

# Reforming water sector governance

Key findings to inform the update of Victoria's  
30-year infrastructure strategy

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# Executive summary

In 2016, we identified the need to manage threats to water security as a component of Infrastructure Victoria's 30-year infrastructure strategy (30-year strategy). Our water supplies are under pressure from population growth and climate change, with some predictions suggesting that, unless action is taken, water shortages could emerge in Melbourne as soon as 2028. Supply shortfalls could appear even sooner in some regional areas of the state.

Alongside the challenges posed by population and climate change, there are changing community expectations and customer needs surrounding the water sector. Increasingly, the provision of water services is being viewed within the context of delivering broader liveability benefits, while customers expect to be more meaningfully engaged in decision-making, such as when options for future supply augmentation are being considered.

In the 30-year strategy, Infrastructure Victoria highlighted the importance of increasing efficiency in meeting water demands, conserving readily available water resources, and planning for the long-term availability of water supplies. We made recommendations that included proposed reforms to governance arrangements – the rules, policies, practices, processes and institutional arrangements that drive decisions about achieving objectives around the management of urban water resources and services.

More recent reviews undertaken by the Productivity Commission and Infrastructure Australia reinforce the need for further governance reforms.

Infrastructure Victoria is now updating the 30-year strategy. As part of this process, we have been examining water governance arrangements in more detail, with a view to making more specific governance reform recommendations to facilitate water supply security in Victoria.

Infrastructure Victoria engaged Marsden Jacobs Associates (MJA), an economic consultancy with expertise in water markets, to assist us. MJA consulted with more than 50 professionals – from government, water businesses, regulators and academics – to better understand the key issues and to help formulate reform options, and almost 1,000 Victorians participated in a community survey. Views were sought on matters such as:

- the adequacy of the current arrangements for urban water augmentation;
- potential long-term water supply options in Victoria;
- barriers to the use of different water supply options;
- water planning governance issues, including role clarity, responsibility, authority and autonomy; performance monitoring and accountability to customers; and sanctions for non-performance; and
- consumer expectations for being consulted in water supply augmentation decisions and preferences for the use of recycled water (including their willingness to use recycled water as a drinking water supply).

MJA have synthesised their work in a report which is available on the Infrastructure Victoria website. In addition, Infrastructure Victoria has developed case studies, with input from some of Victoria's water authorities, that highlight how governance issues currently impact on planning processes and the use of water resources in Victoria.

Taken together, the findings of work by Infrastructure Victoria and MJA to date suggest that, while Victoria has been at the forefront of governance reforms designed to achieve the objectives of the National Water Initiative – a shared commitment by all Australian governments to increase the efficiency of water use and promote supply security – further action may be needed to meet the challenges posed by population growth and climate change, and to adapt to changing community expectations.

In particular, Infrastructure Victoria and MJA analysis suggests:

- **All potential water sources – including non-conventional options, such as recycled water and stormwater - should be considered as supply augmentation opportunities**, based on their economic merit, and whether they meet minimum public health and environmental requirements. This could defer the need for high-cost major supply augmentation (such as a second desalination plant). To facilitate this, consideration should be given to reforms that remove the barriers and correct distortions that currently constrain effective planning and decision-making about the use of all available water sources.
- **Planning processes need to be more integrated and adaptive.** There is more that could be done to improve the integration of centralised and decentralised investment decisions, and to strengthen the interface

of water planning with urban development and broader land use planning and resource management processes. Furthermore, there are opportunities to modify planning frameworks so that the management of water resources is more adaptive to changing circumstances.

- **The community wants to be – and needs to be – more involved in decision-making** about water supply augmentation options. We need a better understanding of consumer preferences about how water augmentations are planned, how decisions are made in relation to the use of water from different sources, and the trade-offs that customers are prepared to make between different supply options and impacts on their household water bills. To enable effective community engagement, there is a need for greater transparency, improved information and more education to improve the water 'literacy' of water customers, the media and other key stakeholders to support major changes to the way that we use water.

