3. Transitioning to manufactured water

Image: Dights Falls on the Birrarung (Yarra River), Wurundjeri Woi-wurrung Country

As our population grows and river water becomes scarcer, the Central and Gippsland Region will need to reduce its reliance on river water. While water efficiency measures and better use of existing supplies are important, these alone will not meet future demand. Instead, a transition to using more manufactured water (desalinated water, fit-for-purpose recycled water and treated stormwater) will be required to supply our cities and towns.

3.1 Transitioning to manufactured water

Manufactured water sources include desalinated water, recycled water and treated stormwater.

Water efficiency measures and better use of existing supplies continue to be a focus, but these alone will not meet the widening gap between water supply and demand. Greater Melbourne has a current shortfall of 50 to 70 gigalitres per year, depending on rainfall, and this could increase by an additional 85 gigalitres by 2030 in a worst-case scenario (high climate change and high demand scenario).

Modelling shows that the Central and Gippsland Region is likely to need additional water supplies within the next 10 years. Water supplies may also need to double over the next 50 years to meet demand. We must start planning now for a range of near-term water supply options so that new urban water supplies are ready for delivery when they are needed.

There are no new large-scale opportunities to extract water sustainably from rivers or groundwater supplies in the region. New water supplies will largely come from manufactured water resources such as desalinated water, recycled water and treated stormwater. Building new dams is not an option because suitable dam sites have been exhausted. In the future there will also be less rainfall on average to refill dams. Dams do not create water, so any new dams would source water from elsewhere, either from the environment or other supplies. Groundwater also relies on recharge from rainfall and is not a climate-independent water source.

For Melbourne, Geelong and cities and towns connected to the Melbourne Supply System, manufactured water sources will need to meet 65 per cent of water needs by 2050, up from 35 per cent in 2020. This could increase to 80 per cent by 2070 (see **Figure 1.8**). In the near term, manufactured water sources will largely come from additional desalination supplies. There is also potential for other water sources – recycled water, treated stormwater and rainwater via household tanks – to supply up to 20 per cent (or 200 gigalitres per year) of non-drinking water needs by 2070 across Greater Melbourne.

New water supplies will be matched to fit-for-purpose uses and adhere to state and national water quality guidelines, to protect public health and the environment. The water supply cost, quantity and quality will also influence how water can be used.

Desalination provides us with safe, affordable and reliable water direct to our drinking supplies, which we need in the near term. Desalination has the added advantage of being completely rainfall independent. It can operate at its full design capacity immediately after construction, so that we can be confident in the volume of water it will deliver.

There are still aspects about other manufactured water sources that we need to better understand, but they remain integral to securing our water supplies. Through smart investment now, and as technology evolves and our understanding of how to capitalise on manufactured water grows, we can unlock the potential of all manufactured water sources. This will ensure we have a diverse and adaptable portfolio of water supply options in the future.

Investments in new water supplies will balance the region's growing water demands with the need to keep water bills affordable. As the use of manufactured water increases, some river water will be freed up for other uses, such as returning water to Traditional Owners and to the environment, without taking water away from farmers or other water users (see **Chapter 9**).

The role of recycled water and stormwater usage for agriculture is discussed in **Chapter 7**.

Links to the Water Grid Plan

Options for future, regionally significant urban water supplies will be progressed via the Water Grid Plan, a new infrastructure plan that will be released in 2023.

The Water Grid Plan will include a portfolio of projects to help meet short to medium-term urban water supply needs and will include options to increase manufactured water supplies. It will align with options included in this Strategy.

Smaller, but important local projects to increase use of manufactured water, will be progressed by water corporations or through IWM forums.

3.2 Increasing desalination supplies

Our plan:

- investigate options to expand the region's desalination supplies to meet future needs
- progress regionally significant urban water projects through the Water Grid Plan

The role of desalinated water

Regular desalinated water orders from the Victorian Desalination Project are an integral part of the region's drinking water supplies, due to the current water supply deficit in storages of 50 to 70 gigalitres annually. Storage levels would be 24 per cent lower today without the ongoing contribution of desalinated water.

Desalinated water is ordered annually based on advice from metropolitan water corporations (**Figure 3.1**). Placing annual orders allows the flexibility to adapt to changes in weather patterns while maintaining water storage levels so that the region is prepared for the next drought. For example, 15 gigalitres of desalinated water was ordered for 2022–23 due to the 2021–22 wet summer and La Niña weather pattern.

Figure 3.1: Water orders for the Victorian Desalination Project, 2016–23

Image: Victorian Desalination Plant, Wonthaggi, Bunurong Country

Wonthaggi desalination

Water security benefits

The Victorian Desalination Project is a rainfall-independent source of water. It has the capacity to supply up to 150 billion litres of water a year or about one-third of Melbourne's annual water use. Since 2016–17, desalinated water orders have contributed to 24 per cent of Greater Melbourne's water storages. Importantly, the plant is not only operational when our water supply reaches critical levels. Instead, its purpose is to help ensure that our water supply does not drop to those levels. While there is a cost to run the desalination plant and secure our water supplies, the economic costs of severe water restrictions or water shortages are far worse. Even with annual orders of desalinated water, Melbourne's water bills are among the lowest of any capital city in Australia.

Protecting the Wonthaggi marine and coastal environment

Ongoing environmental management is a key focus of the desalination plant. The plant connects to Bass Strait at Wonthaggi via long intake and outlet tunnels. These tunnels not only draw in seawater but also protect the coast and marine environment by exiting outside this sensitive marine and coastal park. The intake has been specifically located and designed to minimise adverse effects on marine life. Water is drawn from the ocean at a low velocity so that marine life can freely swim in and around the pipe without being drawn into the plant. The inlets are located approximately 800 metres from the shore, a distance that further reduces impacts on marine flora and fauna. A monitoring and reporting program has found that the impact on marine life from the project is negligible.

There are strict guidelines and requirements for any discharges to waterways or the ocean. The plant's discharge licence, issued by the Environmental Protection Authority (EPA), specifies the quality of the water permitted to be discharged to the ocean. The EPA monitors the operator's compliance with the discharge licence as part of its annual reporting regime – See the Victorian Desalination Project Environmental Management Plan (AquaSure 2019).

Powering the desalination plant with renewable energy

In recognition that the desalination process is energy intensive, we have committed to offsetting 100 per cent of the energy used with renewable energy. This commitment is in place regardless of the size of the water order. AquaSure, which owns and operates the plant, offsets all power used to operate the plant and transfer pipeline by buying Renewable Energy Certificates through AGL.[13] This provides incentives for AGL to produce energy through renewable sources from its portfolio, including windfarms and solar.

The renewable energy requirements for the Victorian Desalination Project have set the highest benchmarks and have directly stimulated new renewable energy projects. Victoria is transitioning to a clean and modern energy future that will create jobs and build skills and capabilities across the sector.

The impact on bird and bat populations from wind farms, which are one source of renewable energy, is minimal, with independent monitoring programs finding negligible effect on the populations of threatened species. Further details about these programs, including the exact numbers of bird deaths, can be found online at: **www.agl.com.au/about-agl/how-we-source-energy**.

13 Renewable Energy Certificates (RECs), also known as Renewable Energy Credits, are tradeable, non-tangible energy commodities that represent one megawatt-hour of electricity generated from a renewable energy source (as defined under legislation).

Investigating options to expand desalination capacity

Modelling shows that, even with the Victorian Desalination Plant operating at full capacity, Melbourne, Geelong and other cities and towns which depend on the Melbourne Supply System could experience water shortages this decade if we experience a severe drought. For example, Melbourne's storages dropped quickly in 2006, when they fell by around 20 per cent in a single year. It is important that we have additional water supply options ready to deliver for this reason, to avoid delays and minimise costs for any infrastructure required.

