

Supplying and Using Recycled Water

November 2021

Independent assurance report to Parliament
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The Hon Nazih Elasmr MLC
President
Legislative Council
Parliament House
Melbourne

The Hon Colin Brooks MP
Speaker
Legislative Assembly
Parliament House
Melbourne

Dear Presiding Officers

Under the provisions of the *Audit Act 1994*, I transmit my report *Supplying and Using Recycled Water*.

Yours faithfully



Andrew Greaves
Auditor-General
17 November 2021

The Victorian Auditor-General's Office acknowledges Australian Aboriginal peoples as the traditional custodians of the land throughout Victoria. We pay our respect to all Aboriginal communities, their continuing culture and to Elders past, present and emerging.

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Audit snapshot

Are responsible agencies increasing the use of recycled water to meet future water demand?

Why this audit is important

The Victorian Government estimates that the demand for water could exceed our supply in some areas of Victoria as early as this decade due to population growth and climate change.

To prevent this, the water sector must take further action to increase our water supply and efficiency. Optimising recycled water use will help to address this risk by reducing the pressure on drinking water.

Who we examined

- Department of Environment, Land, Water and Planning (DELWP)

- Environment Protection Authority Victoria
- Barwon Water
- City of Greater Geelong.

What we examined

- if responsible agencies have effectively developed and implemented strategies to increase recycled water use
- if barriers to increasing recycled water use have been identified and addressed.

What we concluded

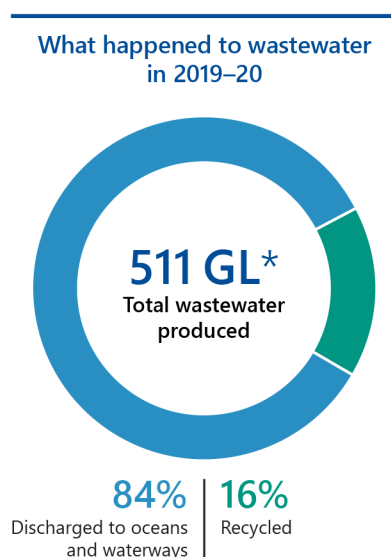
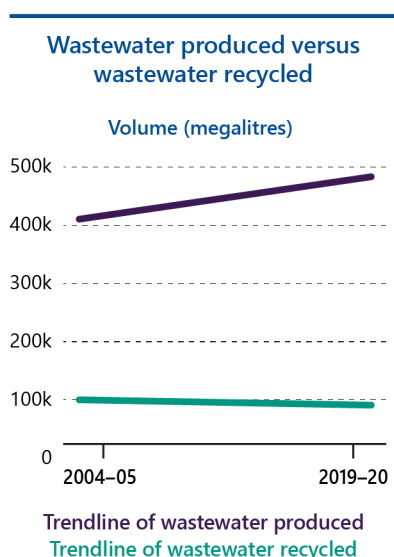
Recycled water use has not increased over the last decade.

Many Victorians have a limited understanding of water security and the risks and benefits of using recycled water. Responsible agencies can help to overcome this by directing more of their effort to community education.

But there are also some known and potential regulatory, economic and physical barriers to recycled water uptake that can be addressed.

Responsible agencies are actively engaging with the community to understand risks and opportunities for recycled water. They are also working together to identify and deliver water recycling projects.

Key facts



Note: *GL stands for gigalitre, which is 1 000 megalitres.

Source: VAGO, based on DELWP data, DELWP's *Victorian Water Accounts 2019–20* and Melbourne Water's *Melbourne Water System Strategy*.

What we found and recommend

We consulted with the audited agencies and considered their views when reaching our conclusions. The agencies' full responses are in Appendix A.

Addressing barriers to using recycled water

The Department of Environment, Land, Water and Planning's (DELWP) 2016 *Water for Victoria* plan is the Victorian Government's response to the impacts of climate change on Victoria's water resources and the availability of water in the future.

This plan supports the water sector's actions to increase recycled water use for safe and suitable non-drinking purposes. However, this outcome depends on how well the water sector understands and manages regulatory, policy, physical and economic barriers and influences the community's attitudes towards recycled water.

For example, the government designs regulatory frameworks to protect public health and the environment. However, it is important that DELWP reviews them so they do not unnecessarily limit recycled water use.

DELWP has a good understanding of these barriers and is working with water stakeholders on projects to identify and address them if necessary. The impact of these projects is unclear because most are still in progress.

Community understanding

Water corporations have a legislative role to engage with and educate the community.

For example, Barwon Water actively engages with its community through its water planning and school education programs. Its engagement program, *Water for our Future*, includes a broad range of engagement activities designed to help it understand community and stakeholder values and generate ideas about the region's water future. Barwon Water uses these insights to inform its future water management plans.

Despite actions like this, many Victorians have a limited understanding of water security and the risks and benefits of recycled water. More community education is needed if recycled water use is to increase. DELWP is considering the most

Water security refers to the availability and reliability of an area's water supply. To ensure Victoria's water security, responsible agencies must source safe and reliable water supplies to meet our future demand.

appropriate approach to supporting the water sector to engage with the community about the risks and benefits of recycled water.

Regulatory barriers

Environmental benefit guidance

Since 1988, the Environment Protection Authority Victoria (EPA) has allowed water corporations to use treated wastewater for environmental benefit. For example, treated water can be added to wetlands to support fauna and flora or to stressed rivers to improve their flow.

However, EPA and DELWP have not produced guidance to water corporations about the information they need to submit to seek approval for using recycled water for environmental benefit.

Four of the state's 18 water corporations report that they use recycled water for beneficial allocation, which is how the Essential Services Commission (ESC) categorises environmental benefit. EPA has assessed these uses as part of each water corporation's discharge licence or effluent re-use scheme.

Water recycling guidelines

EPA sets guidelines for water suppliers, managers and users on how to safely and sustainably use recycled water in Victoria.

The water sector had raised concerns that the water recycling guidelines were outdated, complex to apply and did not clearly outline agencies' roles and responsibilities. In 2020, DELWP led a joint agency review of the guidelines.

This review led to EPA releasing the updated *Victorian guideline for water recycling* in March 2021. The updated guidelines, which streamline and combine multiple guidance, are risk based and clarify agencies' roles and responsibilities.

Emerging contaminants

EPA and water corporations apply a risk-based framework to manage the impact of contaminants on recycled water use. The sector needs to review and update this framework to cover new and emerging contaminants, including pathogens, viruses, hormones, chemicals, microplastics and heavy metals. This provides confidence to existing and potential customers that recycled water is safe to use.

To address this barrier, DELWP and EPA are conducting research to improve their knowledge of the public health and environmental risks that can be associated with recycled water.

Physical constraints

The existence, location and capacity of water corporations' wastewater treatment plants and the infrastructure needed to supply, store and distribute recycled water affects if and how the agricultural sector, industries, businesses, councils and households use recycled water.

In addition, as recycled water cannot be pumped through drinking water pipes, new distribution networks, such as third pipe or purple pipe systems, need to be

According to the *State Environment Protection Policy (Waters)*, **environmental benefit** is achieved when water corporations release treated wastewater into a waterway or wetland and improve its environmental conditions. To do this, water corporations must pass EPA's discharge licence assessment or be approved for EPA's effluent re-use scheme.

An **EPA licence** sets out a water corporation's conditions for discharging treated wastewater.

An **EPA-approved effluent re-use scheme** sets acceptable re-use conditions for recycled water.

ESC defines **beneficial allocation** as treated wastewater discharged to a waterway for recognised environmental purposes (as prescribed by EPA). There must be a quality characteristic that is a net benefit to the environment.

Environmental flow is water specifically managed to protect and restore a healthy environment within rivers, flood plains, wetlands and estuaries.

Residents in some housing estates have two separate water pipes, meters and taps for their recycled and drinking water supplies. This is referred to as **purple pipe**, dual-pipe or **third pipe systems**. The colour purple is used to identify pipes that carry recycled water to ensure that recycled water is not confused with drinking water.

constructed. It is much more cost-effective to plan and build these networks in new developments than to retrofit them in established areas.

To manage these barriers, DELWP is commissioning research and embedding integrated water management (IWM) into its strategic land-use policy and planning processes.

DELWP is also working to protect agricultural land on Melbourne's urban fringe that is close to recycled water plants by engaging with the community on planning policy options.

IWM is a collaborative approach to water planning. It brings all organisations that influence the water cycle together, including water corporations, councils, catchment management authorities (waterway managers), Traditional Owners and DELWP. This approach considers the environmental, social, cultural and economic benefits of water use.

Recommendations about addressing barriers to using recycled water

We recommend that:

Response

Department of Environment, Land, Water and Planning	1. works with the water sector and the Environment Protection Authority Victoria to develop and implement water education programs that consider: - targeting different users, such as the community, industries, councils and the agricultural sector - improving the community, industries, councils and agricultural sector's understanding of water security and the benefits and risks of using recycled water - including consistent messaging about using recycled water and specifying roles and responsibilities for education (see Section 2.2)	Accepted
Environment Protection Authority Victoria	2. works with the Department of Environment, Land, Water and Planning to develop and implement guidelines to inform water corporations' applications for using recycled water for environmental flows (see Section 2.3).	Accepted

Optimising recycled water use

To increase Victoria's recycled water use, the water sector:

- strategically plans and sets goals
- works together to identify opportunities
- funds recycled water projects
- stimulates new demand
- measures the impact of its actions.

Planning and setting goals

While the government aims to increase Victoria's recycled water use, it has not set a specific statewide target.

DELWP advised us that this is for a number of reasons, including lessons learnt from the 20 per cent wastewater recycling target that the government set in 2002. This target, which was met in 2008, drove investment decisions and an initial increase in the state's recycled water supply and use. However, this growth has not been sustained and it also resulted in some investments that were not as economically efficient as possible.

DELWP also advised us that this experience taught the sector that the most sustainable, reliable and cost-effective mix of water sources should be sought in each location, rather than a blanket target for one water source.

In metropolitan Melbourne, IWM forums are developing a more effective outcomes-based approach that considers all available water supply options that are suitable for local conditions. This involves developing evidence-based outcomes, measures and targets to drive catchment and local-scale investments.

In regional Victoria, DELWP has initiated town water and pollutant balance assessments for representative locations. This is the first step towards building an evidence base to define the best location-specific outcomes. Growth potential was a key factor in how DELWP selected the representative locations, which include Wangaratta, Geelong and Wodonga.

Water corporations' targets

Thirteen of the state's 18 water corporations have set goals to increase their recycled water use. These goals range from using 4 to 100 per cent of the total volume of wastewater they produce.

For example, Barwon Water has committed to increase its recycled water allocated for productive use by 1 000 megalitres (ML) a year by 2023 and achieve a 100 per cent recycling rate by 2030. Barwon Water is effectively driving greater recycled water use by setting and pursuing ambitious goals. While its long-term goal is aspirational, it is on track to achieve its short-term goal.

Working together to identify opportunities for using recycled water

In 2018, DELWP established 10 regional and five metropolitan IWM forums across the state to facilitate and progress IWM. This shift to a more collaborative approach is improving water planning and identifying opportunities for using recycled water and stormwater.

For example, DELWP, Barwon Water and the City of Greater Geelong are working together with members of the Barwon IWM forum to identify, prioritise and plan projects that align with the forum's *Barwon Strategic Directions Statement 2018* and maximise recycled water opportunities.

DELWP shares best-practice recycled water initiatives and lessons learnt through meetings with metropolitan and regional IWM forum chairs. Barwon Water is using its experience from its past recycled water projects to inform and improve its current and planned projects.

DELWP's project to develop **water and pollutant balances** for 18 selected towns and cities in regional Victoria will support water sector stakeholders to understand the potential water resources available and inform development of IWM opportunities.

Productive use refers to the benefit achieved from recycled water use. For example, using recycled water for agricultural irrigation or to irrigate open spaces and sportsgrounds for the community has higher a value than disposing of it on grass around a water treatment plant.

Funding recycled water projects

Recycled water projects are funded by water corporations, the private sector, councils and the state and Australian governments. Water corporations typically fund recycled water projects when:

- other water sources are scarce
- recycling water is cheaper than treating wastewater to meet EPA's discharge requirements
- there is demand for recycled water close to a treatment plant
- recycled water is a cheaper alternative than increasing drinking water supplies or wastewater treatment.

If projects have agriculture, tourism or other broader community benefits, the state or Australian governments may contribute.

DELWP provides dedicated funding to support priority IWM projects that provide a net public benefit.

From 2017–18 to 2019–20, DELWP's IWM program provided approximately \$10.8 million towards 97 projects. Over the same period, the program attracted over \$19.7 million in co-investment from water corporations and recycled water customers.

In 2020, 10 IWM capital projects that were ready for delivery attracted further funding of around \$12.7 million from the Victorian Government's Building Works package. This funding is part of the government's response to the coronavirus (COVID-19) pandemic to drive Victoria's recovery.

However, recycled water projects compete with other IWM projects for a small pool of dedicated state government funding that is limited to small and medium-sized projects. Water stakeholders seek funding for larger projects from other state government or Australian Government grant programs.

Stimulating new demand

Water corporations play an important role in identifying opportunities for using recycled water. Barwon Water proactively explores opportunities to stimulate new demand for recycled water. It does this by seeking expressions of interest from potential customers, reviewing existing customers' water use and investigating potential new demand for recycled water.

It is also upgrading its water infrastructure to reduce the salinity of wastewater on the Bellarine Peninsula to make recycled water a more viable option for agricultural customers.

As a result of its efforts, Barwon Water has increased the amount of recycled water allocated for customer use to meet its short-term goal.

Measuring the impact of actions to increase use

DELWP does not have evidence to demonstrate if the policies and actions introduced by *Water for Victoria* have increased recycled water use since 2016. This is because any changes in recycled water use require longer-term monitoring.

While DELWP does not currently measure and report on the impact of embedding IWM principles at a statewide level, it developed an evaluation framework in 2019. It plans to use this framework to measure the impact of the IWM program when it has been running long enough to deliver informative results.

IWM forums only measure expected drinking water savings and increased recycled water use for individual projects. DELWP and the five IWM metropolitan forums are currently developing monitoring, evaluation, reporting and improvement plans for their entire catchments.

Water corporations have data on the volume and classes of recycled water that they produce or have the capacity to produce. While they report on volume data annually, class data is not widely shared or used across the sector. This limits DELWP and other stakeholders' understanding of recycled water supply, use and future opportunities across the state. Separating water corporations' reporting of urban and industrial recycled water use into residential, council and industrial categories would also provide greater insights.

Water corporations manufacture recycled water to different standards or **classes** depending on its intended use. In Victoria, the highest standard is class A, which is used in public open spaces, agriculture, industries and by households for watering gardens and flushing toilets. Uses for class B and class C include industrial cleaning or livestock fodder.

Recommendations about optimising recycled water use

We recommend that:		Response
Department of Environment, Land, Water and Planning	3. publicly reports statewide information to share knowledge and demonstrate how integrated water management forums are delivering the expected outcomes of <i>Water for Victoria</i> (see Section 3.4)	Accepted
	4. clarifies data reporting categories and considers separately reporting on council, residential and industrial recycled water use as well as drinking water savings (see Section 3.4).	Accepted

1.

Audit context

Water is critical to life and the liveability of our cities and towns. However, in *Water for Victoria*, the Victorian Government estimates that our demand will exceed our water supply in some areas of Victoria as early as this decade due to population growth and climate change.

To prevent this, the water sector must take further action to increase water supply and efficiency. In Victoria, drinking water is supplied for household, recreational and commercial use. Using recycled water for purposes that a lesser-quality water could satisfy will help to address the risk of future shortages.

