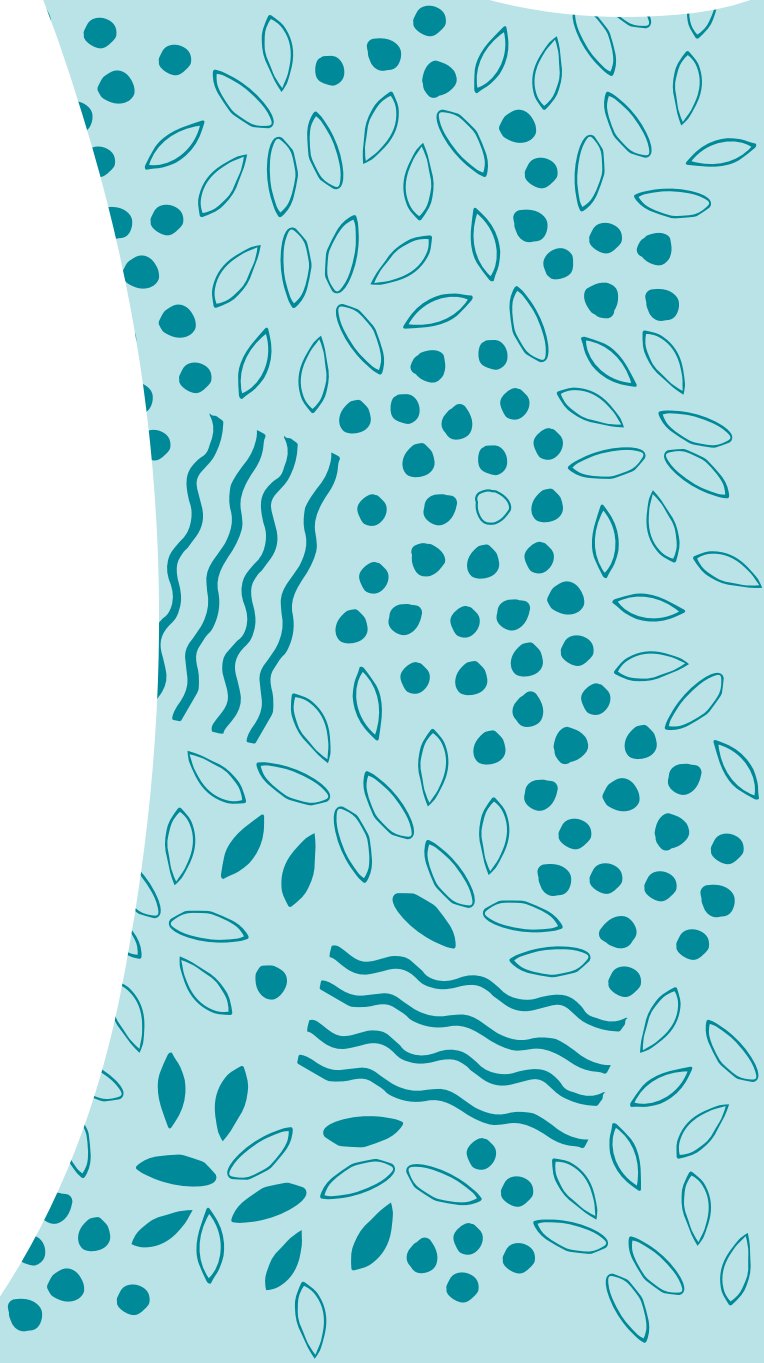
1.4. Education and awareness

Improving community awareness about how to use water more efficiently is an important way to prepare for and respond to drought. Barwon Water continues to engage in education and awareness campaigns (such as our Schools Water Efficiency Program) to assist our customers to be more waterwise. Our website also provides some helpful tips for saving water in the home.

1.5. Stages of water restrictions

There are four stages of water restrictions under the By-Law, which build on the rules set out in the Permanent Water Saving Plan. The stages increase in severity and are designed to be implemented as drought conditions continue and storage levels decline. Decisions about the implementation of restriction levels are made by using 'restriction rule curves', which are explained in Section 1.6.

Water restrictions aim to curb more discretionary water use (primarily outdoors) and do not restrict the use of water for indoor purposes such as drinking, washing, cleaning or sanitation. The four stages of water restrictions are summarised below. The restrictions are described in detail in Barwon Water's Water Restriction By-Law No. 190.



1.6. Water restriction rule curves

To ensure we can maintain water supply during a drought or emergency, we adhere to restriction rule curves.

These curves can trigger short-term actions should conditions necessitate sourcing additional water or curbing demand.