Moving to climate-independent water sources over time – including desalinated water – is critical to meeting the region's future water needs and avoiding severe water restrictions. Desalinated water is a viable near-term option because, unlike recycled water and treated stormwater, large volumes can be supplied directly into the drinking water system. Increasing the use of desalinated water can also free-up river water for other uses and values. This includes returning water to the environment and to Traditional Owners (see **Chapter 4**).

Victoria's existing desalination plant at Wonthaggi was designed to allow a 50-gigalitre expansion, to deliver 200 gigalitres per year to the Melbourne supply system. Further work is required to identify and assess the viability of options for additional desalination capacity and significant community engagement and input will inform any future decisions.

Future regionally significant urban water projects, which include expanding the region's desalination supplies, will be identified and progressed through the Water Grid Plan (see **Chapter 9**).

Any increase to supplies from desalination requires significant lead and implementation time, that's why we need to progress planning activities for desalination options now so we can meet critical urban supply issues when needed and avoid rushed execution during a crisis.

The regionally significant supply options will be complemented by smaller but important local projects that will be progressed by water corporations or through Victoria's IWM program.

In line with our commitment to net zero greenhouse gas emissions by 2050, any new water supplies will need to use renewable energy, or offset the energy used.

Action 3-1: Investigating options to expand the region's desalination capacity

The Victorian Government and water corporations will undertake planning and readiness work on several near-term desalination options to ensure that the region's desalination capacity can meet system shocks and future needs. Options will be progressed through the Water Grid Plan.

Ongoing

Significant community engagement and input will inform any future decisions about potential sites to expand desalination capacity. As potential sites are identified we will apply planning controls to maintain their viability in the long term. The potential expansion of desalination capacity in the region will inform strategic land-use plans in the region, including via the review of Plan Melbourne (DELWP 2017a) and future regional growth plans (DELWP 2014).

Action 3-2: Incorporating consideration of water security into Plan Melbourne

The Victorian Government will consider water security needs and the likely future expansion of desalination capacity in the review of Plan Melbourne.

By 2024

3.3 Increasing the use of recycled water and stormwater

Our plan:

- use IWM to drive investment and collaboration
- investigate options for large-scale supply networks and smaller, local recycled water and stormwater projects
- offer grants for using recycled water and stormwater to irrigate open spaces

Recycled water

Less than 20 per cent of the region's recycled water is used each year, making it an underutilised resource in a drying climate. For decades, wastewater has been treated and used safely as recycled water for a range of non-drinking uses, including for:

- agriculture for irrigating crops and for stock drinking water (see **Chapter 7**)
- irrigating sporting fields, trees, private open spaces such as private golf courses and public open spaces and parks
- residential and commercial purposes (via purple pipe schemes) or industrial processes
- supporting biodiversity, for example, the Ramsar wetlands at the Western Treatment Plant
- wastewater treatment processes.

Overcoming barriers to using recycled water is critical. One of the main barriers is the high costs associated with treating, storing and delivering recycled water to where and when it is needed (DELWP 2021e). A recent performance audit by the Victorian Auditor-General's Office on the supply and use of recycled water outlines other key barriers to using more recycled water and how they are being addressed by responsible agencies (VAGO 2021).

This Strategy commits to actions that address these barriers, including matching suitable supplies with demand and improving user confidence. Making better use of recycled water, for non-drinking purposes, can delay the need for major augmentations to our drinking water supplies and help return water to our rivers and to Traditional Owners.

Fit-for-purpose recycled water

To protect public health and the environment, recycled water is deemed fit for purpose based on the microbial qualities of the water, and is classified into three classes (A, B and C) that represent the minimum standards of treatment for categories of use. The level of treatment increases with the potential for higher levels of human exposure to the water, reflecting the potential risks associated with uses.

Fit-for-purpose use is also influenced by how much salt is in the recycled water. Salt levels in recycled water are managed by the supplier through trade waste agreements, influent monitoring, or in the west of Melbourne, via a recycled water desalination plant. They can also be managed by the user on application, for example by shandying with less salty water appropriate for a specific crop.

Class A is water designated for high exposure uses, so it is the highest-quality recycled water. It is suitable for use in residential developments (for purposes such as washing clothes, flushing toilets and watering gardens), irrigation of open spaces with unrestricted public access and irrigation of edible crops intended for raw or unprocessed consumption.

Class B recycled water is used mostly on dairy cattle grazing land. It can also be used for industrial use, subject to restrictions on human contact.

Class C may be used in urban areas that have controlled public access (for non-potable purposes only), and in agriculture – for example, on human food crops that will be cooked or processed, grazing or fodder for livestock – and in industrial systems with no potential worker exposure.

Recycled water is not currently a permitted source of drinking water. We will continue to consult the community on future water sources, how to best use stormwater and recycled water, and advance our understanding of the technology, regulation and community acceptance of using recycled water for this purpose.

Stormwater

As our cities and towns grow, stormwater created from rain on impervious surfaces such as roofs, roads and footpaths will increase, and so will the damage it causes to urban waterways. While retarding basins, wetlands and litter traps help to slow and clean stormwater, this alone is not enough to manage the volumes of stormwater that are generated by urbanisation. For example, in Wyndham, one of Australia's fastest-growing municipalities, annual stormwater production is expected to grow from 19 gigalitres in 2018 to 35 gigalitres in 2050 (*Werribee catchment scale integrated water management plan* (DELWP 2021i)). Growing regional towns will also experience similar changes. For example, Bannockburn's annual stormwater production is expected to increase to 2.6 gigalitres by 2050, almost doubling current stormwater production in the township (*Bannockburn water and pollutant balance summary* (DELWP 2021a)).

From 2020 to 2021, 5 gigalitres of stormwater was used in Greater Melbourne, out of approximately 400 gigalitres of stormwater generated. If we can find cost-effective ways to store, treat and distribute stormwater to where it is needed, we can save precious drinking water, contribute to local greening, amenity and recreational opportunities as well as improve the health of urban waterways. The contribution that rainwater tanks make towards reducing stormwater runoff and saving drinking water is discussed in **Chapter 2**.

Why is stormwater a problem?

Stormwater that is not captured can harm our waterways and is a major threat to the environmental health of waterways in urban areas.

The effects of stormwater include:

- erosion – fast-moving urban water flows can erode waterway corridors and damage aquatic habitats
- loss of baseflow – lack of infiltration caused by impermeable surfaces reduces baseflows in waterways
- nutrients – stormwater runoff collects pollutants, including nutrients from fertilisers and pet droppings, leading to algal blooms
- other pollutants – chemicals such as pesticides and petrol can be washed into urban waterways and cause significant damage
- sediment – can block sunlight from reaching important aquatic ecosystems
- changes to natural flow patterns – rapid stormwater runoff changes the flow regime in waterways, which affects aquatic species that rely on natural flow and temperature cues as part of their lifecycle
- flooding – fast-moving stormwater can cause flooding in urban and suburban areas

This is particularly evident in the highly urbanised local waterways such as the Kooyongkoot (Gardiners Creek), Merri Creek, Lollypop Creek, and Steele Creek in Greater Melbourne, the Yarrowee River in Ballarat and Armstrong Creek in Greater Geelong.

Stormwater pollutants also have an adverse impact on the marine environment, either when stormwater drains directly or via waterways.

Read more about the effects of stormwater on waterway health across Melbourne, in Melbourne Water's *Healthy waterways strategy* (Melbourne Water 2018): **healthywaterways.com.au**.