This chapter provides essential background information about:

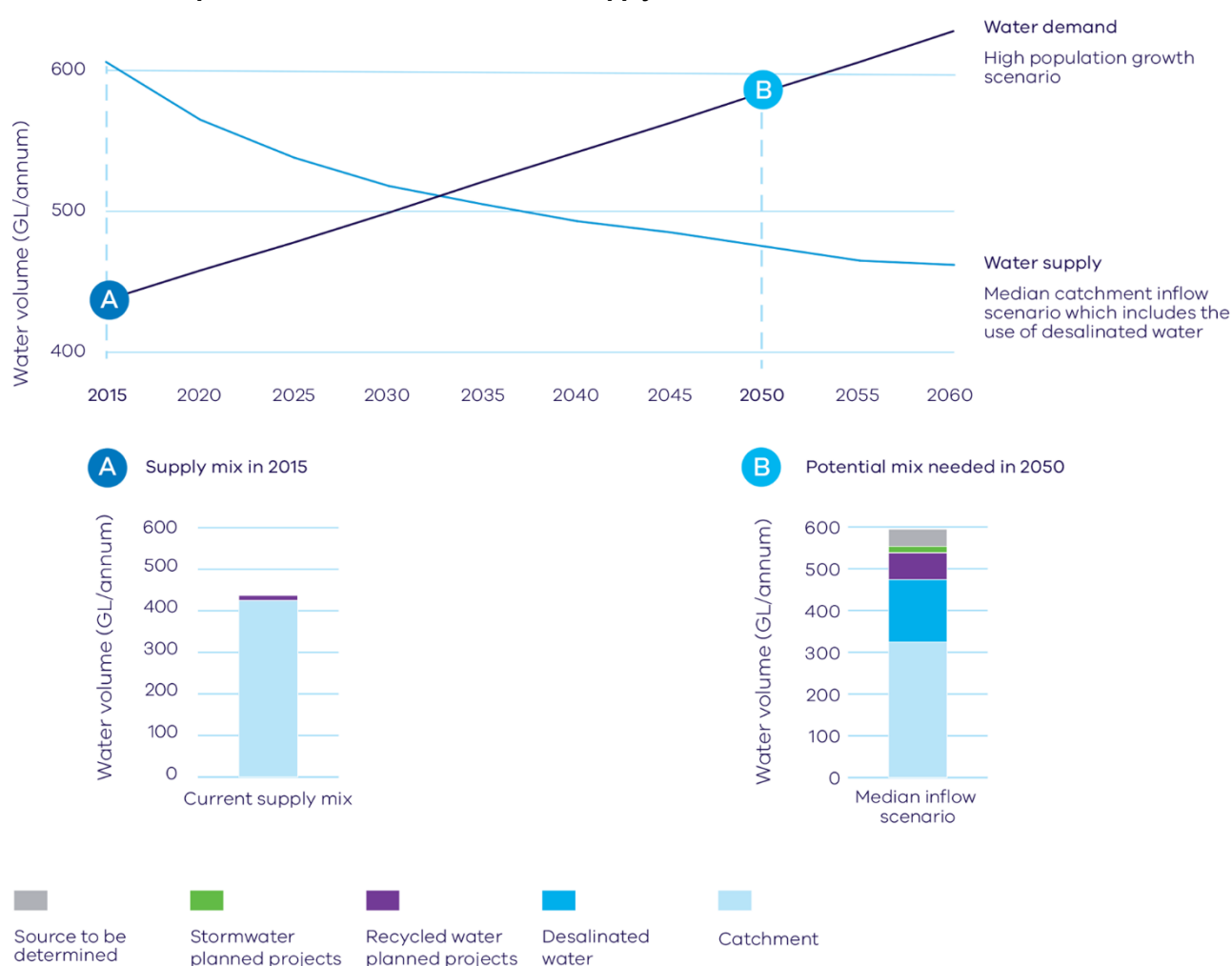
- Victoria's water outlook
 - Recycled water
 - How Victoria uses recycled water
 - Water security in Victoria
 - Roles and responsibilities
-

1.1 Victoria's water outlook

As Figure 1A shows, in 2016 the Victorian Government forecast that demand will exceed supply in metropolitan Melbourne as early as 2033 unless the water sector takes further action to increase water supply and efficiency. Melbourne Water's 2017 *Melbourne Water System Strategy* suggests this may occur as early as this decade (2028) under a high population growth and climate change scenario. DELWP's October 2021 draft *Central and Gippsland Region Sustainable Water Strategy* confirms this forecast.

Figure 1A also shows that we need to diversify the range of water sources we use to secure our supply by 2050. Water corporations regularly update this modelling to inform water resource planning.

FIGURE 1A: 2016 predictions for Melbourne's water supply, demand and sources



Note: GL stands for gegalitre, which is 1 000 ML.

Source: DELWP's 2016 *Water for Victoria* plan.

Victoria's demand for water

Two key factors impact Victoria's demand for water—population growth and climate change.

Population growth

Population growth increases the demand for water and sewerage services. In its 2019 report *Growing Victoria's Potential*, Infrastructure Victoria estimated that Victoria's population would grow from 6.4 million in 2018 to more than 10 million by 2051.

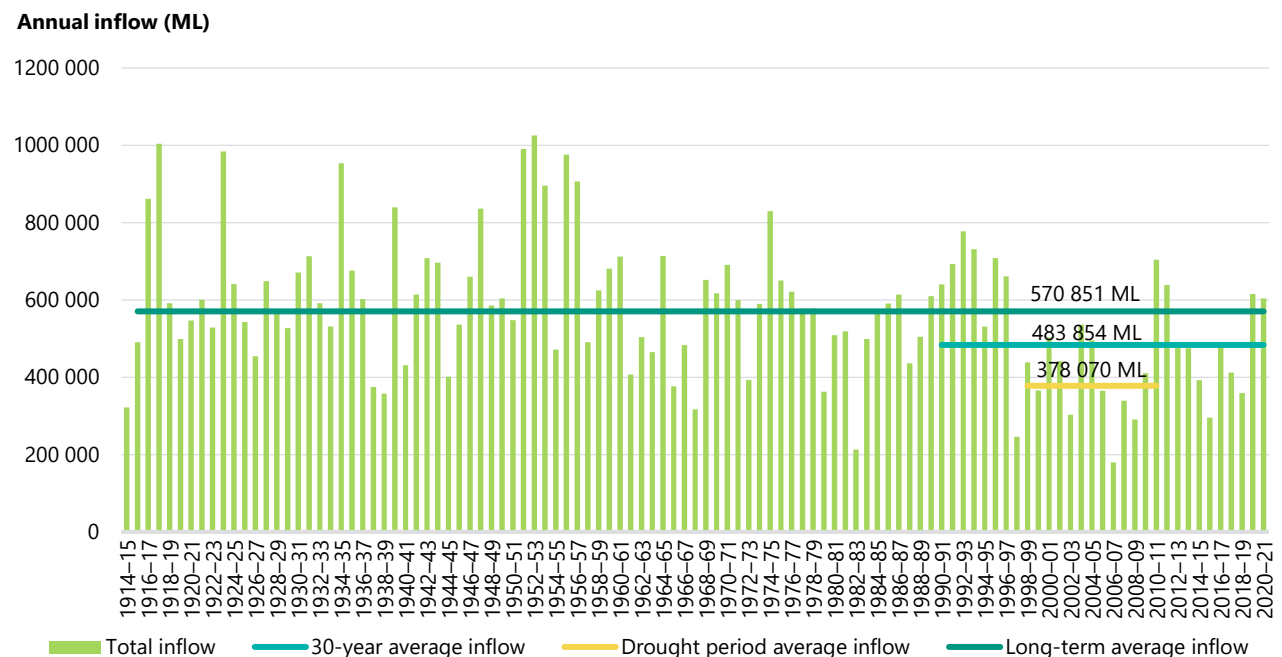
However, the COVID-19 pandemic has added uncertainty to Victoria's population projections. The government's 2021–22 state Budget forecasted zero population growth in 2020–21 due to the impact of the pandemic and Australian border closures. It expects population growth to rebound when restrictions ease.

Climate change

Climate change is leading to warmer, drier conditions. This means less water in our rivers and creeks and less rainwater flowing into our dams, which puts more pressure on our water supply.

As Figure 1B shows, annual inflows to Melbourne's main reservoirs have declined in the last 100 years.

FIGURE 1B: Annual inflows to Melbourne's main reservoirs from 1914–15 to 2020–21 compared to the long-term average

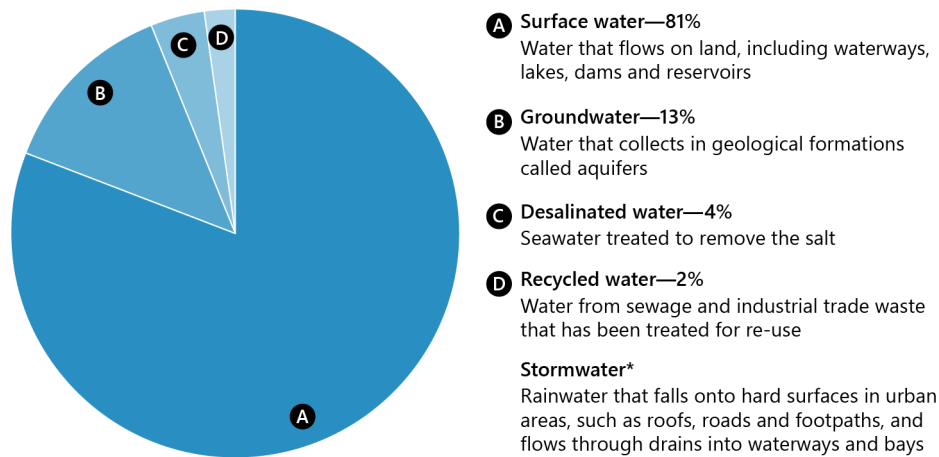


Source: VAGO, based on DELWP data.

Victoria's water supply

Figure 1C shows Victoria's water sources.

FIGURE 1C: **Victoria's main water sources by use in 2019–20**



Note: *DELWP does not include stormwater in statewide water data.

Source: VAGO, based on DELWP's *Victorian Water Accounts 2019–20*.

1.2 Recycled water

Recycled water is underused in Victoria. This is partially because Victorians see recycled water as a waste product instead of a potential water resource.

Drinking water supplied for non-drinking purposes could be substituted with recycled water in many cases where it does not compromise human health or the environment. Where appropriate, switching to recycled water provides a number of benefits, including:

- reducing the pressure on our drinking water supply
- reducing the need to increase the capacity of the water supply system or introduce water restrictions
- making urban water supplies and communities more resilient to drought and climate change
- reducing the amount of water:
 - taken from rivers and dams
 - discharged
- enhancing the liveability of our cities and towns by creating cooler, greener places with additional water for public spaces.

Recycled water is reliable in both quantity and quality. It is less dependent on rainfall than conventional surface water sources and can therefore be produced throughout the year regardless of the weather conditions.

Water corporations treat wastewater for its intended purposes to make it safe for humans and the environment. For these reasons, recycled water is an important part of the solution to address Victoria's increasing water demand.

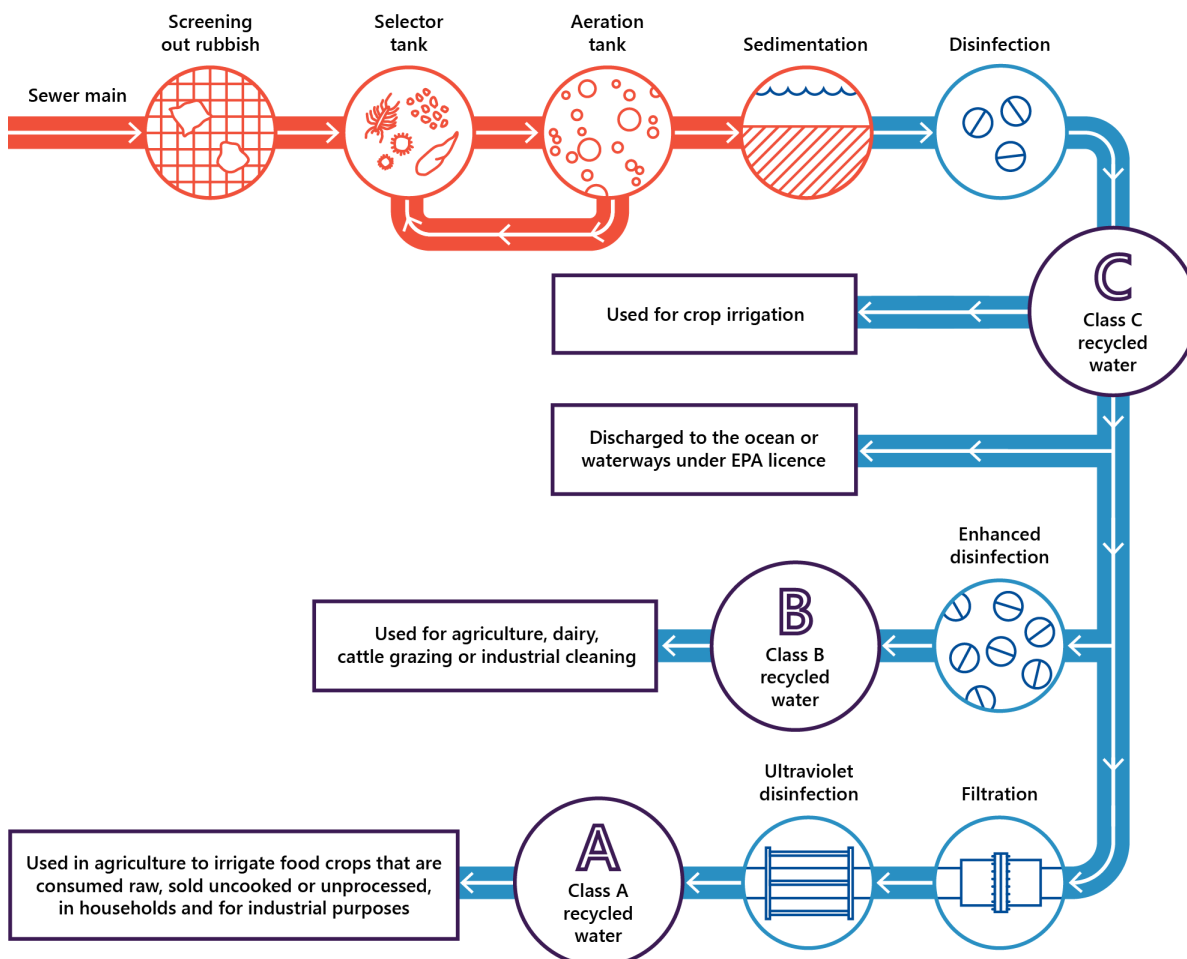
How recycled water is produced

Water corporations treat wastewater (sewage and industrial waste) at their treatment plants through a combination of mechanical and biological processes. These processes produce:

- recycled water for the water corporation or its customers to re-use (treated to different classes depending on its intended use)
- discharged treated wastewater, which is treated to the standard required by a water corporation's EPA licence then discharged to a water corporation's land, waterways or the ocean.

Figure 1D shows the recycled water production process.

FIGURE 1D: **Recycled water production process**



Source: VAGO, based on Barwon Water

Water corporations seek customers for recycled water to:

- manage their discharge volumes
- reduce wastewater treatment costs if recycling water is cheaper than treating wastewater to meet environmental discharge requirements
- cost-efficiently and sustainably manage wastewater generated from urban areas if a water corporation does not hold an EPA licence to discharge wastewater to a waterway or to the ocean
- cost-efficiently substitute fit-for-purpose recycled water for uses that currently use drinking water
- help them achieve a range of economic benefits
- meet demand close to their treatment plants
- avoid the costs of expanding the drinking water supply system or upgrading wastewater treatment infrastructure if recycled water is a cheaper alternative.

Recycled water classes

Water corporations manufacture recycled water to different standards or classes that are suitable for its intended use. EPA's *Victorian guideline for water recycling* outlines the different classes of recycled water and their permitted uses, which Figure 1E shows.

FIGURE 1E: **Classes of recycled water**

Class	Health risk management	Uses
A	Highest level of treatment to allow direct human contact	• Urban, for: • washing machines, flushing toilets and domestic gardening through purple pipe schemes • irrigating open public spaces, including sportsgrounds and parks where public access is unrestricted • Agricultural, for irrigating food crops that are consumed raw, sold uncooked or unprocessed • Industrial, for processes that workers may be exposed to • Other, such as firefighting
B	Use restricted to minimise direct human contact	• Agricultural, for dairy cattle grazing • Industrial, for cleaning
C	No direct human contact uses allowed	• Urban, for irrigating urban green spaces with controlled public access • Agricultural, for irrigating cooked or processed human food crops and grazing/fodder for livestock • Industrial, for processes that workers are not exposed to

Source: VAGO, based on EPA's *Victorian guideline for water recycling*.

The cost of treating water increases significantly as its quality improves, especially if it is necessary to reduce its salinity.