We follow restriction rule curves to avoid our water storages falling below 'contingency storage' levels. The contingency storage is the volume of water that we aim to always maintain in reserve and plan never to need. This water is an additional safeguard in the event of unprecedented climate conditions or major emergencies.

For instance, in Figure 1, short-term actions to increase supply would be implemented ahead of falling into the restrictions range. If storage volumes continued to drop, irrespective of additional supply, then water restrictions may be triggered to buffer supplies until there is significant recovery of storage volumes.

Each of our water supply systems has a different contingency storage.

Based on our knowledge of annual patterns in demand and supply, the restriction rule curves describe the minimum storage level we would prefer at any point through the year to avoid levels potentially dropping into the contingency storage. The restriction curves factor in reduction in demand due to each stage of water restrictions.

There is a curve for each stage of water restrictions, which describes the storage level below which restrictions should be triggered. We use the curves as a guide and apply some discretion based on prevailing conditions and the short-term climate outlook.

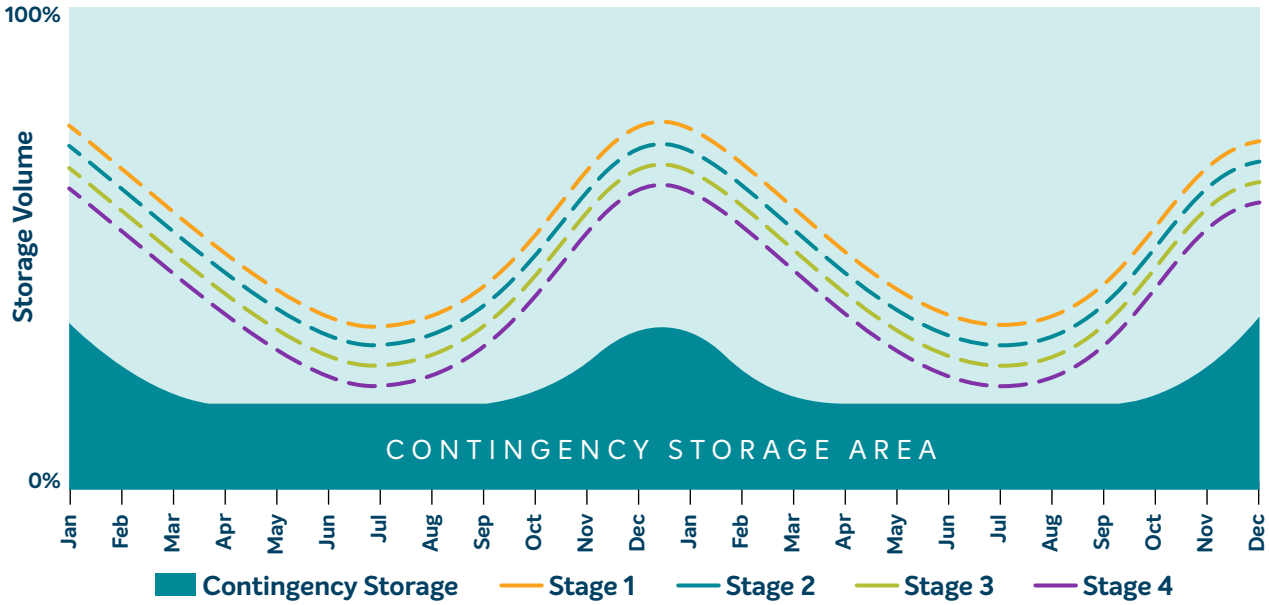


Figure 1 Example water restriction rule curve.

2. Drought Response Plan

Barwon Water has developed a Drought Response Plan to describe the actions we will take in response to drought or any other water shortage. This plan meets the requirements of, and should be read in conjunction with, our Statement of Obligations and the Water Restriction By-Law No. 190.

2.1. Restriction rule curve zones

Water restrictions are implemented with reference to water restriction rule curves for each system. The restriction zones are split into three main sections: normal operating zone, water restriction zone and contingency storage zone. The zones are shown in Figure 2 and the descriptions and actions for each zone are shown in Table 1.

The actions described for each zone are complementary to the ongoing activity that is undertaken to maintain service levels over time, such as planning and delivery of new sources of supply.