Increasing the use of recycled water, stormwater and rainwater through IWM

In the past, our management of stormwater and wastewater has focused on protecting the environment. This has meant moving it away as quickly as possible and treating the wastewater to an agreed environmental standard, so that it can be safely discharged into waterways and bays or applied to land. We have not always considered changes to the flow regimes of receiving rivers, or Traditional Owners' responses to seeing their waterways used as a drainage system. But this philosophy is changing to a more holistic one, encompassing the numerous social, cultural, environmental and economic benefits of using stormwater, rainwater and recycled water.

IWM captures this holistic philosophy. It is a collaborative approach to the planning and management of all elements of the water cycle that fundamentally shifts the way water, land-use planning, and urban development opportunities are understood and undertaken in Victoria.

Realising opportunities to use recycled water, stormwater and rainwater through an IWM approach is central to this Strategy and how we plan to secure our water needs. Continued incremental investment is required in infrastructure to treat, store and deliver these new water supplies to users where net public benefits can be achieved, and it is important that the costs and benefits are fairly spread over time.

IWM forums

The Victorian Government supported the establishment of 18 IWM forums across the state to enable partnerships with Traditional Owners, water corporations, local government and catchment management authorities. The IWM forums in the Central and Gippsland Region are Barwon, Central Highlands, Werribee, Maribyrnong, Yarra, Dandenong, Western Port, Gippsland and East Gippsland. Each IWM forum has a shared vision and identifies local opportunities to increase the use of recycled water, treated stormwater and rainwater to match suitable water supply with the water needs in the forum area. As a result of the IWM forums, more than $17 million was invested over the last four years (2017 and 2021) to support 50 IWM projects in the Central and Gippsland Region. These projects will ultimately supply around 1,700 megalitres per year of recycled water and more than 100 megalitres per year of stormwater to a range of end users. For more information on these IWM projects, a progress report is available at **www.water.vic.gov.au**.

Further investment in 2022–23 is highlighted in **Figure 3.2**.

Image: Recycled water sprinkler, Wadawurrung Country (photo supplied by Barwon Water)

1. Victoria Park Alternative Water Scheme Detailed Design
2. Wendouree West Reserve Recycled Water Scheme Detailed Design
3. Brunswick Central Parklands IWM Plan
4. Ruthven Wetland Detailed Design
5. Moonee Ponds Creek Stormwater Harvesting System Construction
6. Bannockburn IWM plan
7. Patterson River Recycled Water Scheme Feasibility Study
8. Curtain Square Stormwater Harvesting Scheme Construction
9. Naturalisation of Blind Creek at Lewis Park
10. Monbulk Creek Smart Water Network Installation
11. Floating Wetland to Improve Wastewater Quality Detailed Design and Pilot Project
12. Bass Coast Revegetation of Biolink Corridors
13. South Gippsland Shire Council IWM Plan
14. Crooke Street Stormwater Treatment Wetlands Construction
15. Monbulk Recreation Reserve Stormwater Harvesting System Construction
16. Jan Juc Daylighting – stage 2
17. Winchelsea Greening and Stormwater Treatment Upgrades
18. Dingley Recycled Water Scheme

Figure 3.2: New IWM projects of 2021-22 within IWM forum boundaries in the Central and Gippsland Region

Policy 3-1:
Continue to progress IWM projects identified through IWM forums

The Victorian Government will continue to support IWM forums to collaboratively plan and deliver an optimal mix of recycled water, stormwater and rainwater that contributes to long-term water security, and improved liveability and economic prosperity in the Gippsland and Central Region.

Action 3-3:
Maturing the IWM investment framework

The Victorian Government, in collaboration with IWM forum partners, will improve how investments in IWM projects are made to best realise the multiple community and environmental benefits that are difficult to quantify when using all sources of water.

By 2025

Policy 3-2:
Clarifying roles and responsibilities for delivering IWM outcomes

The Victorian Government will clarify existing roles and responsibilities to ensure the water, land-use planning and urban development sectors can deliver on IWM outcomes

Investigating options for large-scale supply networks

To help meet the expected demand for water in the Central and Gippsland Region, we will need to dramatically increase the volumes of recycled water and treated stormwater we use to complement desalination in the longer-term. This will require substantial investment in large-scale water supply infrastructure to connect end users with fit-for-purpose water supplies. Large volumes of recycled water and treated stormwater could be used for agriculture and industry if available at the right place, quality and time. Where large-scale urban redevelopment occurs within the same sub-catchment, this new water could also supply non-drinking uses in homes, public open spaces and workplaces. It could help meet future demands and free up water in rivers, storages and aquifers for other uses and values.

Preliminary investigations show that large-scale recycled water networks are not cost effective across the whole of Greater Melbourne. However, networks to service Greater Melbourne areas that can connect to agricultural users in the peri-urban landscape or to high urban growth areas are worth further consideration (see **Chapter 7**).

These large-scale networks in Greater Melbourne have the potential to:

- save up to 126 gigalitres of drinking water a year by 2070, across urban growth and redevelopment and existing areas
- supply up to 196 gigalitres of recycled water to agribusinesses by 2070, freeing up around 28 gigalitres for other uses and values.

Future investigations will consider a broader range of water sources, including treated stormwater and internally plumbed rainwater tanks.

Large-scale recycled water and treated stormwater networks are likely to become increasingly important for meeting non-drinking water needs in regional areas, with potential to promote the growth, sustainability and resilience of the regional economy and provide water for environmental and Traditional Owner cultural values. For example, in the Barwon region a large-scale network connecting schemes in the Moorabool Valley, Surf Coast Hinterland, South Balliang and on the Bellarine Peninsula could potentially:

- save up to an additional 4 gigalitres of drinking water demand a year by 2070 across urban growth and existing areas
- supply up to 40 gigalitres of alternative water to agribusinesses by 2070
- assist in managing the impact of urban stormwater on sensitive environments.

Large-scale recycled water and treated stormwater networks could be built alongside other major infrastructure projects to streamline costs and planning and provide an additional boost to Victoria's economic recovery. Further investigations will clarify the costs and benefits to the community, to guide future decisions on staged implementation of network infrastructure, building on local networks over time.

Action 3-4:
Investigating options for large-scale recycled water and treated stormwater networks in Greater Melbourne

By 2025

The Victorian Government in collaboration with Greater Metropolitan Melbourne IWM forum partners will:

i. Further investigate the feasibility of large-scale recycled water and treated stormwater networks to meet a range of uses and values in Greater Melbourne, focusing on five regions:
   a. west and north-west (Werribee and Maribyrnong catchments)
   b. north (Northern Growth Area and surrounding agricultural areas)
   c. east (high-density redevelopments in the eastern and south-eastern suburbs and agricultural areas in Yarra Valley)
   d. south-east (South East Growth Area and agricultural areas in Pakenham and neighbouring regions)
   e. Mornington Peninsula.

ii. Commence development of business cases for the feasible, large-scale networks.

Action 3-5:
Investigating options for a large-scale recycled water and treated stormwater network in the Barwon Region

By 2025

The Victorian Government will support Barwon Water to investigate, in collaboration with the Barwon IWM forum partners, the feasibility of large-scale recycled water and treated stormwater schemes in the Barwon Region, including the Moorabool Valley, Surf Coast Hinterland, South Balliang and the Bellarine Peninsula. In the long term, opportunities to connect these schemes to create a network will also be considered.