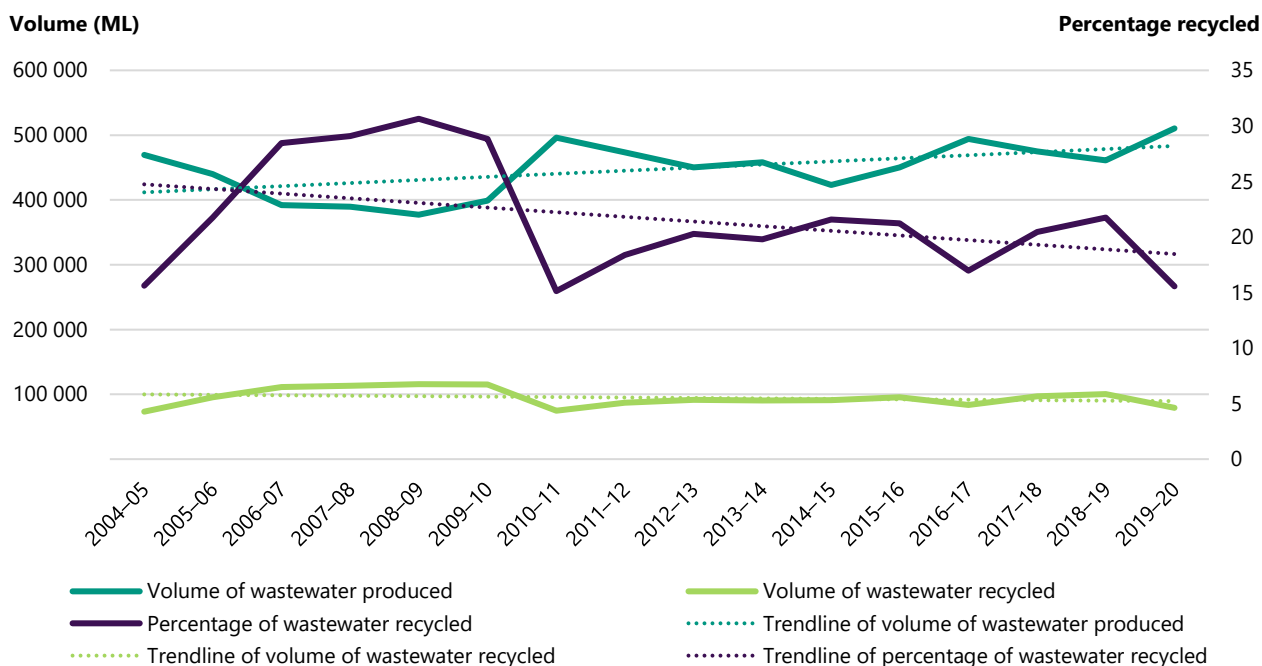
1.3 How Victoria uses recycled water

The Victorian Government allows water customers to use recycled water for non-drinking purposes. While the amount of wastewater produced over the last 10 years has increased with the state's population growth, the amount recycled has not increased at the same rate, which Figure 1F shows.

Figure 1F also shows the impact of the Millennium drought, with recycled water use rising between 2004 and 2007 and falling between 2009 and 2011.

The Millennium drought was Victoria's most severe drought since European settlement. Lasting from 1997 to 2009, it broke in 2010, which is Victoria's fifth wettest year on record.

FIGURE 1F: Volume of wastewater produced and recycled in Victoria from 2004–05 to 2019–20



Source: VAGO, based on DELWP data.

Impact of rainfall on recycled water use

Annual rainfall has a significant impact on recycled water use.

In wetter years, Victoria's recycled water use is lower and water corporations usually discharge excess recycled water.

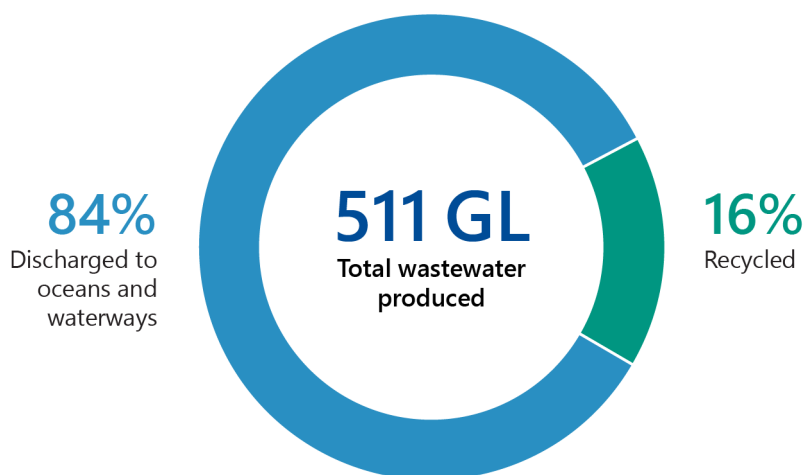
In dry years, recycled water use is higher. In some areas of the state, the demand for recycled water cannot always be met.

The disparity between recycled water availability and demand is an issue because some areas do not have sufficient storage infrastructure for recycled water.

What Victoria uses recycled water for

As Figure 1G shows, in 2019–20, water corporations produced 511 GL of wastewater of which only 16 per cent was recycled. They discharged 84 per cent of treated wastewater into the ocean, waterways or land.

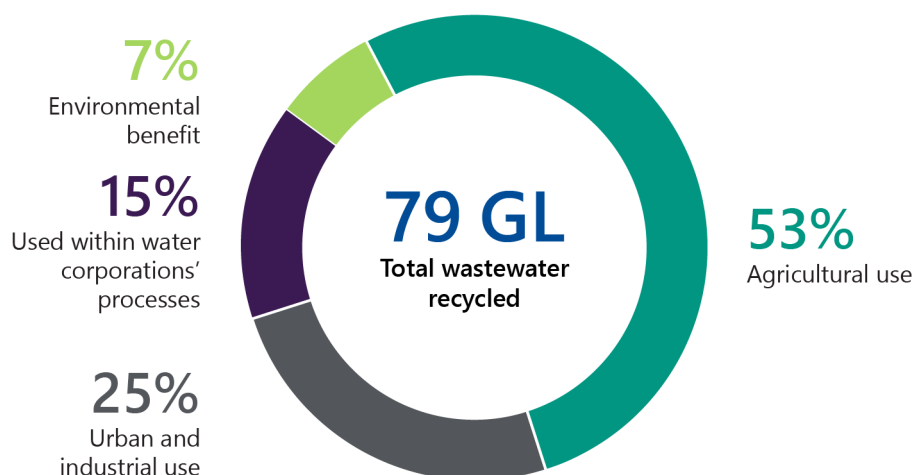
FIGURE 1G: **Victoria's production of recycled water 2019–20**



Source: VAGO, based on DELWP's *Victorian Water Accounts 2019–20*.

As Figure 1H shows, water corporations recycled 79 GL of wastewater in 2019–20. Figure 1H also shows how recycled water was used in Victoria in 2019–20. The agricultural sector is the largest user of recycled water.

FIGURE 1H: **How recycled water was used in Victoria in 2019–20**



Source: VAGO, based on DELWP's *Victorian Water Accounts 2019–20*.

1.4 Water security in Victoria

Barriers to using recycled water

There are many potential barriers to using recycled water. These barriers include:

- the community's limited water literacy and negative attitudes towards using recycled water
- policy and regulatory settings that unnecessarily limit recycled water use
- physical barriers, including:
 - the distance between water treatment plants and recycled water users
 - developing land without considering water planning issues and not leaving space for recycled water assets
 - the need for separate pipelines to distribute recycled water to users
 - challenges to build infrastructure in developed areas
 - limited storage capacity for surplus recycled water
- economic barriers, including:
 - the high cost to build infrastructure to treat, distribute and store recycled water
 - the high ongoing costs to produce recycled water by treating wastewater
 - the complexity of identifying polluters and beneficiaries to determine who should pay for these costs.

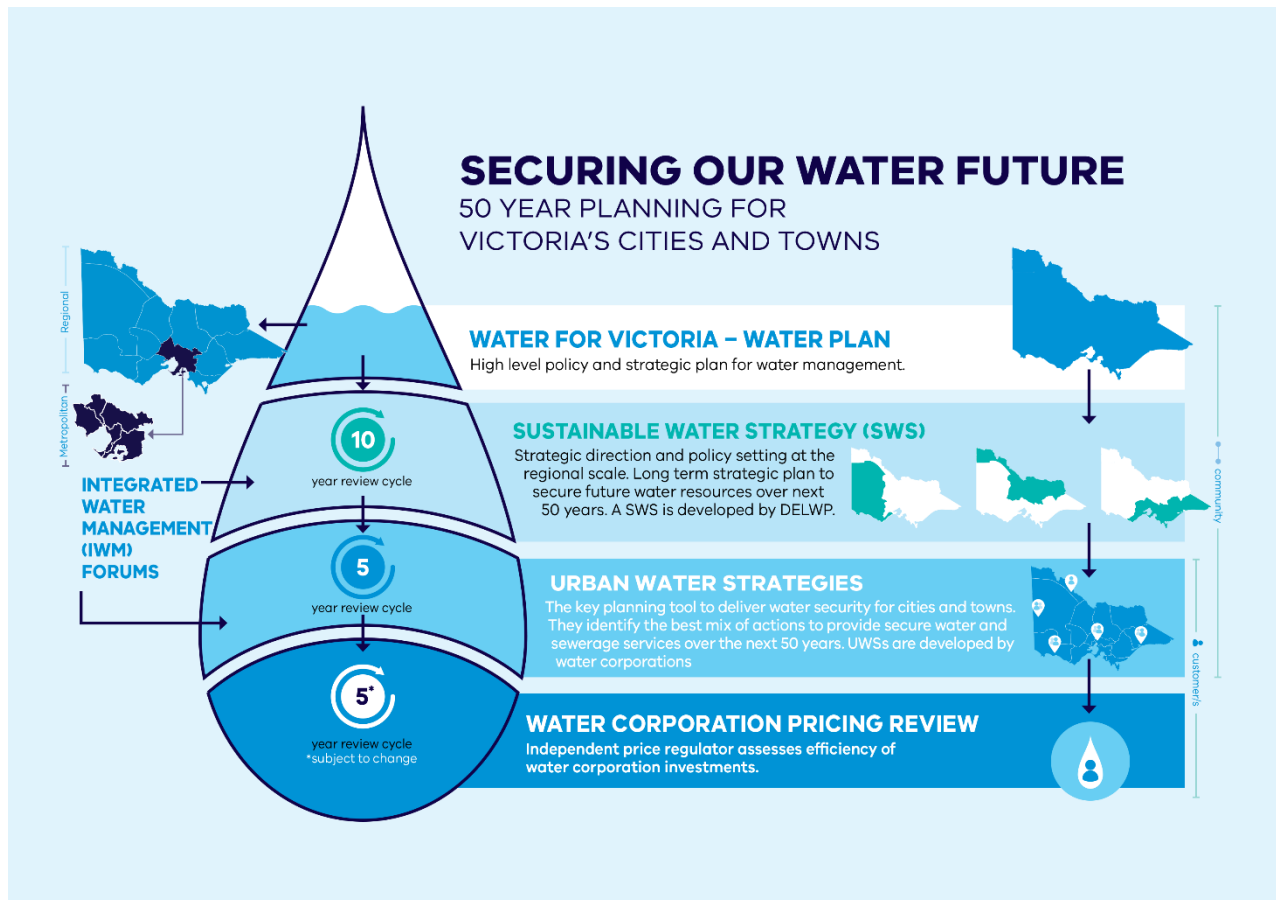
Water literacy is knowledge about water sources, water management and water-related issues.

The government's approaches to securing Victoria's future water supply

The Victorian water sector has plans at the state, regional and local levels to secure Victoria's future water supply. As Figure 1I shows, this includes:

- Victoria's water plan *Water for Victoria*
- sustainable water strategies (SWSs)
- urban water strategies
- water corporations' pricing reviews.

FIGURE 11: Victoria's water planning



Source: DELWP.

Water for Victoria

In 2016, the Victorian Government released its water plan, *Water for Victoria*, to manage Victoria's water resources.

In chapter 5 of *Water for Victoria*, DELWP outlines the government's position towards recycled water. It commits to 'continue to support the use of diverse water sources that are safe and suitable to improve water security and the resilience and liveability of our cities and towns'. This includes using recycled water for non-drinking purposes to reduce pressure on Victoria's drinking water supply.

Sustainable water strategies

The Victorian Government's SWSs identify threats to each region's water availability and how water users, water corporations and catchment management authorities can respond to them.

There are four SWSs in Victoria—for the central, northern, Gippsland and western regions.

DELWP is developing a new SWS for the Central and Gippsland region to replace its existing SWSs. Its estimated release date is the end of 2022.

Catchment management authorities are responsible for coordinating the strategic planning and integrated management of the land, water and biodiversity of each region.

Urban water strategies

An urban water strategy outlines the actions that a water corporation must take to manage supply and demand in its service area.

All urban (metropolitan and regional) water corporations published their most recent urban water strategy in 2017.

Water corporations are required to review and update their urban water strategies every five years. Their next strategies are due for completion in March 2022.

Pricing review

Every five years, most water corporations submit a pricing submission to ESC. Pricing submissions outline the key strategies, projects, initiatives, revenue and operational requirements that impact future water pricing.

Water corporations also engage with their customers to determine their willingness to pay for water services, including recycled water.

ESC approved most water corporations' 2018–2023 pricing submissions in June 2018.

IWM planning

DELWP established 10 regional and five metropolitan IWM forums as an action from *Water for Victoria*. These forums play a role in reviewing and identifying opportunities for recycled water use through IWM plans.

Through the forums, participating organisations aim to collaboratively deliver location-based water solutions that achieve the best community outcomes for the least cost.

1.5 Roles and responsibilities

Department of Environment, Land, Water and Planning

DELWP is the water sector's lead agency. It is responsible for the sector's administration, policy and regulation.

DELWP oversees water corporations' performance in supplying water and sewerage services under the *Water Act 1989*.

Environment Protection Authority Victoria

As Victoria's environmental regulator, EPA regulates wastewater discharges and recycled water use. The *Environment Protection Act 2017* requires EPA to protect human health and the environment by reducing the harmful effects of pollution and waste. Its role includes:

- approving:
 - all class A recycled water schemes
 - class B and C schemes with a capacity of over 1 ML a day
- auditing, reviewing, modifying and revoking recycled water schemes
- issuing guidelines, such as the *Victorian guideline for water recycling*
- issuing licences to water corporations that control environmental standards for wastewater discharges
- informing and educating the community and stakeholders about the health and environmental risks associated with using recycled water.

Water corporations

Victoria's 18 water corporations include:

- Melbourne Water, which is the wholesale provider to the three metropolitan urban water corporations
- three metropolitan urban water corporations that service Melbourne
- 12 regional urban water corporations that service regional cities and towns
- four rural water corporations that provide services for irrigation, stock, environmental and recreational purposes (two of these corporations are also regional urban water corporations).

Under the *Water Act 1989*, water corporations are responsible for:

- supplying water and wastewater services
- educating the community about water supply and sewage
- developing and implementing programs for conserving and efficiently using water.

In addition, the *Water Industry Act 1994* sets out water corporations' objectives for service delivery, pricing and performance. Under this Act, the Minister for Water may issue:

- statements of obligations to water corporations, which inform how they should perform their duties and apply government policies
- letters of expectations, which outline performance expectations and priorities for the water sector to deliver *Water for Victoria's* actions.

Barwon Water

Barwon Water is Victoria's largest regional urban water corporation. It supplies services to over 320 000 people. Its region includes Geelong with a boundary extending to Little River, the Bellarine Peninsula, Colac, Apollo Bay, Meredith and Cressy.

Councils

Councils are responsible for managing stormwater, drainage and urban planning under the *Local Government Act 2020* and the *Planning and Environment Act 1987*.

City of Greater Geelong

The City of Greater Geelong provides community services to the greater Geelong area. Geelong is Victoria's largest regional city with a population of over 268 000 people. The City of Greater Geelong's municipality covers an area of 1 248 square kilometres and includes the Bellarine Peninsula, the Barwon River and the You Yangs Regional Park.

The City of Greater Geelong uses recycled water to irrigate its sportsgrounds. Residents in its fastest growing residential area of Armstrong Creek receive recycled water through a purple pipe network.

Department of Health

The Department of Health regulates the quality of drinking water to protect and promote public health through the *Safe Drinking Water Act 2003*.

Essential Services Commission

ESC determines water pricing and oversees service standards for Victoria's water agencies under the *Essential Services Commission Act 2001*. It publicly reports on the Victorian urban water sector's performance as a whole and for each individual water corporation.