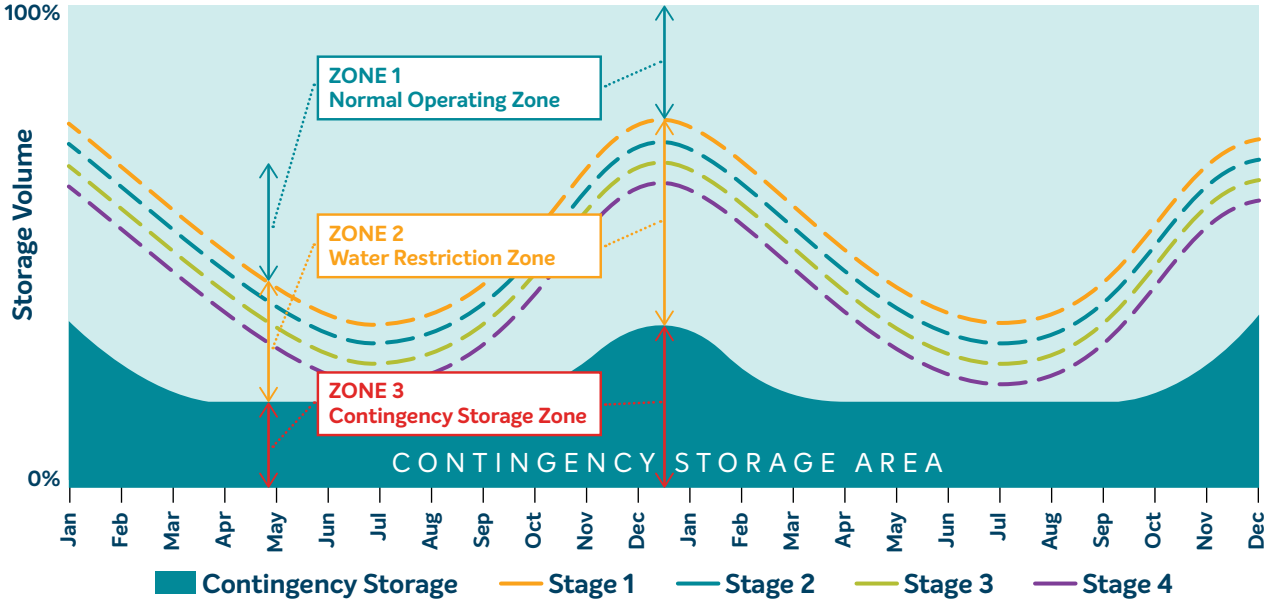


Figure 2 Illustration of water restriction curve zones.

Zone	Description	Actions
Zone 1 Normal Operating Zone	Storage levels are at a healthy level.	• PWSP always in place • Monitor water storage levels
Zone 2 Water Restriction Zone	Water storage levels at a level where demand reduction measures are required to stop levels Table dropping into the contingency storage.	• Implement water restrictions in stages • Implement system-specific drought response measures • Monitor water storage levels closely.
Zone 3 Contingency Storage Zone	Planning and system augmentation is undertaken so that storage levels never enter this zone.	• Implement system-specific drought response measures • Monitor water storage levels closely.

Table 1: Water restriction zone descriptions and actions

2.2. System-specific drought response measures

Drought response measures may include water restrictions, targeted community education and awareness campaigns, carting of water (by tanker truck) to smaller water systems, and the ability to bring online the Anglesea Borefield or increase transfer rates of the Melbourne–Geelong Pipeline for the Geelong, Golden Plains, Bellarine and Surf Coast system. Water restrictions can be implemented as actual water storage levels approach designated restriction curves (which describe staged trigger points). For each water supply system, there is a specific contingency plan tailored to suit the different system size and characteristics.

These actions are complementary to those set out in the Water for our Future Strategy, which identifies the steps we will take to ensure that service levels are maintained over time.

Common actions across all systems

There are some common actions that can be undertaken across any system as storage levels decline under very dry or drought conditions. These include:

- Increased and targeted water efficiency and awareness campaigns
- Engaging with large water users about water conservation measures they can take
- Education to ensure awareness of state-wide Permanent Water Savings Rules (PWSR).

Our Annual Water Outlook – published in December every year – also forecasts storage levels under a range of short-term climate outcomes. This shows the potential trajectory of storage levels compared with the restriction range for each system, which helps inform the community about the likelihood of any need for drought response measures.

2.2.1. Geelong, Golden Plains, Bellarine and Surf Coast

The resilience of this system to drought conditions is underpinned by access to multiple sources of water supply, each of which is triggered at different times based on storage levels. This is described by the supply enhancement triggers for the system, which currently include:

- Increase use of the Melbourne to Geelong Pipeline to transfer more water from Melbourne if storage levels at Wurdee Boluc reservoir fall below defined trigger points
- Activate the Anglesea borefield from "standby" to "operational" mode if storage levels at Wurdee Boluc reservoir fall below defined trigger points
- Commission ultra-low lift pumps if storage levels at Wurdee Boluc fall below defined low levels

These triggers will be revisited under Action GG6: Maintain efforts to continually optimise our system, so that we can make best use of available water resources and entitlements.