Barwon's large-scale recycled water and stormwater network

Barwon Water has an ambitious goal to convert 100 per cent of recycled water to beneficial use. By 2070 the volume of recycled water available for beneficial use in the Barwon region could increase to 40 gigalitres per year. While this is a significant challenge, it also presents a huge opportunity to achieve positive outcomes for the regional economy and to provide for the region's environmental and cultural needs. A staged transition away from conventional water, sewerage and stormwater systems that discharge to waterways or the ocean, to a connected network that matches recycled water and stormwater to suitable uses, would enhance the region's resilience and prosperity in the face of a changing climate.

The network would link to and improve several local 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 in the long term include:

- **boosting agriculture and primary industries**, for example in the Moorabool Valley, Surf Coast Hinterland and the Bellarine Peninsula
- **reduced environmental impact from urban stormwater**, for example in the Karaaf wetland near Torquay
- **increased resilience to climate change for existing river water irrigators**
- **potential for returned water to rivers**
- **efficient sewage management from key future growth areas,** which includes avoiding expensive sewerage upgrades through congested built-up areas of Geelong.

Investigating recycled water, treated stormwater and rainwater for local use

The IWM program is driving investment in local recycled water, treated stormwater and rainwater projects that can save regionally significant volumes of water and support greener and cooler communities. Local opportunities, including the role of catchment-scale IWM plans, are described below and examples of recently funded projects are illustrated in **Figure 3.2**.

Greater Melbourne

Developed through the five IWM forums in Greater Melbourne, catchment-scale IWM plans are bridging the gap between regional Water Grid Planning and local plans for climate change adaptation, stormwater management and open space provision. The plans seek to inform future water, land-use and infrastructure decisions, including opportunities to enhance our waterways and natural environments. Performance targets drive action across seven strategic outcomes for IWM (see **Figure 3.3**). Targets that support resilient water supplies for the region include:

- gigalitres per year of recycled water, stormwater and rainwater for non-drinking uses, to substitute potable water supplies and help meet Greater Melbourne's future water needs
- gigalitres per year of recycled water and stormwater for agricultural production to support existing and new production
- gigalitres per year of recycled water delivered to customers working to achieve ambitious aspirations for a circular economy.

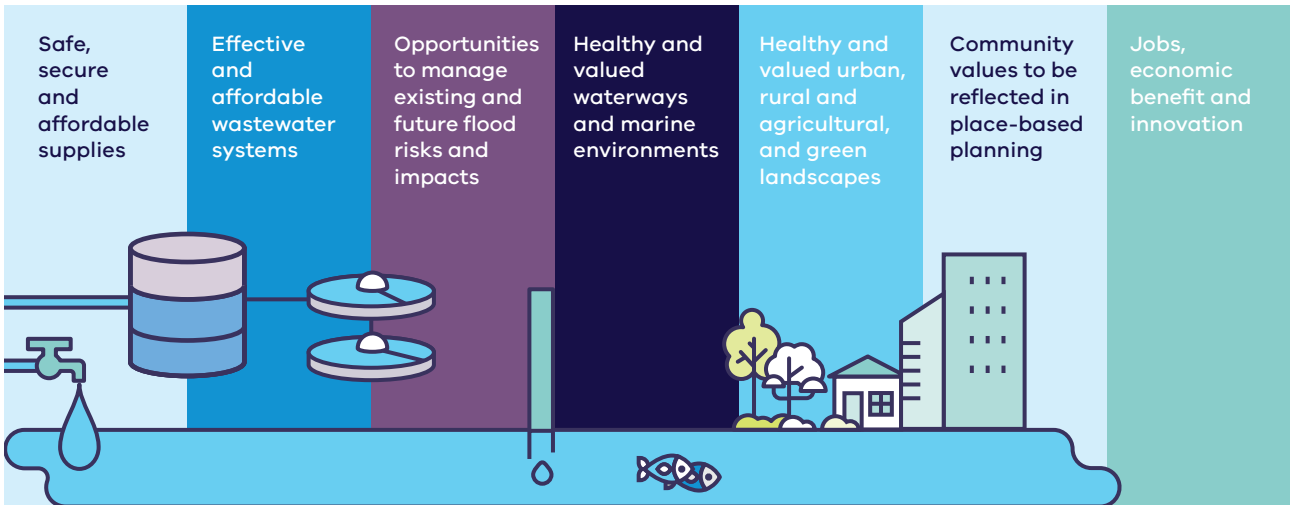


Figure 3.3: The seven strategic outcomes for IWM in Victoria

To continue to drive progress, action plans will be developed to help each IWM forum work towards its performance targets. These will clarify how and when each action will be delivered, by whom, and to where in the catchment.

Policy 3-3: Contribute to achieving the targets in the catchment-scale IWM plans

Melbourne Water and metropolitan water corporations will work with IWM forum partners to contribute to achieving the relevant targets in the catchment-scale IWM plans, to increase the use of fit-for-purpose recycled water, treated stormwater and rainwater for the five metropolitan Melbourne catchments.

Action 3-6: Developing catchment-scale IWM action plans for Greater Melbourne

The Victorian Government, through the Greater Metropolitan Melbourne IWM forums, will develop action plans in the Werribee, Maribyrnong, Yarra, Dandenong and Western Port catchments to strategically drive delivery of their catchment-scale IWM plans.

By 2023

Integrated opportunities in Sunbury

The population of Sunbury is forecast to more than double over the next 20 years. With serious water shortfalls expected in the local area's supplies, this is predicted to lead to an increased reliance on the Melbourne Supply System to supply Sunbury customers. Under current stormwater management arrangements, this will diminish waterway values. Sunbury's Jacksons and Emu creeks will see a decline in populations of platypus, frogs, macroinvertebrates and vegetation, and a weakening of community connection.

Greater Western Water, Melbourne Water, Hume City Council and the Department of Environment, Land, Water and Planning are working with the community to find IWM opportunities to meet these challenges. Opportunities being progressed include a regional-scale stormwater harvesting scheme that could supply up to 3.8 gigalitres of water per year. The project could help to ease growing pressure on drinking water supplies, support a cooler and greener community, and reduce excess stormwater runoff from damaging local waterways.

To find out more, visit: YourSay **https://yoursay.melbournewater.com.au/Sunburys-Water-Future**

CASE STUDY

Dingley Recycled Water Scheme for South-East Green Wedge

The Dingley Recycled Water Scheme will deliver reliable, high quality (Class A) recycled water, through 42 km of pipes and a pump station, to large water users in the Dingley Green Wedge zone and Sandringham Sandbelt region (see **Figure 3.4**). The Victorian Government is providing $24.8 million towards the $72 million capital project, with South East Water funding the remainder.

The scheme will supply 1,800 million litres annually from the Eastern Treatment Plant to public and private sites, including local parks, golf courses, education and sporting facilities, commercial nurseries and market gardens.

The scheme has the capacity to supply potential future demand from the Suburban Rail Loop precincts, as well as the National Employment and Innovation Clusters in Monash and Dandenong. The use of recycled water for agriculture and liveability outcomes is strongly supported by the local community.

The project provides a unique opportunity to increase the sustainability of local economies and communities, provide economic stimulus to help grow Victoria, respond to the impacts of climate change and supporting Victorians with high quality public open space. It is an excellent example of IWM approach to water services.