2.

Managing barriers to using recycled water

Conclusion

DELWP, EPA and Barwon Water have a good understanding of the barriers that can influence recycled water use. DELWP is working with the water sector to deliver a program of initiatives to explore and manage these barriers.

Community and stakeholder attitudes towards recycled water have improved over the last decade. However, DELWP needs to play a greater role in educating water users about water security and the benefits and risks of using recycled water.

Since 1988, water corporations have been able to use recycled water for environmental benefit. However, due to low demand expressed by waterway managers, EPA and DELWP have only recently progressed a guidance framework for this. DELWP, EPA and ESC are working together to clarify the definitions for environmental benefit to improve consistency in reporting.

This chapter discusses:

- Understanding potential barriers
 - Understanding and addressing stakeholder and community attitudes
 - Navigating regulatory and policy barriers
 - Managing physical barriers
 - Managing economic barriers
-

2.1 Understanding potential barriers

DELWP has improved its understanding of the barriers that influence recycled water use by engaging with IWM forums. In 2018, IWM forums identified the top barriers to achieving their desired water outcomes. Figure 2A lists the recycled water barriers by importance to metropolitan and regional IWM forums.

FIGURE 2A: **Recycled water barriers identified by IWM forums**

Recycled water barriers

Perceived lack of grant funding to encourage investment in recycled water projects

Policy does not support or provide guidance for all possible recycled water end uses

Community water literacy is not at a level where technology, costs and the benefits of water cycle infrastructure is understood or accepted

Current policy prevents recycled water from being considered as a potential benefit to waterways

Source: VAGO, based on DELWP.

DELWP's priority work program

DELWP used this knowledge to develop a priority work program that has the potential to address these barriers, which Figure 2B shows. DELWP has also commissioned studies and set up joint working groups to further understand them. However, the impact of these activities is unclear because most of them are still in progress.

FIGURE 2B: **DELWP's 2020–21 priority work program for recycled water**

Theme	Key deliverables and actions	Expected completion date
End-use regulation	• Update EPA's water recycling guidelines	Completed 2021
	• Investigate mandating recycled water use for some purposes	Completed 2021
	• Develop a framework for using recycled water for environmental benefit	2022
Economic framework	• Develop a common economic evaluation guideline	Completed 2020
	• Encourage use of the cost allocation framework	End of 2021
	• Develop guidance for funding and financing IWM projects	End of 2021
	• Develop public funding investment principles	March 2022
	• Communicate findings of the pricing review	End of 2021
Infrastructure	• Invest in recycled water projects through IWM grants and other funding	Ongoing
	• Investigate the feasibility of large-scale recycled water networks— Assessment of a City-wide Alternative Water Network	End of 2021
Education	• Develop a recycled water narrative	March 2022
	• Increase visibility of recycled water use	2022
	• Update wastewater irrigation development guidelines	2022
Incentives	• Consider incentives for target industries, such as co-investment through IWM funding	Ongoing
Research	• Investigate gaps in research, such as contaminants and technology	End of 2021

Source: VAGO based on DELWP.

In 2020, DELWP held two workshops to test its work program with water corporations and VicWater. DELWP surveyed participants and found that 73 per cent agreed with its work program. Participants asked DELWP to prioritise the project for using recycled water for environmental benefit.

DELWP reports progress against its work program to IWM forum meetings. It also reports to the Resilient Cities and Towns Reference Group, which was set up by the Minister for Water to advise DELWP on delivering chapter 5: Resilient and liveable cities and towns of *Water for Victoria*.

In this chapter, we examine DELWP's work to address the following barriers through its priority work program:

- stakeholder and community attitudes
- regulatory and policy barriers
- physical barriers
- economic barriers.

VicWater is the peak industry association for water corporations in Victoria. Its role includes influencing government policy, addressing industry issues and providing information to its members and stakeholders.

2.2 Understanding and addressing stakeholder and community attitudes

A 2014 national survey conducted by the Cooperative Research Centre for Water Sensitive Cities found that Australians did not have a good understanding of wastewater and how it is treated. The survey also found that Victorians had a lower level of water-related knowledge compared to other states. Just 10 per cent of Victorians were 'water literate'.

Many Victorian water users are not aware of the state's water security challenges. They consider recycled water high risk and have indicated a preference to use drinking water for purposes that a lesser-quality water source would satisfy. This is even in situations where recycled water costs less than drinking water.

Relevant agencies need to understand and address this lack of knowledge to increase recycled water use in Victoria. To do this, they need to understand the community's concerns better and build its understanding of water security and the benefits and risks of using recycled water. This will help to change attitudes and increase recycled water use where it is safe, suitable and supported.

Barwon Water

Barwon Water effectively engages councils, local members of parliament, community and environmental groups, customer and environment advisory committees and household water customers to understand their attitudes towards recycled water and its uses. It uses this information to inform its decisions about current and future recycled water use.

Engaging the community to inform water planning

In 2019, Barwon Water launched its engagement program, Water for our Future. Through the program, Barwon Water involves the community to:

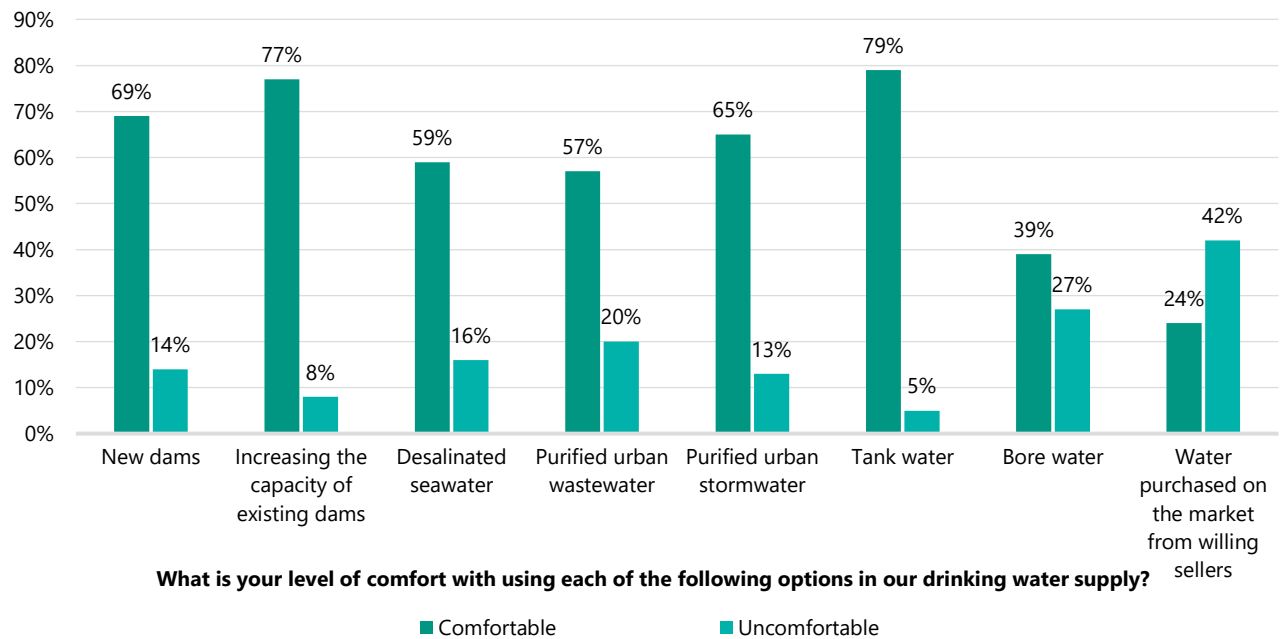
- plan its future priority work
- inform its 2022 urban water strategy.

Barwon Water has engaged with over 5 000 people through a broad range of activities within the program.

From August 2019 to June 2020, Barwon Water conducted community outreach surveys and engagement events as part of the Water for our Future program. It found that 31 per cent of respondents are interested in recycled water as a new water source.

Further customer research, which Barwon Water conducted from March 2020 to August 2020, also found that 57 per cent of respondents are comfortable with recycled water as a potential future drinking water supply, as Figure 2C shows.

FIGURE 2C: Barwon Water customers' attitudes towards different drinking water supplies



Note: Purified urban wastewater is recycled water for drinking purposes.

Source: VAGO, based on Barwon Water's Water for our Future community engagement.

Other engagement activities

Barwon Water engages with and educates its community through its website, social media, media releases and community newsletters. It also delivers recycled water education programs to schools that are in residential areas with purple pipes.

Barwon Water engaged with the community to inform its 2018 pricing submission to ESC, which set its water prices for 2018 to 2023. It used focus groups, interviews and customer perception surveys to collect insights into community attitudes towards recycled water.

Barwon Water regularly engages with its recycled water customers. It collects feedback from its class A recycled water customers through targeted email and telephone campaigns. Its account managers regularly engage with class C recycled water customers to address queries and record issues.

Measuring engagement and education

Barwon Water's corporate strategy, *Strategy 2030*, includes a range of performance indicators for community engagement and education, including participation in school education programs. Barwon Water's executive management monitors its performance through a monthly balanced scorecard.

Department of Environment, Land, Water and Planning

Engaging the community

DELWP engages with the community when it is developing policies. Its engagement, which focuses on the whole water cycle, has led to insights into recycled-water-related issues.

For example, DELWP identified that there was a broad range of awareness levels and attitudes towards recycled water through a 2016 *Water for Victoria* focus group. It found that participants strongly supported investing in manufactured water, including desalinated water, recycled water and treated stormwater.

DELWP's engagement with the community and stakeholders on *Water for Victoria* identified the need for greater community education. In response, it conducted community education programs, including a school education program. However, the programs do not specifically relate to recycled water.

DELWP is assessing if there is a specific gap in its community engagement about recycled water and if there is, what it should do to address it. This is one of the areas it is focusing on in the development of the new Central and Gippsland region SWS.

DELWP also engages with Traditional Owners on water policy, programs and projects that they self-determined as a priority. For example, it engages with Traditional Owner groups to identify opportunities to return water to country.

Improving public information

DELWP is also working to improve publicly available water data. For example, DELWP developed the Victorian Water Accounts, which is an online, user-friendly and engaging overview of water use and availability across the state.

DELWP also publishes a snapshot of Victoria's current and emerging water security position in its biennial statements. This interactive dashboard provides information about various water sources across the state.

While DELWP's biennial statements do not include recycled-water-specific information, they outline water infrastructure, projects and challenges across Victoria, which is useful for understanding what roles recycled water can play.

Despite this, DELWP's public reporting does not contain sufficient information about recycled water to allow interested parties to identify opportunities for future recycled water use.

Understanding stakeholder views

DELWP engages well with its stakeholders.

For example, in May 2021, DELWP held a workshop to examine what role the state government should play in recycled water communications in response to feedback from IWM forums. Participants included water corporations, councils and other government agencies. Key findings from the workshop included:

- Recycled water communications need to be part of a broader water education and water security narrative.
- There is strong support for the government to play a role in these communications.

- Communication activities need to be tailored for different user and community groups.
- Key messages across these activities need to be reinforced.

Responding to stakeholder feedback

Following the May 2021 workshop, DELWP used its understanding of community attitudes towards recycled water to develop a program to help water corporations engage and educate their communities. This will support water corporations to better understand and address community concerns and increase community understanding of water security issues and recycled water.

DELWP will develop and implement this program alongside its broader programs to improve two-way communication with the community about water security.

Sharing knowledge with stakeholders

In July 2016, DELWP funded a program to prepare its key stakeholders for IWM. This program delivered IWM workshops and masterclasses to build IWM skills for councils, water corporations and catchment management authorities across the state over a two-and-a-half-year period. Over 3 000 people from 630 organisations took part.

DELWP also conducted an alternative water webinar in November 2020 about IWM planning and policy updates related to recycled water. More than 250 water stakeholders statewide attended the event.

Environment Protection Authority Victoria

As Victoria's environmental regulator, EPA works with recycled water stakeholders. Its engagement focuses on health and safety concerns and the environmental impacts of wastewater discharge and recycled water use. EPA engages with stakeholders by:

- hosting stakeholder workshops
- responding to complaints and queries from the public
- regulating water corporations' wastewater discharges
- attending IWM forums.

This has enabled EPA to gain insights into recycled water issues that are relevant to its regulatory role.

Addressing stakeholders' concerns

EPA convenes a water industry reference group, where all water corporations, VicWater and relevant state government departments collaborate and openly discuss issues related to the water industry and EPA.

EPA also maintains a dedicated page on its website about recycled water, which provides access to technical information and support for class A recycled water users.

Understanding recycled water users' attitudes

EPA notes that cross-connection incidents that lead to drinking water contamination affect the community's confidence in recycled water. Four incidents have been identified since 2009.

A **cross-connection incident** occurs when a drinking water supply system is connected to a non-drinking supply or other substance that could result in drinking water contamination.

EPA also notes that several councils terminated their recycled water schemes after the Millennium drought broke and reverted to using drinking water due to perceived safety concerns. Consequently, EPA believes there is a need to better educate recycled water users, including councils, that recycled water is a reliable and important water supply option.

City of Greater Geelong

The City of Greater Geelong's community engagement focuses on land planning issues and understanding community expectations about urban parks and sportsgrounds. It also collaborates with key stakeholders on recycled-water-related issues.

The council has been involved in the Barwon IWM forum since it started in 2018. It plays a significant part in some of the forum's priority projects. For example, it leads the \$400 000 Stead Park project, which irrigates sportsgrounds with recycled water. It is also in a working group with Barwon Water to link IWM planning with delivering the Northern and Western Geelong Growth Areas (NWGGA).

2.3 Navigating regulatory and policy barriers

The state's regulatory and policy settings for using recycled water aim to protect public health and the environment. It is important that DELWP reviews them to ensure they do not unnecessarily limit recycled water use.

DELWP has a good understanding of the regulatory and policy barriers to recycled water use. It is effectively working with the water sector to improve regulatory and policy frameworks to support recycled water use and improve water security.

Recycled water for environmental benefit

Since 1988, EPA's *State Environment Protection Policy (Waters of Victoria) 1988* has allowed water corporations to use treated wastewater for environmental flows in stressed waterways.

While some water corporations have expressed interest in this, EPA has not produced guidance on what information water corporations need to submit to seek approval to use recycled water for environmental benefit.

Four of the state's 18 water corporations report that they use recycled water for beneficial allocation, which is how ESC categorises environmental benefit. EPA assessed these applications as part of each water corporation's discharge licence or effluent re-use scheme against the relevant requirements in the *Environment Protection Act 1970* and associated regulations.

Investigating recycled water use for environmental benefit

In 2009, the former Department of Sustainability and Environment (now DELWP) commissioned an investigation into using recycled water for flow-stressed waterways. This investigation led to its Report for Sewage Treatment Plant Discharges to Flow Stressed Waterways, which concluded that discharged treated wastewater benefits stressed river systems.

DELWP advised us that it has not taken further action on the report because using recycled water for flow-stressed waterways has not been a priority for waterway managers since the Millennium drought broke in 2010.

In 2016, *Water for Victoria* recognised an opportunity to use recycled water for environmental water outcomes at a more local level. This is becoming increasingly important given the drier climate outlook.

DELWP has recently progressed this work in response to recent interest from waterway managers (catchment management authorities and Melbourne Water). Waterway managers have the authority under EPA's *State Environment Protection Policy (Waters of Victoria)* to decide if recycled water meets a waterway's flow requirements.

Current environmental benefit use

Water corporations identify opportunities to use recycled water for environmental benefit when developing their urban water strategies.

Two water corporations discharge treated wastewater into ecologically and culturally significant wetlands that are protected by an international agreement called the Ramsar Convention. They are:

- East Gippsland Water, which has discharged recycled water into the Macleod Morass near Bairnsdale since 1939. It works with Parks Victoria to manage nutrient levels and water flows to protect the wetland habitat
- Melbourne Water, which discharges treated wastewater from the Western Treatment Plant near Werribee to support the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar-listed wetland. This has provided benefits for waterbirds, migratory shorebirds and benthic fauna.

DELWP acknowledges that there are clear cases of recycled water discharges providing some environmental benefit. DELWP and EPA are developing a risk framework for environmental benefit assessments. They are also looking at protecting water added for environmental benefit from being:

- removed or used further downstream
- redirected by a water corporation to meet future customer demand for recycled water.

Developing guidance

In 2018, EPA was developing a decision-making framework to help water corporations use recycled water for environmental benefit. However, this framework did not progress due to EPA's other reform priorities and lack of dedicated resources for this work.