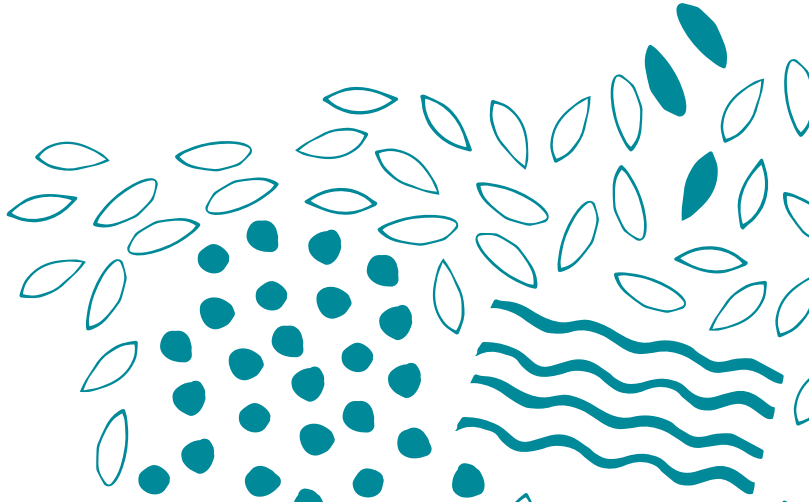
Water restrictions remains an option as a demand reduction measure if total system storage levels fall below defined trigger points, noting that the likelihood of triggering restrictions in the next five years is very rare, i.e. less than 1%.

The actions identified in the Water for our Future Strategy for the Geelong, Golden Plains, Bellarine and Surf Coast system will also be progressed in the coming years. These actions help to reduce demand or boost supply so that the need for drought response measures in the future is diminished. Some of these actions will be progressed immediately, where it makes sense to do so. Others – particularly those requiring major investment – will require us to monitor conditions to make sure that we invest at the right time.

2.2.2. Colac

Colac's storage levels are largely governed by operating rules which allow the increased use of the Barwon–Colac Pipeline if pre-determined triggers are approached. At present, supply from this pipeline (which accesses water in the Geelong, Golden Plains, Bellarine and Surf Coast system) can meet 100 per cent of Colac's peak monthly demand. This proportion will reduce over time as Colac's demand grows, but in the immediate term it helps to boost storages and avoid levels declining into the restriction range.

The implementation of water restrictions remains an option as a demand reduction measure, if storage levels do decline into the restriction range for the system.



2.2.3. Lorne

The smaller size of the Lorne system means that drought response measures can be activated quickly, but also that they must be initiated earlier to be effective. The primary drought response measures are:

- introduction of staged water restrictions as storage levels decline through the restriction range and the relevant triggers of each restriction curve
- implementation of water carting to supplement storage levels
- Targeted supply to the school, hospital and other essential services can be arranged as needed

There is a practical limitation on the volume of water that can be delivered by tanker each day (due to, for example, tanker size and the proximity to other water sources). This means that water carting may be proactively undertaken to boost falling storage levels, so that – along with the effect of reduced demand from water restrictions – storage levels are sustained for longer during dry conditions.

Triggers for restrictions and water carting are very dependent on the time of year, given the seasonality of Lorne's demand. Water can be carted from locations such as Aireys Inlet and Winchelsea, which are connected to the Geelong, Golden Plains, Bellarine and Surf Coast system. Water carting from Apollo Bay would be avoided, given that both systems are likely to face dry conditions at the same time.

2.2.4. Apollo Bay

Like the Lorne system, drought response measures can be activated quickly in Apollo Bay and are more effective if implemented earlier. Drought response measures in Apollo Bay include:

- implementation of water restrictions as storages approach designated restriction rule curves
- water carting from the nearest available source (avoiding the Lorne system if possible).

These actions would be complemented by the common actions identified above to work with the community and large customers to proactively reduce demand ahead of (and during) periods of water restrictions.

2.2.5. Gellibrand

As Barwon Water's smallest water supply system, Gellibrand has never experienced water restrictions and has a high level of water security. Flows in Lardners Creek, which supplies Gellibrand, have always vastly exceeded the water demands of the system, even under the driest conditions.

In the unlikely event of a severe drought or emergency, water restrictions could be implemented to reduce demand. Given the small demands of the system, water carting from the nearest available source can meet all demand needs and therefore, the most likely drought response measure.

Barwon Water