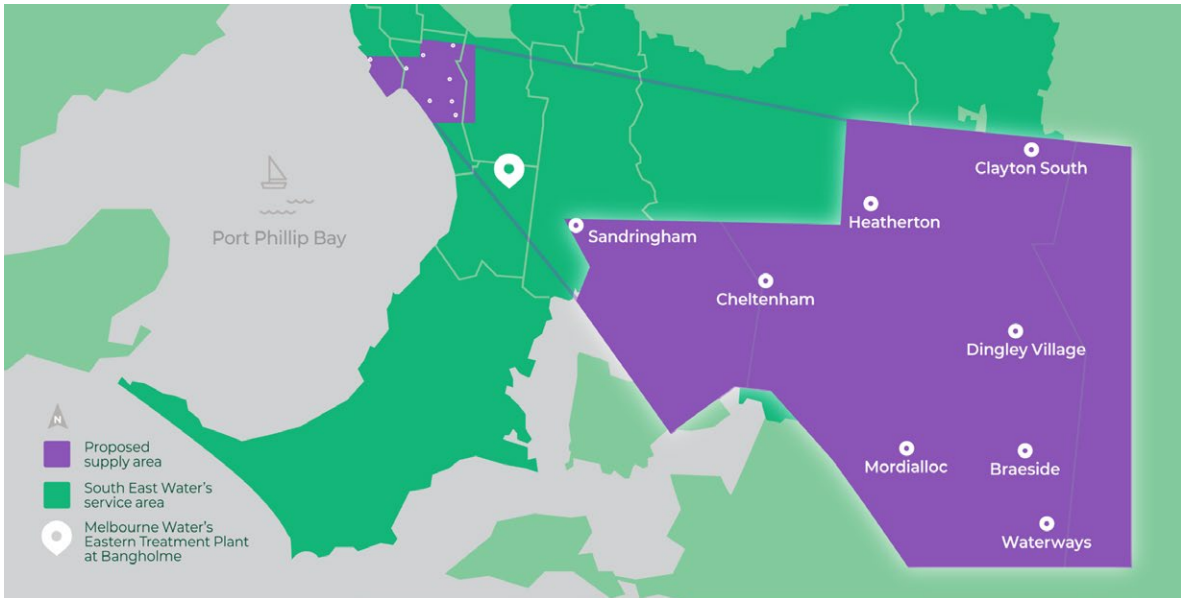


Figure 3.4: Dingley Recycled Water Scheme supply area

Regional areas

There are opportunities to use IWM to increase manufactured water use in regional areas, particularly in the west and north of Geelong, Ballarat and Bairnsdale. For example, the City of Ballarat's IWM plan identifies several small, medium and large-scale opportunities to better use stormwater, groundwater and recycled water for a variety of uses and values (Central Highlands Water et al. 2018).

To date, IWM planning in regional Victoria has occurred at the town or precinct scale, and this has identified many opportunities to provide new water supplies for valued local community assets such as sports ovals (see **Figure 3.2**). To understand the best opportunities and priorities for using manufactured water in a regional setting, we need to examine the relationship between the water cycles of regional towns within the broader catchment-scale water cycle. We will work with stakeholders to undertake a case study in the Barwon and Moorabool basins, to examine this relationship. The case study will identify manufactured water use opportunities and inform future water management planning decisions and policy reform to suit the regional context.

Action 3-7: IWM planning for regional Victoria

The Victorian Government will explore the benefits of IWM planning at different scales using the Barwon and Moorabool basins as a case study.

By 2024

CASE STUDY

IWM for Geelong's northern and western growth areas

New growth areas in the north and west of Geelong, which will become home to more than 110,000 new residents and a variety of new businesses and industries over the next 50 years, will be planned and built applying IWM. More than one-third of the total expected population growth in Barwon Water's service area will occur here. Clever and creative urban design for these areas will generate a green, liveable city and build water resilience in the area. This aims to avoid any long-term net increase in imported potable water to these growth areas and allows for any new water sources identified to support environmental and Traditional Owner values (see **Section 4.1** and **Policy 4-2**). The North and West Geelong IWM plan has been co-funded by the Department of Environment, Land, Water and Planning, Barwon Water and the City of Greater Geelong, its key features include the following:

- Class A recycled water will be delivered via a purple pipe network to homes, industry and open spaces to reduce the future demand for potable water supplies by 3.4 gigalitres per year. Pending further investigation of water quality and seasonal availability of the new water, this could also enable the supply of recycled water for environmental flows in the Moorabool Yulluk (Moorabool River) as pumped groundwater contributions from the Batesford Quarry decline. Alternatively, this initiative could support irrigated agriculture, horticulture and viticulture in the Moorabool Valley.
- Passively irrigated street trees, swales and enhanced-infiltration billabongs will retain 4.4 gigalitres of water per year in the landscape.[14] These will support a greater tree canopy, covering an additional 85 hectares, for a cooler, greener community.
- Local waterways will be naturalised and rehabilitated and revegetation works will be completed along the Barwon River, Moorabool Yulluk (Moorabool River) and Cowies Creek. This will create high-value green corridors and increase biodiversity.
- In the long term, the capture and transfer of treated stormwater from wetlands in the development could supply more than 5 gigalitres to the region over the next 30 to 50 years (subject to investigations confirming the viability of this proposal).

Actions to improve waterway health in the Barwon River are described in **Chapter 8**.

14 Swales are shallow, vegetated open channels that convey and treat stormwater.

CASE STUDY

Western Park stormwater harvesting project

Through a partnership between Baw Baw Council, Gippsland Water and the Victorian Government, facilitated through the Gippsland IWM forum, an existing wetland near the Western Park ovals in Warragul has been modified for stormwater harvesting and treatment to irrigate nearby sports fields. A new storage tank will supply 20 megalitres per year of treated stormwater to irrigate the sporting grounds, helping to reduce potable water use, and stormwater discharges to the Hazel Creek. The project is expected to be completed by the end of 2022.

Using recycled water and stormwater to create greener, open spaces

With increased urbanisation, demand for open space in urban areas is growing. On very hot days, irrigated green spaces provide significant cooling benefits to those visiting or living nearby – supplying water to these spaces is essential to maintaining their amenity. However, not all communities in the region have close access to irrigated green open spaces and the impact of this imbalance is expected to amplify, as we experience more frequent and intense hot, dry periods in the future.

Studies show that the amount of water required to irrigate Melbourne's open spaces could more than double by 2050, increasing by an additional 16 gigalitres per year (Melbourne Water 2021). However, Melbourne Water predicts that at least 40 per cent of this demand could be met by stormwater and recycled water.

In locations where it is not practical to irrigate green open spaces with stormwater or recycled water, smarter irrigation practices are paramount. Smarter irrigation enables us to get greater value from the water that we use, by saving water during cooler periods, as well as hot periods, using sufficient water to provide cooling benefits for the local community.

However, water corporations have limited authority to deliver these projects that provide liveability, amenity or health and wellbeing benefits for the community. To deliver these opportunities, water corporations often partner with other organisations, including local councils, who may have clearer accountability to deliver projects with these outcomes in mind.

Action 3-8: Use of recycled water and stormwater for greener, open spaces

The Victorian Government will provide:

- grants to co-invest with water corporations and councils in infrastructure to use stormwater and recycled water to irrigate open spaces, facilitated through the IWM program
- one-off grants to managers of open space, to complete water use and efficiency audits for sporting grounds which identify and map opportunities to reduce, or substitute, demands on the potable water system.

By 2026

Image: Western Park Recreational Reserve, Warragul, Gunaikurnai Country

3.4 Better planning and regulation

Our plan:

- embed IWM in land use planning decisions and urban design
- improve guidelines for using recycled water and stormwater
- work with the water sector to identify and manage emerging contaminants

Embedding IWM in land-use planning

Urban planning in Victoria is guided by many land-use policies, controls and regulations. Urban planning is closely linked to water management, as it determines the use of land on which water can be collected, stored and distributed to communities, as well as how much water can be used in urban and peri-urban areas.