In 2019, DELWP established a joint working group to progress this framework. Drivers of this work include ongoing studies in parts of Melbourne, which are investigating the potential for recycled water to benefit flow-stressed waterways.

The working group includes representatives from DELWP, EPA, the Department of Health, Melbourne Water, Barwon Water and the North Central Catchment Management Authority. As of September 2021, it is developing a risk assessment framework to assess flow and quality risks and benefits. DELWP expects the

The Ramsar Convention is an international treaty aimed at preserving natural resources. Its aims are to halt the worldwide loss of wetlands and conserve those that remain.

Benthic fauna are invertebrates that live on the bottom of a sea, river or lake. For example, worms, crabs and starfish.

framework to be finalised by late 2021. This will inform the guidelines it expects to complete by late 2022.

DELWP intends to test community attitudes to using recycled water for environmental benefit as part of its Central and Gippsland SWS engagement process.

Water recycling guidelines

DELWP and EPA are improving their water recycling guidelines. This involves regulatory changes and conducting research to address the water sector's concerns.

In 2018, DELWP started coordinating a review of EPA's water recycling guidelines with the support of a working group, which included EPA, the former Department of Health and Human Services, VicWater and Yarra Valley Water. The working group agreed that improvements were required to address the water sector's feedback about:

- multiple outdated guidelines
- unclear roles and responsibilities
- extended timeframes for approving recycled water schemes and new recycled water uses.

The working group drafted new guidelines in 2020. In November 2020, community and stakeholder feedback on the draft guidelines found that 62 per cent of respondents thought the changes improved the guidelines' useability.

In March 2021, EPA released updated and consolidated water recycling guidelines. In early 2021, DELWP and EPA started the second stage of this review, which includes:

- updating irrigation guidelines, which are around 30 years old
- improving scientific knowledge of emerging contaminants in recycled water.

Emerging contaminants

The government does not fully understand the risks posed by emerging contaminants. This could impact the government's decisions about recycled water use, as these are informed by its understanding of risks and benefits.

Emerging contaminants in recycled water and wastewater discharges is a growing issue across Australia due to their potential impact on human health and the environment.

DELWP is funding a project that started in 2019 to help EPA, VicWater and water corporations better understand this issue. The project is testing water samples for 250 contaminants of concern, including:

- per- and polyfluoroalkyl substances (PFAS)
- pharmaceuticals and personal care products
- endocrine-disrupting chemicals
- pesticides and herbicides
- phenols
- disinfection by-products.

This work will help DELWP and EPA understand and manage new and emerging contaminant risks and make decisions about future uses for recycled water. EPA expects to publish the findings by the end of 2021.

2.4 Managing physical barriers

DELWP and Barwon Water proactively manage physical barriers that limit the water sector's ability to supply recycled water. These barriers include:

- the distance between wastewater treatment plants and potential customers, which impacts recycled water's availability and use due to delivery costs
- councils developing land before water corporations plan water infrastructure
- the need to construct a separate pipeline to deliver recycled water from treatment plants to customers
- retrofitting infrastructure in developed areas, which is much more expensive than constructing infrastructure in new developments
- limited storage capacity for surplus recycled water during wet seasons and years.

Urban land planning

DELWP is examining new ways to manage physical barriers and has embedded IWM principles into strategic land-use policy and planning processes.

DELWP has identified potential opportunities in land use and water planning processes to reserve spaces for recycled water assets. Building these assets close to potential users maximises opportunities for future recycled water use.

In 2020, DELWP and the Victorian Planning Authority commissioned a review, *Resolving Barriers to Integrated Water Management in Precinct Structure Plans and Greenfield Development*, to evaluate these opportunities in Melbourne's western growth corridor. The project tested the assumption that precinct structure plans could provide the basis to embed IWM principles in the earliest stages of development.

This project contributed to the Victorian Planning Authority including suggestions to improve recycled water in its draft *Precinct Structure Planning Guidelines: New Communities* in Victoria in June 2021. The draft guidelines include suggestions to improve recycled water planning, such as:

- locating and designing sporting reserves to take advantage of recycled water opportunities
- considering the seven IWM strategic outcomes during urban planning
- preparing an IWM plan to inform proposed urban development, open spaces and utility infrastructure.

The Victorian Planning Authority aims to finalise these guidelines in the second half of 2021.

In March 2021, DELWP entered into a funding agreement with the Victorian Planning Authority. Through this agreement, the Victorian Planning Authority is providing advice to DELWP and support to IWM forums to develop and progress projects.

Precinct structure plans set out the future structure, long-term land subdivision and development of new neighbourhoods.

Protecting agricultural land

DELWP is taking steps to optimise recycled water opportunities close to water supplies by protecting agricultural land on the edge of urban areas from urban development.

DELWP's planning group has started a strategic agriculture land project with the support of Agriculture Victoria. The project aims to tighten planning controls to:

- maintain the benefits that agricultural land on the edge of urban areas provides
- manage land to support long-term agricultural use.

DELWP's resilient cities and towns water team has been actively involved in the project to ensure IWM is embedded in this work.

From mid-2020 to early 2021, DELWP consulted with key stakeholders on its *Planning for Melbourne's Green Wedges and Agricultural Land: Consultation Paper*. Farmers and other key stakeholders identified access to fit-for-purpose water as the most important criteria for defining important agricultural land.

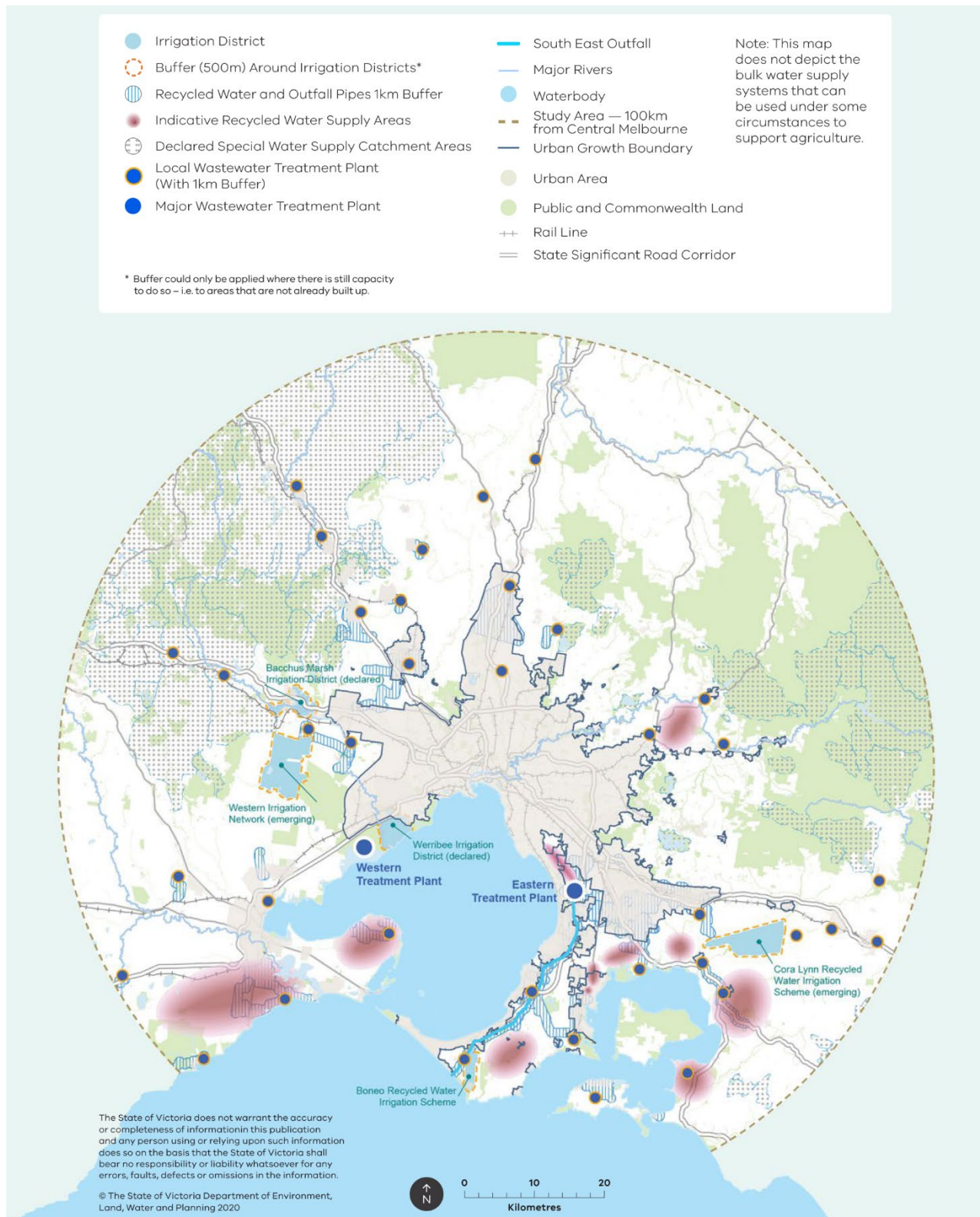
The paper proposes that the planning system protects agricultural land close to existing water infrastructure, including existing water reclamation plants and recycled water pipe networks.

Based on this consultation, DELWP's resilient cities and towns water team helped the planning group develop draft planning amendments that:

- ensure land-use decision-making preserves recycled water opportunities for the future by avoiding permanent land-use changes
- include a map showing recycled water supply areas around water reclamation plants to protect these areas from development and allocate them for irrigated agricultural use, which Figure 2D shows.

Green wedge policy aims to protect significant features and assets found in Melbourne's green wedges. Peri-urban land is important for the environmental, economic, cultural, health and wellbeing outcomes for all Victorians.

FIGURE 2D: Recycled water areas for potential agricultural use



Source: DELWP's Planning for Melbourne's Green Wedges and Agricultural Land: Consultation Paper.

Barwon Water's work to manage physical barriers

Barwon Water understands the impact of physical barriers. It effectively manages them as it explores opportunities to increase recycled water use. For example, Barwon Water:

- located the Northern Water Plant next to a large industrial demand site—an oil refinery
- is extending the recycled water pipeline from the Portarlington Water Reclamation Plant to supply more customers on the Bellarine Peninsula
- is exploring further opportunities for industrial use around the Northern Water Plant
- is exploring further opportunities for agricultural use near the Black Rock Water Reclamation Plant
- worked with a local golf club to develop a sewer mine that pumps wastewater from the main sewer pipe for treatment and use at the club
- is planning to locate future water reclamation plants in the NWGGA close to residential and agriculture demand.

Investigating ways to reduce the cost of physical barriers

Figure 2E provides an example of how water corporations are investigating ways to reduce the costs of recycled water infrastructure for potential customers.

FIGURE 2E: **Case study: Assessment of a City-wide Alternative Water Network project**

Melbourne water corporations are assessing opportunities to connect existing water networks and emerging recycled water schemes to achieve greater economic benefits than individual projects would achieve.

In 2020, water corporations from the five metropolitan Melbourne IWM forums noted that while investments in recycled water infrastructure address local needs, they do not consider the broader regional benefits or future changes in Melbourne's physical characteristics.

To address these issues, DELWP and Melbourne Water are investigating if it is more cost-effective to build a large-scale recycled water supply pipeline through existing urban areas. This could be built simultaneously with Melbourne's major rail and road projects to reduce disruptions and construction costs.

For example, South East Water is investigating options to run a recycled water pipeline from Dingley Village to the Yarra Valley. It is planning to combine this work with the Mordialloc bypass construction.

Melbourne water corporations expect to complete their feasibility investigation of a large-scale water supply network by the end of 2021.

Source: VAGO, based on DELWP information.

2.5 Managing economic barriers

DELWP has a good understanding of how the cost of recycled water projects, including the cost of infrastructure, wastewater treatment, storage and discharge, impact recycled water use. DELWP has taken effective steps to help the water sector evaluate the feasibility of these projects.

Figure 2F shows the economic evaluation resources that are available to help the water sector evaluate the cost and feasibility of recycled water projects.

FIGURE 2F: **Economic evaluation resources**

Body	Key resources
DELWP	• <i>Preliminary Assessment Method for Integrated Water Management Strategies</i> (2015) • <i>A cost allocation framework for IWM projects</i> (2017) • Draft funding principles (2020)
Cooperative Research Centre for Water Sensitive Cities	• <i>Investment Framework for Economics of Water Sensitive Cities</i> (2020) • Financing and funding framework and resources (in development)

Source: VAGO.

In 2018, the Resilient Cities and Towns Reference Group and IWM forums identified that there was a lack of a common, best-practice evaluation framework to help water corporations and their investment partners consistently evaluate the cost and feasibility of recycled water projects. To improve IWM forums' consideration of project costs, the group agreed to review the existing documentation and how it will be used to improve the way IWM forums consider project costs. The tools listed in Figure 2F respond to these needs.

Water for Victoria included an action for developing a common evaluation framework that can consider different planning scales, local conditions and the multiple benefits of proposed investments.

DELWP's IWM economics working group was set up in 2019 to test and evaluate its economic evaluation tools. In 2020, DELWP tested some of its economic evaluation resources and found:

The ...	provide/s ...
cost allocation framework	a clear, logical method of allocating costs among parties.
Cooperative Research Centre for Water Sensitive Cities resources	a valuable range of resources, guidelines and clarifications for users who have some familiarity with cost-benefit analysis.
DELWP draft funding principles	high-level guidance with insufficient detail, which means that in their current form, they may not achieve their stated objectives of guiding government investment.

3.

Optimising recycled water use

Conclusion

DELWP is delivering *Water for Victoria's* actions to increase recycled water use for non-drinking purposes. It is too early to see the impact of these activities because most of them are still in progress.

Barwon Water proactively pursues opportunities to increase recycled water use. It has set an ambitious long-term goal for recycled water use that is challenging to meet. It is on track to achieve its interim goal to increase recycled water allocated for productive use by 1 000 ML per year by June 2023.

DELWP, Barwon Water and the City of Greater Geelong are collaborating with other water stakeholders through the Barwon IWM forum. This forum is identifying and planning for recycled water opportunities earlier to reduce future demand for other water sources.

This chapter discusses:

- Planning to increase use
 - Funding recycled water projects
 - Stimulating new demand
 - Measuring impact
-

3.1 Planning to increase use

Water for Victoria does not set a target or performance measures for increasing recycled water use.

DELWP advised us that this is for a number of reasons, including lessons learnt from the 20 per cent wastewater recycling target that the government set in 2002. It explained that this target, which was met in 2008, drove investment decisions and an initial increase in the state's recycled water supply and use. However, this growth has not been sustained and the target also resulted in some investments that were not as economically efficient as possible.

DELWP also advised us that the experience taught the water industry that the most sustainable, reliable and cost-effective mix of water sources should be sought in each location, rather than a blanket target for one water source.

Most water corporations have short-term goals on recycled water use. For example, Barwon Water has set interim and long-term targets to increase recycled water use. While it is on track to achieve its interim goal, its long-term target is aspirational.

DELWP's goal setting

While DELWP has not set statewide numeric targets, it has identified actions to increase recycled water use. DELWP is working with water corporations and other key stakeholders to drive an outcomes and location-based approach to setting goals for recycled water use.

DELWP advised us that it intentionally did not set specific or numeric goals in *Water for Victoria* or in its Budget Paper No. 3 performance measures due to experience with the 2002 target.

Moving towards a new goal-setting approach

Metropolitan IWM forums are developing a more effective approach to goal setting in their catchment scale IWM plans. They are basing this approach on water sources that provide the best outcomes in each geographical area. This requires agencies involved in water management to evaluate all water supply options against local needs and circumstances.

DELWP notes that this approach will provide more flexibility and identify a broader range of potentially cheaper solutions. For example, catchment scale IWM plans will set a range of outcomes and measures, including targets, to drive catchment and local-scale investments.

In regional Victoria, DELWP has initiated town water balance assessments for representative locations. This is the first step towards building an evidence base to define the best location-specific outcomes. Growth was a key factor in how DELWP selected the representative locations, which include Wangaratta, Geelong and Wodonga.

Actions to increase recycled water use

Figure 3A lists the key actions in *Water for Victoria* to drive recycled water uptake.