To deliver effective and affordable water services, IWM needs to be embedded at the start of land-use planning decisions and urban design. This allows a greater range of options to be identified and evaluated early and at a lower cost. Now, more than ever, we need to consider how our water systems can be designed to provide broader benefits to the community, such as improved urban amenity, reduced flooding and greener, cooler landscapes. Like Victoria's land-use planning system, different scales of IWM planning are necessary to guide decision-makers at different stages of water infrastructure development or renewal (see **Figure 3.5**).

In new developments, for example, houses can be designed to help households reduce their water and energy usage, leading to lower household utility bills. Residential streets can be designed to use gravity to direct stormwater runoff (passive irrigation) to irrigate street trees and create fuller canopies. Retrofitting passive irrigation systems can cost up to 13 times more per tree, on average, than installing them at the start.

IWM not only supports water sector objectives but can also boost land and property sales and contribute to high-quality and environmentally sensitive 'big builds'. For example, ways to use recycled water, instead of drinking water, for dust suppression during the construction of a third runway at Melbourne Airport are being explored. This could save over 1 gigalitre of drinking water over two years.

Policy 3-4: Embed IWM in land-use and infrastructure planning

Land-use planning decisions and major infrastructure projects should consider IWM early in the design process and throughout the different stages of urban development or renewal, to ensure that all sources of water, including stormwater and recycled water, are used in the landscape.

Action 3-9: Strengthen IWM in land-use and infrastructure planning

The Victorian Government will explore ways to clarify IWM objectives and strengthen IWM criteria in planning guidance material and policies, and will explore a potential requirement for the development and use of IWM plans at different geographic scales to guide land-use decisions related to future urban developments.

By 2025

VALUE OF IWM PLANNING AND DELIVERY

WATER SECTOR	COUNCILS/DEVELOPERS/COMMUNITIES
Provides clarity An agreed IWM plan provides clarity for both developers and the water sector regarding how an area will be serviced, the asset that will be required, and a common platform to understand and discuss funding requirements.	
Contribution to water security Reduces demands on potable supplies by maximising use of all sources.	**Improved liveability and desirability of suburb** Building climate-resilient developments through retaining water in the landscape – managing the heat island effect and improving urban greening.
Waterway protection Reduces stormwater entering urban waterways and protects lands adjacent to waterways.	**Branding/marketing** Opportunity to brand and sell sustainability credentials of the development (point of difference from other developments).
Lowering infrastructure costs Can reduce the size, and delay the timing, of centralised augmentations by using more local water supplies.	**Providing and protecting community assets** Water-based amenity assets (lakes, wetlands) and drought-proofing of public assets (sporting grounds and gardens) through provision of stormwater and recycled water.
Meeting wastewater obligations Identifying opportunities for the re-use of wastewater for productive use/protection of public assets – within development or adjacent to development (i.e. productive use of peri-urban agriculture).	**Meeting planning requirements** Supporting developers to meet obligations (such as stormwater management or waterway protection) required under Victoria Planning Provisions.
Meeting customer expectations Delivering on sustainability credentials – maximising use of all water sources.	**Property uplift/development opportunity** Increased property value due to 'water-based development' providing greater returns on investment. Opportunity for higher-quality development due to high-quality drainage management.

Figure 3.5: Value of IWM planning and delivery

Improving the recycled water regulatory framework and guidance

Clear and simple regulations help to build confidence around the many benefits of using fit-for-purpose recycled water. As the first phase of a review of recycled water guidance, a new Victorian guideline for large-scale recycled water schemes was released in 2021 (EPA 2021b). The guideline focused on simplifying and streamlining scheme approvals and reporting processes, using a best-practice, risk-based approach. To help recycled water scheme proponents adjust to the new guideline, the Environment Protection Authority (EPA) is developing templates and examples for key approval and reporting processes.

The next phase of the review of recycled water guidelines focuses on several scientific aspects of recently updated guidance. Key projects include:

- updated guidelines for the use of recycled water for irrigation (EPA 1991). This will help irrigators and proponents of recycled water irrigation schemes to use recycled water appropriately and ensure management controls are in place to protect the environment, the crops being irrigated and human and animal health
- developing guidelines for the use of recycled water for the environment, for example, to improve environmental flows and overall river health where it is safe and suitable (see **Section 8.7**).

Action 3-10: Develop template guidance for recycled water use to streamline approvals

The Victorian Government, EPA and the water industry will develop templates to help industry apply and adjust to the new Victorian recycled water guidelines by streamlining documentation for approvals.

By 2023

Managing emerging contaminants in recycled water

As previously discussed, using fit-for-purpose recycled water and treated stormwater is integral to building secure and climate-resilient cities and towns. Community feedback tells us there is concern about the potential risks of emerging contaminants in recycled water and in the broader environment. For this reason, we must continue the important work underway to assess and manage risks to the environment and human health from emerging contaminants (see **Figure 3.6**). We must also improve communication about this work as we seek to increase the use of recycled water for non-drinking purposes.

Emerging contaminants include pharmaceutical, persistent and bio-accumulative organic pollutants, endocrine-disrupting chemicals, personal care products and industrial or agricultural compounds that can potentially cause harm to the environment or public health. They are not yet well understood and are therefore largely unregulated. These contaminants can be present in the environment due to previous land uses or activities. They frequently occur in many manufactured products which we rely on, such as common household products including non-stick cookware, cleaning products and food packaging.

Emerging contaminants can enter our environment (water, sediment, soil, air, dust, biota and plants) via runoff into water catchments and drinking water storages, direct use on land and disposal via our waste systems, and through garbage, sinks, showers, toilets and trade waste. This makes them difficult to track and regulate across sources and uses. However, technological advances mean we can detect more chemicals in the environment today than we could five years ago.

Water corporations proactively manage new risks to water supplies including: emerging contaminants that might be present in sewage, water storages used to supply drinking water, water treatment plant discharges and recycled water. We will continue to work collaboratively with EPA and the water sector to develop our knowledge of the potential risks from emerging contaminants, as well as refining risk management frameworks and implementing proportional and reasonably practical actions. These actions will ensure risks from the use of recovered resources, such as recycled water, are minimised to prevent harm to the environment or public health. We will also continue to contribute to national research and standards that will inform our state's management approach on emerging contaminants in recycled water.

Policy 3-5:
Invest in research to improve our understanding of emerging contaminants

The Victorian Government will continue to support investment in research that improves our understanding of emerging contaminants, their potential risks, and reasonably practical actions to ensure safe uses of recycled water.

Policy 3-6:
Contribute to national regulatory processes and water quality guidelines

The Victorian Government will continue to participate and contribute to national processes, including input into water quality policy and regulatory processes, actions to reduce contaminants at the source and the development of water quality guidelines and standards, to inform safe uses of all water sources.

Action 3-11:
Identify priority projects to contribute to state of knowledge of emerging contaminants

The Victorian Government will work with the water sector to identify priority projects to enhance our knowledge of emerging contaminants.