FIGURE 3A: **Water for Victoria's recycled water actions**

Action	Description
Action 5.1	Use diverse water sources to protect public spaces, clarify and improve regulatory arrangements for recycled water
Action 5.2	Better urban water planning to address key challenges—develop urban water strategies to look at all drinking and non-drinking water sources and the appropriate use of each source to protect human health
Action 5.6	Work across government for healthy and resilient urban landscapes—strengthen links across portfolios to better align land use and water management planning
Action 5.7	Represent community values and local opportunities in planning—adopt a systematic approach to IWM planning
Action 5.8	Put IWM into practice—support implementation of IWM planning

Source: DELWP, excerpt from chapter 5 of *Water for Victoria*.

These key actions have led to positive outcomes. For example:

- DELWP has increased guidance and expectations for how urban water corporations should plan for recycled water in their urban water strategies
- DELWP established the IWM program to drive collaborative planning for recycled water projects
- DELWP invested in feasibility studies, business cases and constructing recycled water projects
- DELWP and EPA have done recycled water policy work to address barriers to recycled water uptake, such as improving EPA's guidelines.

Water corporations' goal setting

Most water corporations have specific, measurable and time-bound short-term targets on recycled water use that they report against. These targets range from recycling 4 to 100 per cent of the total volume of wastewater they treat. In 2019–20, 13 water corporations reported their performance against recycled water use targets in their annual report.

Barwon Water's goal setting

Barwon Water's recycled water actions

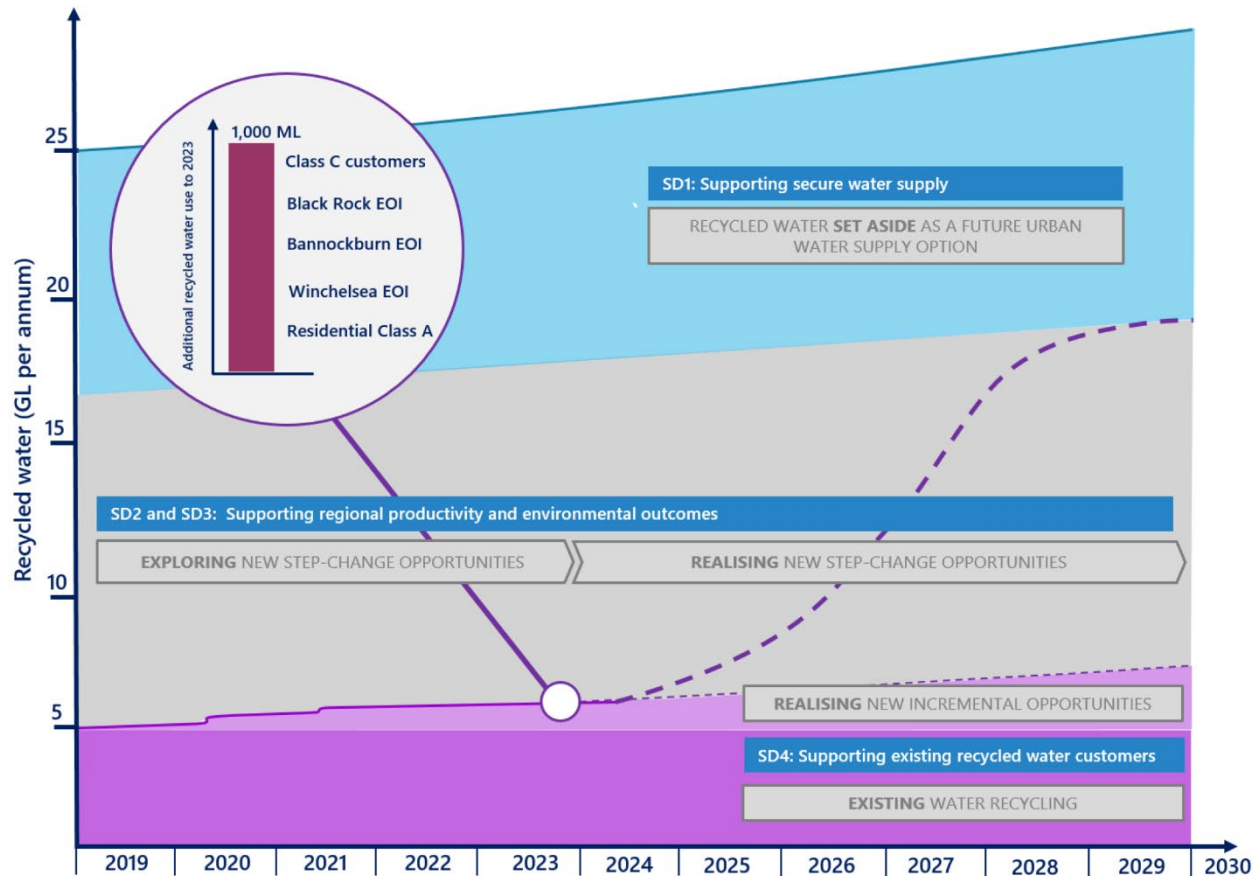
As Figure 3B shows, Barwon Water has set an interim and a long-term goal to increase recycled water use. These goals are to:

- increase the volume of recycled water allocated for productive use by 1 000 ML per year by June 2023
- re-use 100 per cent of wastewater by 2030.

Barwon Water's Recycled Water Plan sets actions to deliver its interim 2023 target. These actions are achievable and aligned to its interim target. Barwon Water monitors its performance against these actions and reviews the opportunities, challenges, actions and lessons learnt for each strategic direction in monthly executive meetings.

While Barwon Water has outlined the key steps towards achieving its 2030 goal, which Figure 3B shows, it has not identified specific actions yet.

FIGURE 3B: Barwon Water's interim and long-term recycled water goals



Note: 'SD' stands for strategic direction.

Source: Barwon Water's Recycled Water Plan.

Barwon Water's Recycled Water Plan describes the strategic directions it will take to achieve its long-term goal of 100 per cent water recycling and zero waste.

As Figure 3B shows, Barwon Water's four strategic directions are:

- supporting secure water supplies by reserving an allocation of recycled water to keep as a long-term future option for drinking water
- supporting regional productivity
- supporting better environmental outcomes
- supporting existing recycled water customers.

While using recycled water for drinking water supplies is possible with existing technologies, Victoria's regulatory, legislative and policy settings do not support this use. However, policy settings may change in the future.

Barwon Water advised us that such a change would require several years to implement because regulators would need to demonstrate the safety and effectiveness of treatment processes. They would also need to engage extensively with the community.

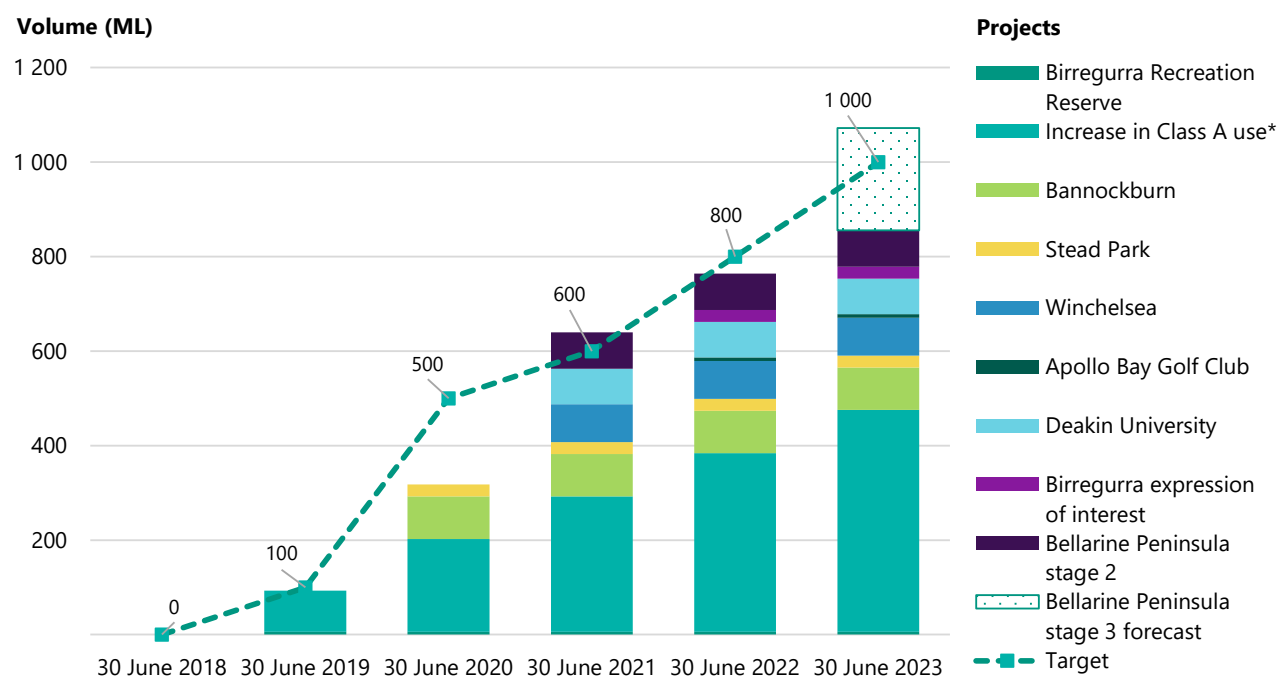
For these reasons, Barwon Water has reserved some recycled water for drinking purposes in the future rather than in the short term. If policy settings do not change, Barwon Water will use this water for non-drinking purposes when the demand for other allocations are met.

Barwon Water's progress against its goals

Barwon Water monitors and reports its progress against its interim goal internally and annually to ESC as part of its outcomes reporting. Figure 3C shows that as of 30 June 2021, Barwon Water is ahead of its target and on track to achieve it by 2023.

ESC **outcomes reporting** involves water corporations self-assessing their performance against their own performance measures and targets using a traffic light system.

FIGURE 3C: **Barwon Water's performance against its interim goal**



Note: *Compared to Class A use at the start of the 2018 pricing submission.

Source: VAGO, based on Barwon Water data.

In May 2021, Barwon Water reviewed its goals to inform its *Strategy 2030* update and 2023 pricing submission. It is retaining its aspirational goal to recycle 100 per cent of treated water by 2030. Barwon Water notes that this is a challenging ambition because:

- the regulatory environment and costs compared to the benefits of using recycled water for environmental benefit are uncertain
- the timeframe for identifying and developing a large-scale recycled water project for either environmental benefit or regional productivity by 2030 is relatively short.

However, Barwon Water told us that it will keep working towards the target in case the technologies, costs and regulatory settings change by 2030.

Barwon Water is also considering committing to a specific recycled water target for 2028. It will make a final decision on this target as part of its 2023 pricing submission.

Working together to identify opportunities

DELWP, Barwon Water and the City of Greater Geelong are working together with members of the Barwon IWM forum to increase recycled water use.

Identifying and prioritising projects

In 2018, the Barwon IWM forum developed the *Barwon Strategic Directions Statement 2018*, which sets the forum's strategic direction. It also identifies 15 priority projects to achieve the forum's strategic outcomes. Most projects focus on developing IWM plans in local areas, including two recycled water projects:

- Barwon Water's Recycled Water Plan
- the City of Greater Geelong's Stead Park project, which is a \$400 000 project to irrigate a sportsground with 25 ML of class A recycled water per year. This project will save 17 ML of drinking water per year.

Barwon Water has completed its Recycled Water Plan. It is currently delivering the Stead Park project in partnership with the City of Greater Geelong.

The Barwon IWM forum prioritises projects that:

- are geographically spread across the region
- include a mix of capital and strategic work, such as research or developing an IWM plan
- deliver on the outcomes of:
 - *Barwon Strategic Directions Statement 2018*
 - *Water for Victoria*
 - government policies.

It also considers projects that have an IWM plan.

In June 2021, the Barwon IWM forum refreshed its list of priority projects. It has included five recycled water projects in its list of 18 priority projects, which Figure 3D shows.

There are four main types of recycled water projects:

- drinking water substitution projects that defer or avoid adding to conventional water supplies
 - projects to comply with EPA's discharge licences
 - projects to use surplus wastewater
 - research and development projects.
-

FIGURE 3D: **Barwon IWM forum's priority projects**

Projects	Project type	Lead organisation
Recycled water (5 projects)		
Recycled water to Bannockburn township	Strategy	Golden Plains Shire
Recycled water to the Surf Coast	Project	Barwon Water
Implementing the NWGGA IWM Plan through the precinct structure plan process	Strategy	Barwon Water
Bellarine Peninsula—stage 3	Project	Barwon Water
Bellarine Peninsula—stage 4	Project	Barwon Water
Other projects		
IWM plans (4 projects)	Strategy/project	Various councils
Water for our Future—urban water strategy (1 project)	Strategy	Barwon Water
Waterways, flooding and sustainability (5 projects)	Strategy/project	Various organisations
Wastewater improvements (1 project)	Project	Barwon Water
Stormwater (2 projects)	Project/capital works	Various organisations

Source: Barwon IWM forum's project opportunities list from its *Barwon Strategic Directions Statement 2018*, which was refreshed in June 2021.

Barwon Water is working with its partners to deliver the recycled water projects listed in Figure 3E.

FIGURE 3E: **Barwon Water's current recycled water projects**

Project	Description	Value	ML per year	Partners	Australian Government funding	State government funding
Deakin University	Irrigating outdoor areas and sports facilities with Class A recycled water	\$4.3 million	75	Deakin University	X	✓
Stead Park	Irrigating the sportsground with 25 ML of class A recycled water per year	\$400 000	25	City of Greater Geelong	X	✓
Bellarine Peninsula—stage 2	Extending existing class C recycled water to seven new customers to benefit local wineries, agriculture and tourism	\$1.99 million	77	New customers	X	✓
Bellarine Peninsula—stage 3	Lowering wastewater salinity to increase recycled water use	\$11.1 million	450	None	✓	✓

Source: VAGO, based on information from Barwon Water and DELWP.

In 2018–19, the Barwon IWM forum received co-funding from DELWP to develop an IWM plan for Geelong’s next long-term urban growth area, which Figure 3F describes.

FIGURE 3F: Case study: How the Barwon IWM forum is using recycled water in growth areas

Geelong's future growth corridor, the NWGGA, is the largest urban growth project in regional Victoria. It is also the region's flagship IWM project.

This residential growth area, which covers Lovely Banks, Fyansford and Batesford, will develop over the next 30 to 50 years and be home to businesses, industries and 110 000 residents.

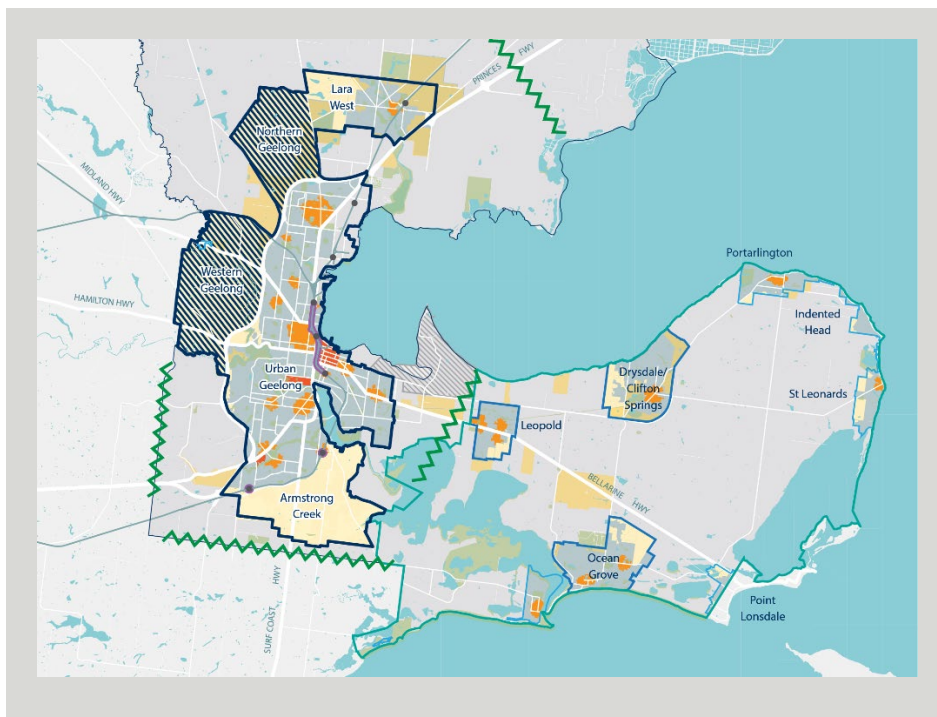
Barwon Water is leading this project with support from water stakeholders. Its Northern and Western Geelong Growth Areas Integrated Water Management Plan, which it completed in 2020, proposes a pathway to deliver recycled water to the growth area for the:

- short term, by supplying class A recycled water from the Northern Water Plant through a newly constructed pipeline to initial phases of the development
- long term from 2035 onwards, by supplying class A recycled water from a newly constructed local water reclamation plant to residents, open spaces, local industries, agriculture and the Moorabool River.