By 2023

Image: Melton Recycled Water Plant, Wadawurrung Country

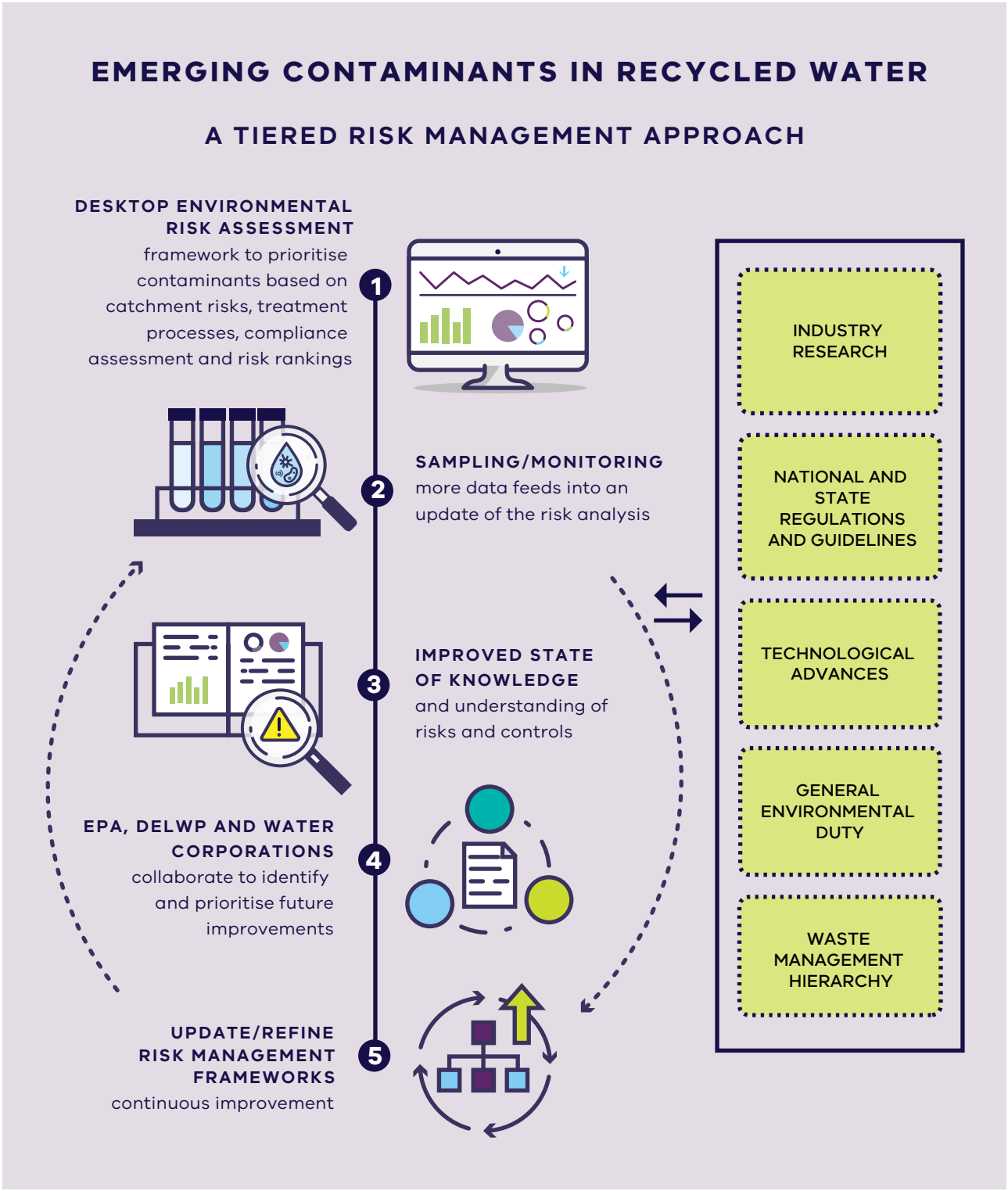


Figure 3.6: Victoria's approach to managing emerging contaminants

3.5 Improving stormwater regulations and guidance

Reviewing stormwater licensing arrangements

Stormwater has historically been treated as a waste product and removed via drains to local waterways as quickly as possible. Regulations focus largely on reducing the risk of flooding and who is responsible for managing drainage. If we are to recognise the benefits stormwater can provide as a resource, the current licensing arrangements require updating to enable greater capture and use of stormwater. For example, the Water Act does not define or refer to stormwater, so interpreting how stormwater fits into the water entitlements framework can be difficult. The water entitlements framework covers water flowing or held in Melbourne Water's infrastructure, but does not include stormwater in local council infrastructure. Up to 3.7 gigalitres of stormwater is licensed, to be harvested from Melbourne Water's works, but harvesting from council assets is not licensed which means that it is not accounted for, and the lack of a clear authority for councils to sell the water to potential users is a barrier to increased uptake.

Action 3-12: Improving stormwater regulations to support increased capture and use

The Victorian Government will work with water corporations and councils to review statewide stormwater licensing and supply arrangements and determine preferred statutory and non-statutory implementation options.

By 2023

Clarifying stormwater roles and responsibilities

To gain better oversight of stormwater as a water resource and to enable more stormwater to be harvested we will also work with water corporations and councils to clarify roles and responsibilities for harvesting stormwater in Greater Melbourne and regional areas. Implementing the preferred option from the Melbourne Urban Stormwater Institutional Arrangements (MUSIA) Review and clarifying roles and responsibilities in high-growth regional areas, such as the Lower Barwon, will help to address the future increase in stormwater from new urban developments. It will also better manage any adverse effects and opportunities to maximise the use of this water resource to meet future urban needs, which may also lead to improved waterway health outcomes. IWM forums will continue to encourage greater harvesting and use of treated stormwater by identifying place-based opportunities across the Gippsland and Central regions, consistent with these clarified roles.

Action 3-13: Implement Melbourne Urban Stormwater Institutional Arrangements (MUSIA)

The Victorian Government will:

- support Melbourne Water and the Municipal Association of Victoria (on behalf of local government) to implement the preferred option from the MUSIA review: the improved 60-hectare option
- embed the confirmed approach into policy or legislation.

By 2028

Review of the Melbourne Urban Stormwater Institutional Arrangements (MUSIA)

The MUSIA Review is a collaboration between the Department of Environment, Land, Water and Planning, Melbourne Water and the Municipal Association of Victoria (MAV) on behalf of the 38 councils in the Port Phillip and Westernport Region. MUSIA aims to better delineate roles and responsibilities for public urban stormwater assets and services. The project partners have agreed in principle on a recommended option to delineate urban stormwater responsibility: delineation by catchment size (improved 60-hectare option).

The agreed option will include an exception to the 60-hectare rule for complex IWM projects involving multi-purpose assets designed to function as a single interlinked network, despite being spread across multiple sub-catchments. For these types of projects, there is benefit in the whole network of treatment assets being managed by one organisation, rather than being divided between councils and Melbourne Water according to a strict 60-hectare rule.

Melbourne Water and the MAV will lead the implementation of the preferred MUSIA options, with the Department of Environment, Land, Water and Planning supporting on an as-needed basis.

Action 3-14: Review stormwater management arrangements in the Lower Barwon

The Victorian Government will work with local government, Barwon water and Corangamite CMA to review arrangements for managing stormwater as a resource for Geelong and the Bellarine.

By 2023

Develop stormwater offsets framework

Many new developments are required to meet stormwater management best-practice standards, by constructing treatment assets on site that remove sediment and nutrients from stormwater. In some cases, it is not practical or cost effective for developers to treat the stormwater on site, and there may be better options for communities if council can build a larger treatment asset within the same precinct or catchment.

Stormwater offsets schemes provide an opportunity for urban developments to meet the required stormwater standards by contributing money towards an offsite asset, rather than constructing an onsite asset.

Action 3-15: Develop a stormwater offsets framework

The Victorian Government will develop a stormwater offsets framework to enable robust and consistent application of offsets for developers and local governments to meet stormwater requirements in the Victoria Planning Provisions.

By 2024

Embedding stormwater flow requirements

Current best-practice standards for stormwater management require new developments to reduce pollutants in stormwater: suspended solids (sediment), phosphorus, nitrogen and litter. However, these pollutants are not the only harmful part of stormwater. The increased volume of stormwater running off new hard surfaces can also damage urban waterways.