By 2071, Barwon Water aims to reduce demand for drinking water by 5.8 GL a year. It also has the potential to supply up to 2.6 GL of class A recycled water to support Moorabool River’s flow.

The City of Greater Geelong is delivering the IWM plan's recommendations through nine precinct structure plans for the NWGGA.

The image below shows the NWGGA, which is highlighted by black diagonal stripes.



Source: VAGO, based on Barwon Water's March 2021 Northern and Western Geelong Growth Areas Integrated Water Management Plan.

Image source: The City of Greater Geelong's August 2020 Northern & Western Geelong Growth Areas Framework Plan.

Sharing lessons learnt

DELWP shares knowledge of best-practice recycled water initiatives and lessons learnt by:

- attending and presenting at IWM forum meetings and organising biannual meetings of IWM forum chairs and leaders
- including case studies of IWM projects in its forum starter packs and guidance
- launching the Knowledge Hub, which is an online database of case studies from across the state that is available to all participating IWM organisations.

DELWP is continuing to examine opportunities to improve knowledge sharing between regions that have similar challenges. This includes plans for a regional IWM summit in early 2022.

Applying learnings from past projects

As Figure 3G describes, Barwon Water uses its experience from past recycled water projects to inform and improve planning for current projects.

FIGURE 3G: Case study: How Barwon Water's experience with the Black Rock class A residential water scheme informed planning for the NWGGA

In 2013, Barwon Water constructed the Black Rock Recycled Water Plant to treat sewage and supply class A recycled water to residents of the new Armstrong Creek and Torquay North residential estates, which are the fastest-growing areas in Geelong.

Barwon Water, the City of Greater Geelong and the Surf Coast Shire planned Armstrong Creek and Torquay North before the introduction of IWM, when planning was less collaborative.

Barwon Water built the Black Rock plant before residential development. However, operating the plant was not practical until a threshold level of demand (5 800 homes) was achieved in December 2019. Before reaching this threshold, Barwon Water supplied customers with drinking water through purple pipes at the Class A recycled water price.

Barwon Water's projections for recycled water use were based on traditional home lot sizes. It found that customer demand was lower than expected due to smaller lot sizes and water-efficient gardens and household appliances.

Using its learnings from Armstrong Creek, Barwon Water made the following changes when planning the NWGGA:

- reducing recycled water demand assumptions
- not supplying recycled water from a new water reclamation plant from the first day of the development
- initially using the excess recycled water capacity from the Northern Water Plant and constructing local water reclamation plants in stages in line with housing development.

Source: VAGO, based on Barwon Water information.

Barwon Water's experience with Armstrong Creek also informed how it staged the Bellarine Peninsula recycled water project.

Barwon Water staged the Bellarine Peninsula project to match supply with customer demand. It refers to the existing development as stage 1. The other three stages of this project are:

- stage 2—extending the recycled water pipeline to seven more customers who have shown interest in recycled water and are located alongside existing recycled water customers (stage 2 has been funded and is being implemented)
- stage 3—upgrading the Portarlington Water Reclamation Plant to reduce recycled water salinity levels to:
 - increase the volume of recycled water used by current customers who use it for their crops
 - attract new customers who cannot currently use recycled water due to its high salinity levels (government funding for stage 3 has been received)
- stage 4—connecting Drysdale and Clifton Springs to the Portarlington Water Reclamation Plant to increase the volume of recycled water available (stage 4 is subject to Barwon Water receiving funding and completing a business case).

Using learnings from past IWM projects to develop IWM guidelines

In 2020, the Barwon IWM forum developed Guidelines for embedding IWM in the Barwon Region to capture lessons learnt from past developments. Barwon Water, DELWP and local councils jointly funded the project. A consultant interviewed organisations involved in seven Victorian water projects, including Armstrong Creek, to investigate the different methods used to inform future IWM planning.

3.2 Funding recycled water projects

The relatively high cost of producing, distributing and storing recycled water compared to drinking water and the availability of funding and costing policies can be barriers to supplying and using recycled water.

Water corporations, the private sector and all tiers of government fund recycled water projects.

Water corporations will typically fund projects that meet key drivers as part of their normal business operations. They may seek government co-contribution if a project's business case demonstrates that it exhibits a net public benefit. For example, the broader health benefits from green open spaces or the regional economic flow-on effects from water-dependent industries, such as agriculture or tourism.

Due to the amount of time between assessing a project's feasibility to fully operating it, it is too early to see the impact of these projects on recycled water use.

Capital investment

Major capital investments lead to big increases in recycled water use.

In 2011, Barwon Water invested in the Northern Water Plant, next to an oil refinery. Initially, Barwon Water and the oil refinery found that the project was not financially

viable. They went ahead with the project after securing state and Australian Government funding. The parties shared the capital costs between them, including:

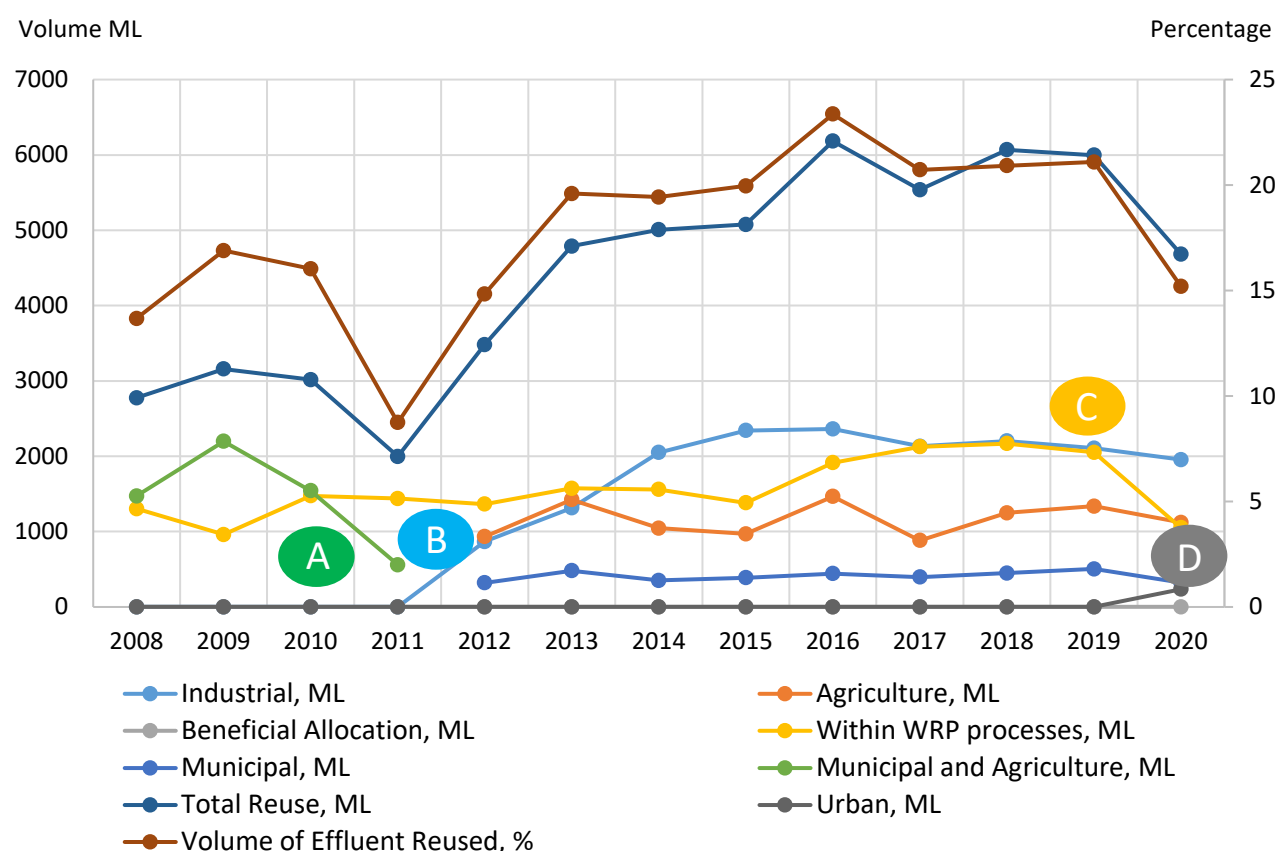
- \$47.5 million from the oil refinery
- \$17.5 million from Barwon Water
- \$20.0 million from the Australian Government
- \$9.2 million from the state government.

As Figure 3H shows, investments in Barwon Water's recycled water infrastructure have increased recycled water use since 2008.

In Figure 3H, Point B (the light blue line) shows the influence of large investments in the biosolids drying facility at Black Rock and the Northern Water Plant in 2011. Both of these investments drove an increase in industrial recycled water use, which resulted in a 1 000 ML increase between 2011 and 2012.

Point D (the dark grey line) marks when the \$43 million Black Rock Class A Recycled Water Plant started operating.

FIGURE 3H: **Barwon Water's recycled water use from 2008 to 2020**



Note: Point A shows the reduction in agricultural use when the Millennium drought broke in 2010. Point C reflects changes to processes at the Black Rock Water Reclamation Plant (or WRP) that reduced the plant's use of recycled water.

Source: Barwon Water.

Australian and state government funding

The Australian Government is a major source of funding for both capital projects and feasibility assessments. One of the main sources of funding is the National Water Grid Authority, which provides funding through the National Water Grid Fund.

Greater Western Water's \$116 million Western Irrigation Network is one of the biggest recycled water projects that the Australian Government is co-funding. The Australian Government has contributed \$48.1 million to the project. Greater Western Water and private agribusinesses are also jointly funding it.

Farmers in the Parwan-Balliang agricultural district, which is near Bacchus Marsh, will benefit from this recycled water irrigation scheme. The project is a major solution to help Greater Western Water manage the increasing volumes of recycled water that its growing population are producing. Farmers will receive around 1 700 ML of recycled water per year from the scheme. By 2050, Greater Western Water forecasts it could deliver up to 19 000 ML of recycled water each year.

Stage 3 of Barwon Water's Bellarine Peninsula project also received \$5.5 million in Australian Government funding.

The Victorian Government offers a range of funding programs that water corporations and partners can apply for to support their recycled water projects. This includes the government's IWM grants program, which specifically supports IWM forum projects, and other general grant programs. One example is DELWP's Distinctive Areas and Landscapes program, which contributed funding to Stage 2 of Barwon Water's Bellarine Peninsula project.

Dedicated state government funding for IWM forum projects

DELWP's IWM grants program funds small to medium-sized projects that IWM forums have identified and prioritised.

Types of projects funded

DELWP's IWM grants program funds capital projects and feasibility studies that promote sustainable water management or address adverse water-related environmental impacts. In the 2019–20 competitively awarded grants round, the maximum government contribution for an individual project was \$2 million for capital projects and \$250 000 for feasibility studies.

DELWP assesses funding applications against criteria that aim to achieve IWM outcomes and provide the best value for money.

IWM recycled water projects compete with other IWM projects, such as stormwater projects, for this funding.

Amount funded

DELWP's program provided approximately \$10.8 million towards 97 projects from its commencement in 2017–18 to 2019–20. Over the same period, the water sector and other partners co-invested over \$19.7 million in these projects.

Figure 3I shows IWM grants program funding since the program started. It also shows the 2020–21 Building Works package stimulus funding to boost the economy during the COVID-19 pandemic.

In 2019, DELWP's **program criteria** and weightings were:

- water saved: 25 per cent
 - IWM impact: 25 per cent
 - technical feasibility: 10 per cent
 - value for money: 30 per cent
 - stakeholder and Indigenous engagement: 10 per cent
-

The Victorian Government has allocated a further \$14.1 million for its IWM grants program for 2021 to 2024.

FIGURE 3I: **Victorian Government funding for IWM projects**

Grant year	Metropolitan	Regional	Total
2017–18	-	\$458 636	\$458 636
2018–19	\$1 820 000	\$2 101 050	\$3 921 050
2019–20	\$2 720 000	\$3 695 722	\$6 415 722
2020–21 Building Works stimulus package	\$12 283 900	\$320 000	\$12 603 900
Subtotal	\$16 823 900	\$6 575 408	\$23 399 308
2021 to 2024—IWM grants program (being developed)	-	-	\$14 100 000
Total	-	-	\$37 499 308

Note: The total amount of the Building Works stimulus package funding includes \$2 million that was re-prioritised from the environmental contributions fund for metropolitan IWM projects.

Source: DELWP.

Applications received and funded

DELWP received more eligible applications than it could fund through its 2019–20 program, which Figure 3J shows. This suggests that there is a pipeline of worthy IWM projects that could be progressed if more funding becomes available.

FIGURE 3J: **Number of IWM grants program applications in 2019–20**

	Capital projects	Feasibility studies	Total
Applications received	21	18	39
Eligible applications	13	15	28
Applications funded	5	10	15

Source: DELWP.

3.3 Stimulating new demand

DELWP and water corporations actively seek to stimulate demand for recycled water.

Policy options to increase recycled water use

In 2021, DELWP commissioned a study to better understand if it should mandate supplying and using recycled water.

The study concluded that there are no mandating options that could increase recycled water use to provide net community benefits and justify the increased water bills that would result.

The review also found that water corporations are accurately assessing recycling projects and there is no indication that they are missing out on cost-effective opportunities.

Additionally, in 2019, DELWP commissioned a study that assessed the impact of price on recycled water use. The study found that there are no significant pricing barriers to using recycled water. It also found that using recycled water in urban areas was not price-sensitive, which means that customers do not choose to use significantly more recycled water in response to decreased water prices.

Barwon Water's initiatives

Barwon Water has taken multiple actions to understand and stimulate demand for recycled water. These have resulted in it attracting more recycled water customers and increasing the volume of recycled water that it has allocated for use from 2019 to 2023.

Forecasting demand

In 2020, Barwon Water commissioned a study about the demand for recycled water—Demand Forecast for Proposed Recycled Water Scheme on the Bellarine.

An expression of interest process informed the study's initial demand estimate. However, more formal testing found that demand was significantly less than the initial estimate. Barwon Water refined the project to make it more economically viable to implement.

Stimulating demand among new and existing customers

Barwon Water proactively seeks new recycled water customers. It works with potential customers to develop customised solutions to meet their water needs. For example:

- during stage 2 of its Bellarine Peninsula project, Barwon Water installed a 2 200-metre recycled water pipeline to supply seven new customers
- during its Bannockburn Water Reclamation Plant project, Barwon Water installed a 500-metre pipeline and pivot irrigator to supply a new customer.

The common features of these two recycled water projects were:

- minimised infrastructure costs due to customers being close to existing infrastructure
- Barwon Water working closely with potential customers to identify, understand and meet their unique needs
- the absence of a low-cost, reliable alternative water source
- a planning scheme that supports agriculture
- Barwon Water contributing financially to avoid further costs to maintain compliance with its EPA discharge licence.

Barwon Water also uses information gathered by its client relations officers to increase recycled water use.

In 2019, Barwon Water reviewed its largest users of drinking water, including councils, agricultural and industrial customers, to identify where it could convert customers to recycled water. The process also identified other opportunities, such as investing in better technology to change or reduce drinking water use.

Improving the quality of recycled water

Another strategy that Barwon Water uses to stimulate demand for recycled water is matching the quality of water it produces with its customers' needs.

For example, stage 3 of the Bellarine Peninsula project will improve the quality of the area's existing recycled water by reducing its salinity. According to Barwon Water, this will allow it to supply an extra 450 ML per year of high quality, fit-for-purpose recycled water to:

- support agriculture and horticulture, including wineries, cellar doors and farm gate tourism to help grow the regional economy
- maintain the unique, high-quality rural landscapes of the Bellarine Peninsula by providing ongoing support for high-value agriculture and horticulture
- provide a climate-independent water source that will reduce the amount of drinking water that is used for agriculture
- ensure the region's long-term sustainability and manage threats from climate change.

Using price to stimulate demand

Many factors can influence customers to use recycled water and how much they use.

In 2019, Barwon Water engaged a consultant to review the impact of price on recycled water use. It found that price contributes to new recycled water customers' levels of interest. However, it also found that existing customers' demand for recycled water is not strongly linked to price.

Barwon Water uses price to encourage its customers to continue using recycled water. In 2018, Barwon Water reduced the price of its class A recycled water from 80 to 70 per cent of the cost of drinking water. This was in line with community preferences, which it tested during consultations for its 2018 ESC pricing submission.

All of Barwon Water's customers benefit from other customers using recycled water. This is because it reduces pressure on drinking water supplies and defers the costs of augmenting its supply. Customers supported reducing the cost of class A recycled water in recognition of this broader benefit.

Barwon Water also reviewed its pricing structures for class B and class C recycled water in 2018, which resulted in significant price reductions for some customers.

Barwon Water advised us that it has not measured the impact of price on class A demand. However, it intends to measure this for class B and class C prices as part of its 2023 pricing submission to ESC.

Planning for the future

Barwon Water assesses the feasibility of future water solutions while acknowledging the current policy settings. Its long-term planning considers all water source options and the possibility of future policy changes.

Its Recycled Water Plan sets aside some recycled water as an option for future drinking purposes in its 50-year plan beyond 2030. This leaves 12 000 ML per year available for other uses. It also plans to further explore recycled water use for environmental flow and large-scale agriculture.

After reviewing its recycled water goals in May 2021, Barwon Water decided to keep its future allocation for drinking water because the Water for our Future Community Panel has supported recycled water as a possible drinking water source in the long term.

Investigating recycled water for drinking purposes

In March 2021, Barwon Water conducted a concept and cost study into using recycled water for drinking water.

Barwon Water initiated this study in response to community interest in using recycled water as a possible long-term water source. It identified the community's interest through community engagement for its Water for our Future program, which it used to co-design its next urban water strategy.

The study found that the cost of using recycled water for drinking water is not significantly different to the cost of desalinating seawater.

Assessing recycled water for environmental flow

In February 2021, Barwon Water conducted a feasibility study into using recycled water for environmental flows for the Barwon and Moorabool rivers. The results will inform its next urban water strategy in 2022 and the new Central and Gippsland SWS.

3.4 Measuring impact

Water corporations have data on the volume and classes of recycled water they produce or have the capacity to produce.

While they report volume data annually, class data is not widely shared or used across the sector. This limits DELWP and other stakeholders' understanding of recycled water supply, use and future opportunities across the state.

To address this issue, DELWP is investigating how water corporations share and report data about recycled water.

While DELWP has increased collaboration across the sector through statewide IWM forums and its investment in recycled water projects, it is too early to measure the impact of these actions.

Measuring changes in recycled water use

DELWP monitors and reports against its actions to increase recycled water use by:

- publicly reporting its annual progress against all high-level actions in *Water for Victoria* action status reports
- analysing annual recycled water use and trends across Victoria in the publicly reported Victorian Water Accounts
- reviewing water corporations' annual reports, which report on recycled water use
- engaging with the water sector on policy reform.

IWM forums measure recycled water use and the expected drinking water savings for individual projects. However, DELWP does not collect or report this information to show how much IWM projects are increasing recycled water use.

DELWP developed an evaluation framework in 2019. It plans to measure the impact of the IWM program when it has been running long enough to deliver informative results.

Reporting

Water corporations report on recycled water use in their annual reports. However, the data they report is not detailed enough, which limits insights into trends over time.

Water corporations report the volume of wastewater they produce, recycle and re-use in their performance reporting to ESC. However, these reports do not provide sufficient insights into how they use recycled water or where opportunities for increased use may exist. This is because they do not:

- segment urban and industrial use
- provide data on volumes of recycled water use by class
- provide information about the benefits of recycled water use.

DELWP has also recognised that water corporations' reporting to ESC is inconsistent and lacks detail. It is taking steps to address this issue.

Inconsistent reporting to ESC

DELWP's ability to map recycled water supply, use and future availability is limited by:

- the lack of clarity on what water corporations count as recycled water
- inconsistencies in the way water corporations report to ESC.

EPA advised us that there needs to be more information and clarity about ESC's water performance indicators and definitions for recycled water for environmental benefit.

For example, four water corporations report their treated wastewater discharges under their EPA licences as recycled water use for beneficial allocation.

EPA, DELWP and ESC are working together to clarify the definitions for this type of discharge to remove any inconsistencies in how water corporations report on it.

This will improve the accuracy of water corporations' reported data and provide better insights into recycled water re-use and availability.

Lack of detail about recycled water classes and use

Water corporations segment the volume data they report to ESC by use. However, they group urban use, which includes both council and domestic household use, and industrial use together. Disaggregating this data would help some stakeholders to better understand where opportunities for increasing use lie.

DELWP is building and maintaining a geographically based dataset to improve the clarity of water corporations' reporting on productive recycled water use. It intends to update the Victorian Water Accounts dataset, which covers 214 water reclamation plants across the state, to include information on:

- plant locations, which are linked to a mapping system
- volumes of recycled water produced
- volumes of recycled water used

ESC performance reporting

captures urban water corporations' performance against specific key performance indicators over a five-year period.

- classes of recycled water produced
- classes of recycled water that water reclamation plants can produce.

In August 2021, DELWP updated its Victorian Water Accounts dataset with information on the volumes of wastewater produced and recycled by plant location. It is working to add water class information to this dataset and link the plant-specific data to a map layer.

In August 2021, DELWP started a project that will assess how it collects, communicates and uses recycled water data and information to increase recycled water use. This project may improve the way DELWP makes statewide data available to inform future potential uses.

APPENDIX A

Submissions and comments

We have consulted with DELWP, Barwon Water, the City of Greater Geelong and EPA, and we considered their views when reaching our audit conclusions. As required by the *Audit Act 1994*, we gave a draft copy of this report, or relevant extracts, to those agencies and asked for their submissions and comments.

Responsibility for the accuracy, fairness and balance of those comments rests solely with the agency head.

Responses were received as follows:

DELWP	57
Barwon Water	59
City of Greater Geelong	60
EPA	61



Department of Environment,
Land, Water and Planning

PO Box 500, East Melbourne,
Victoria 8002 Australia
delwp.vic.gov.au

Mr Andrew Greaves
Auditor-General
Victorian Auditor-General's Office
Level 31, 35 Collins Street
MELBOURNE VIC 3000

Ref: SEC015355



Dear Mr Greaves

PROPOSED PERFORMANCE AUDIT REPORT – SUPPLYING AND USING RECYCLED WATER

Thank you for your letter of 26 October 2021, providing the Department of Environment, Land, Water and Planning (DELWP) with an opportunity to comment on the proposed performance audit report *Supplying and Using Recycled Water*.

I appreciate the work of your office in conducting this audit, and I am pleased to confirm acceptance of all recommendations directed to DELWP. Our Management Action Plan for responding to the recommendations is enclosed.

As you have seen, the Victorian Government is exploring opportunities to increase the supply and use of recycled water where it is safe, suitable, and economically feasible.

DELWP has shown its commitment to deliver on *Water for Victoria 2016*, by co-funding on-ground recycled water supply projects, streamlining Environment Protection Authority regulations for recycled water use and increasing integration of water with land use planning. We have also established Integrated Water Management Forums across Victoria to bring together all organisations with an interest in water management, so that water-related decisions for the future are made collaboratively and with local needs and local communities in mind.

All of this work contributes to reducing pressure on our drinking water supplies, improving the health of our waterways and increasing the resilience and liveability of our cities and towns. The Victorian Government has committed to continuing this important program, with further funding to be spent over the coming three years.

DELWP is well placed to respond to the recommendations of this audit, and the actions to address these have already commenced.

Should you require any further information in relation to DELWP's response, please contact Nikki Gemmill, Acting Director Resilient Cities and Towns, DELWP on (03) 9637 8689 or via email at Nikki.gemmill@delwp.vic.gov.au.

Yours sincerely

John Bradley
Secretary

7 / 11 /2021

Encl.

Any personal information about you or a third party in your correspondence will be protected under the provisions of the *Privacy and Data Protection Act 2014*. It will only be used or disclosed to appropriate Ministerial, Statutory Authority, or departmental staff in regard to the purpose for which it was provided, unless required or authorized by law. Enquiries about access to information about you held by the Department should be directed to foi.unit@delwp.vic.gov.au or FOI Unit, Department of Environment, Land, Water and Planning, PO Box 500, East Melbourne, Victoria 8002.



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Supplying and Using Recycled Water Performance audit

DELWP's Management Action Plan

Recommendation	Agreed action	Completion date
Recommendation 1: DELWP works with the water sector and EPA to develop and implement water education programs that consider the following: • target different users, such as the community, industries, councils and the agricultural sector • improve the community, industries, councils and agricultural sector's understanding of water security and the benefits and risks of using recycled water • include consistent messaging about using recycled water and specify roles and responsibilities for education	<u>DELWP accepts this recommendation.</u> DELWP will work with the water sector and the EPA to identify opportunities to improve existing engagement and education programs to increase community confidence and recycled water uptake. This process will inform the need for and delivery of any future supplementary activities to be delivered by DELWP, water corporations and EPA, in line with the relative functions of these organisations.	31 December 2022
Recommendation 3: DELWP publicly reports statewide information to share knowledge and demonstrate how forums are delivering the expected outcomes of <i>Water for Victoria</i>	<u>DELWP accepts this recommendation.</u> DELWP will address this by developing a public Integrated Water Management (IWM) 'report card', which will outline what has been delivered through the Victorian Government's IWM program under <i>Water for Victoria</i>.	30 April 2022
Recommendation 4: DELWP clarifies data reporting categories and considers separately reporting on council, residential and industrial recycled water use, as well as estimated drinking water savings	<u>DELWP accepts this recommendation.</u> DELWP will work with EPA, the water sector, and the Essential Services Commission (ESC) to confirm opportunities to clarify and improve data reporting categories. This will inform any changes to DELWP's annual Victorian Water Accounts.	30 August 2022



Environment,
Land, Water
and Planning

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Your reference: 34610 21

9 November 2021

Mr Andrew Greaves
Auditor General
Victorian Auditor General's Office
Level 31
35 Collins Street
MELBOURNE VIC 3000

Dear Auditor General,

Re: Proposed Performance Audit Report Supplying and using recycled water

Thank you for the opportunity to review and comment on the proposed report on the performance audit, Supplying and using recycled water.

Barwon Water is committed to increasing the use of recycled water in our region, and supporting the Water for Victoria Plan as we tackle the impacts of climate change and seek to ensure the availability of water for the future. We welcome the insights presented in the report and will continue to collaborate with government and community stakeholders with the objective of optimising the use of recycled water.

Given there are no recommendations requiring Barwon Water's response, we do not wish to suggest any further changes to the report. Furthermore, I appreciate the efforts of your audit team and the professionalism of their approach and conduct during the audit under challenging circumstances.

I look forward to receiving the final report,

Yours sincerely,



Joanne Plummer
Board Chair, Barwon Water

Cc: Dallas Mischkulnig, Director, Performance Audit
Jenny Koong, Senior Manager, Performance Audit
Tracey Slatter, Managing Director, Barwon Water

Barwon Region Water Corporation
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Enabling regional prosperity

CITY OF GREATER GEELONG

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Mr Andrew Greaves
Auditor-General
Victorian Auditor-General's Office
Level 31, 35 Collins Street
MELBOURNE VIC 3000

10 November 2021

Doc No: Record Number
Our Ref: 3461021
Your Ref: BND-21-4883

Dear Andrew,

Re: Audit report response – Supplying and using recycled water

Thank you for providing the proposed audit report on supplying and using recycled water for our response dated 26 October 2021.

Council officers have reviewed the report in detail and have confirmed that it is an accurate reflection of our role and approach to planning for recycled water.

We support the overall findings and recommendations of the audit. We note the recommendation for further guidance on role and use of recycled water for environmental flows. This action should be implemented as a priority by the government.

The City will continue to play an active role in the planning and delivery of integrated water management outcomes for our region. We look forward to continuing our strong working relationship with Barwon Water and DELWP on this topic. This work includes the preparation of a municipal integrated water management strategy and delivery of IWM outcomes in the Northern and Western Geelong Growth Areas.

Please contact Gareth Smith on 5272 4266 or garethsmith@geelongcity.vic.gov.au if you'd like to discuss further.

Yours sincerely



Martin Cutter
Chief Executive Officer



Our Ref: C302

Mr Andrew Greaves
Auditor-General
Victorian Auditor-General's Office

Dear Mr Greaves

Proposed performance audit report - Supplying and using recycled water

I refer to your letter of 26 October 2021 to the Chair of the Environment Protection Authority Victoria (EPA) Governing Board, Professor Kate Auty, about the Victorian Auditor-General's Office's proposed performance audit report 'Supplying and using recycled water'. I have been asked to respond on her behalf.

I appreciate the work of your office in conducting this audit. EPA has considered the audit findings and accepts the recommendation directed to it. I note that activities are already underway in response to the recommendation, and I refer you to our enclosed action plan for further detail.

EPA understands the importance of alternative water sources and supports the use of recycled water. We encourage its use in a safe and sustainable manner to minimise the associated risks to human health and the environment, whilst maximising its social and economic benefit. EPA will continue to work with our partners to identify opportunities for increasing the use of recycled water to meet future water demand.

Thank you and your team for your constructive engagement throughout the audit.

Yours sincerely



Lee Miezis
Chief Executive Officer

29 /10 / 2021

Encl: EPA action plan to address recommendation

Environment Protection Authority Victoria
GPO Box 4395, Melbourne VIC 3001 DX210082
1300 372 842 (1300 EPA VIC) www.epa.vic.gov.au



EPA action plan to address recommendation from Supplying and using recycled water

No	VAGO recommendation	Action	Completion date
2	(Environment Protection Authority Victoria) works with DELWP to develop and implement guidelines to inform water corporations' applications for using recycled water for environmental flows (see Section 2.3).	Accepted. EPA and DELWP have already begun the development of a framework that informs water corporations of the information that should be collected, assessed, and provided when seeking approval for the use of recycled water for environmental flows. This framework is being developed by a joint working group which includes EPA, DELWP, the Department of Health, Melbourne Water, Barwon Water, and the North Central Catchment Management Authority. Key information from the framework will be published as an EPA guideline in mid-2023.	Guideline to be published in mid-2023, with implementation actions to follow.

APPENDIX B

Acronyms and abbreviations

Acronyms

DELWP	Department of Environment, Land, Water and Planning
EPA	Environment Protection Authority Victoria
ESC	Essential Services Commission
GL	gigalitre
IWM	integrated water management
ML	megalitre
NWGGA	Northern and Western Geelong Growth Areas
PFAS	per- and polyfluoroalkyl substances
SWS	sustainable water strategy
VAGO	Victorian Auditor-General's Office

Abbreviation

COVID-19	coronavirus
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APPENDIX C

Scope of this audit

Who we audited	What we assessed	What the audit cost
• DELWP • EPA • Barwon Water • City of Greater Geelong	We assessed if responsible agencies are increasing the use of recycled water to meet future water demand.	The cost of this audit was \$700 000.

Our methods

As part of the audit we:

- analysed water sector and agency data
- reviewed published literature
- reviewed water strategies and plans, policies, guidelines and procedures and other documents provided by audited agencies
- interviewed staff at each agency.

We conducted our audit in accordance with the *Audit Act 1994* and ASAE 3500 *Performance Engagements*. We complied with the independence and other relevant ethical requirements related to assurance engagements.

We also provided a copy of the report to the Department of Premier and Cabinet and the Department of Treasury and Finance.

Auditor-General's reports tabled during 2021–22

Report title

<i>Integrated Transport Planning</i> (2021–22: 01)	August 2021
<i>Major Infrastructure Program Delivery Capability</i> (2021–22: 02)	September 2021
<i>Clinical Governance: Department of Health</i> (2021–22: 03)	September 2021
<i>Managing Conflicts of Interest in Procurement</i> (2021–22: 04)	September 2021
<i>Major Projects Performance</i> (2021–22: 05)	September 2021
<i>Administration of Victorian Courts</i> (2021–22: 06)	October 2021
<i>Protecting Victoria's Biodiversity</i> (2021–22: 07)	October 2021
<i>Management of Spending in Response to COVID-19</i> (2021–22: 08)	October 2021
<i>Supplying and Using Recycled Water</i> (2021–22: 09)	November 2021

All reports are available for download in PDF and HTML format on our website
www.audit.vic.gov.au

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