The EPA published urban stormwater management guidance to help improve the management of urban stormwater in Victoria (EPA 2021a). The guidance reflects current science and addresses the risk of harm from urban stormwater flows, including setting stormwater flow reduction targets for Greater Melbourne. It also contributes to Victoria's state of knowledge and helps organisations minimise the risk of harm to the environment and human health so far as reasonably practicable. To complement the guidance and strengthen compliance with the targets, we will investigate options to include them in the Victoria Planning Provisions or other regulations.

Action 3-16: Embedding stormwater flow requirements

The Victorian Government will assess and explore the feasibility of options that include stormwater flow reduction targets into the Victoria Planning Provisions or other regulations.

By 2024

Building community confidence

There are significant opportunities to improve the use of fit-for-purpose recycled water and treated stormwater to provide water security and other broader community benefits if we can build community confidence in the use of recycled water and stormwater as a resource. This will require demonstrating best-practice science, enforcing strong regulation, and engaging with the community about their concerns (largely on water quality) and the potential benefits. See the section on emerging contaminants above.

Action 3-17: Building community confidence in recycled water and stormwater

The Victorian Government will work with the water sector and EPA to develop and implement engagement and education programs that improve understanding of the benefits and risks of using recycled water and stormwater.

By 2026

Better accounting and reporting

Tracking progress of recycled water and stormwater use is important for increasing the use of stormwater and recycled water in some localities, because it demonstrates the benefits that can be important for a region's prosperity, liveability and productivity. Importantly, using these new decentralised sources can free up drinking water and reduce extraction from already stressed rivers, helping to preserve these supplies for future generations and creating opportunities to return river water to Traditional Owners.

Action 3-18:
Clearer guidance on recycled water accounting and reporting

The Victorian Government will assess the need for clearer guidance on recycled water accounting and reporting, to increase the consistency and accuracy of recycled water data for a better understanding of its use and availability.

By 2023

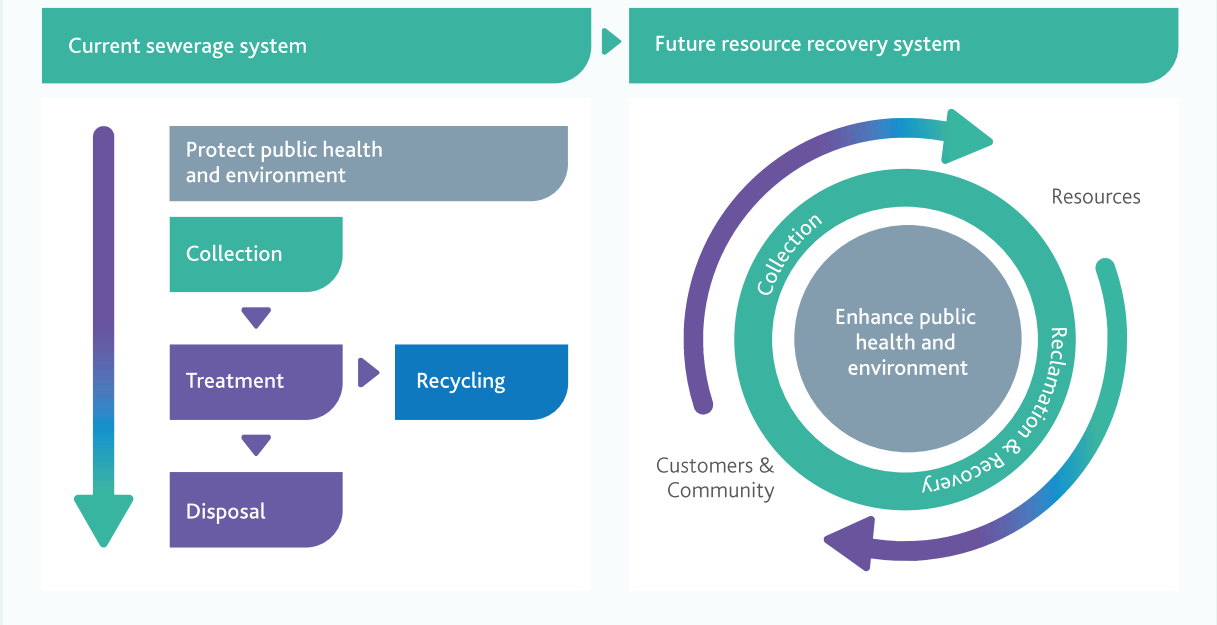
For more information about the use of stormwater and recycled water to improve environmental flows, see **Section 8.7**.

3.6 A circular economy

Our plan:

- support transition to a circular economy by using recycled water for renewable hydrogen production

A circular economy separates economic activity from the use of finite resources and environmental degradation. It moves away from a linear consumption model where we take, make, use and dispose, towards a system where waste is instead seen as a valuable resource or input, which can be repurposed for another unconnected process (see **Figure 3.7**).



Transitioning from a linear treatment system to a circular economy

Figure 3.7: Transitioning from a linear treatment system to a circular-economy system (Melbourne Water 2017)

Victoria's water sector can play a central role in embedding circular economy approaches, not just across the water cycle but also in the energy, agriculture, waste and construction sectors. It can:

- provide benefits such as recovering valuable resources from food waste
- boost clean, secure and reliable green energy supplies close to end-users
- generate by-products that improve soil condition and agricultural productivity
- reduce waste and harmful contaminants released to the natural environment.

These opportunities convert wastewater, and the organic waste it contains, into valued commodities. Products such as recycled water and biosolids are valued resources in a circular economy, to grow our food, light our homes and manufacture products. This model can convert wastewater treatment from a cost liability and business risk to a potential revenue source, which can offset other pressures on customer prices.

The Victorian Government is working with water corporations, catchment management authorities and industry peak bodies to collectively drive circular economy opportunities. We are using the power of collaboration to champion positive change, prioritise our focus areas and build confidence in projects that accelerate our transition to a circular economy. Flagship research and pilot projects will find new ways to reduce waste in water processes, identify markets for by-products and help regenerate natural systems.

Renewable hydrogen production

Renewable hydrogen could play an important role in the decarbonisation of Victoria. Potential uses include blending with or replacing natural gas in our pipelines, long-term energy storage, direct use in industrial applications or powering zero-emissions vehicles, including trains, buses and cars.

Although the water requirements for renewable hydrogen production are relatively small, the use of climate resilient water, such as recycled water, is an important step towards a circular economy, and would avoid the need for the industry to compete for river water. A further incentive for the co-location of hydrogen production facilities and wastewater treatment plants is high-purity oxygen, a by product of renewable hydrogen production via electrolysis. Low-cost and sustainable, pure oxygen is a useful input to wastewater treatment plants and has the potential to significantly reduce the carbon emissions of Victorian water corporations.

The Victorian Government and the water industry are working together to identify pilot projects such as the Hydrogen Park Murray Valley gas blending project at Wodonga, the Bacchus Marsh Recycled Water Plant and the Aurora wastewater treatment plant in Wollert, north of Melbourne. These projects will showcase the fundamental role recycled water can play in providing sustainable water supplies to Victoria's emerging renewable hydrogen industry. In future, stormwater could also play a role in renewable hydrogen production.

Policy 3-7:
Support transition to a circular economy by using recycled water or stormwater for renewable hydrogen production

The Victorian Government will continue to work together with the water sector to identify where recycled water or stormwater can supply renewable hydrogen production to support transition to a circular economy.

Image: Recycled water at the Sands Golf Club, Torquay, Wadawurrung Country (photo supplied by Barwon Water)