Based on the work by Infrastructure Victoria and MJA, some options for possible reforms are presented in this paper. Over the next six months, Infrastructure Victoria will be undertaking targeted consultations to ensure we gather all views before release of our draft recommendations in 2020, as part of updating the 30-year strategy. These consultations will have the objective of testing the proposed reform options outlined here, and ultimately prioritising them for inclusion in the next 30-year strategy.

# The importance of water governance

Water security ensures that households, the community, agriculture, industry and the environment can sustainably access adequate quantities of acceptable quality water for a range of purposes. Infrastructure Victoria identified the need to manage threats to Victoria's water security as a key element of the framework that underpinned *Victoria's 30-year infrastructure strategy* (the 30-year strategy) that was released in 2016.

Victoria's history of drought has highlighted the importance of managing water resources sustainably, while the demands of a growing population and climate change are putting water resources under further pressure – for example:

- Victoria's population is expected to grow from just over 6 million in 2018 to more than 10 million by 2051, which will drive increasing demand for water and sewerage services.
- A warmer, drier climate in the future will mean less water flowing into our dams from rainfall, putting more pressure on water supplies.
- Climate change may also result in more extreme events that will disrupt essential water and wastewater services more often. There may be flooding and greater risks of fire in water supply catchments, while more significant rainfall events could create overland flows of stormwater.

Alongside these developments, there are changing community expectations and customer needs. Customers want governments and water corporations to shift from merely being suppliers of core services, to providing broader liveability and community services. Communities and visitors expect healthy rivers, lakes and bays to enjoy for recreation, while liveability is enhanced by trees and green spaces, which need to be watered. The viability of many industries (notably agriculture, manufacturing, energy and mining) is reliant on access to water. Customers also want to be more meaningfully engaged in decision-making, such as when options for future supply augmentation are being considered.

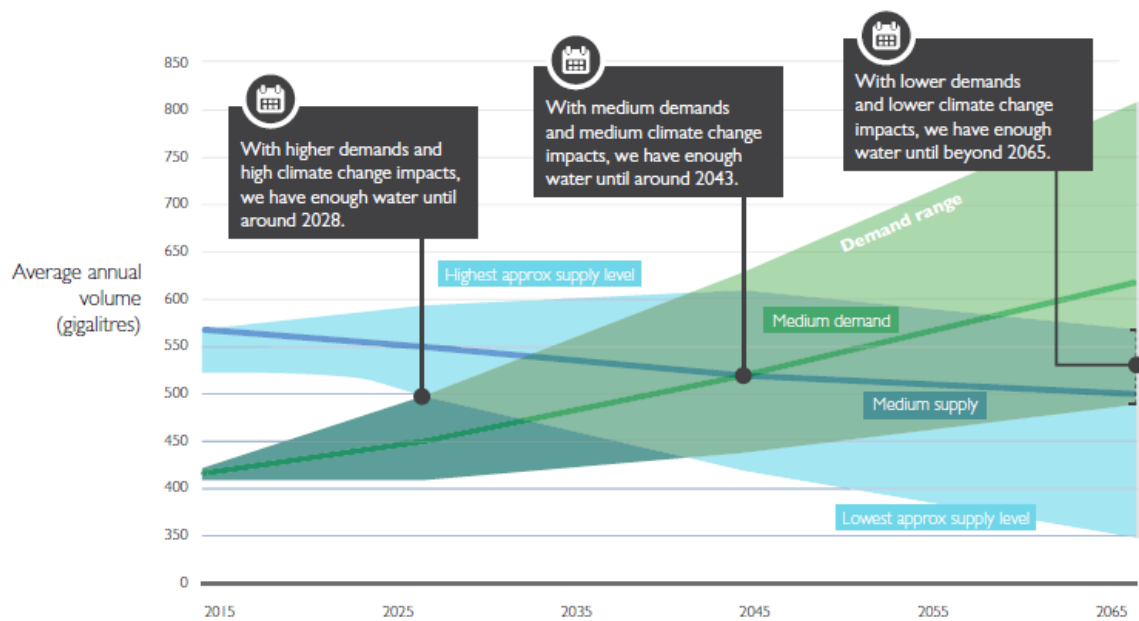
Victoria is already responding to these threats to water security and changing community expectations. For example:

- There has been major investment in water infrastructure to improve water supply security for Melbourne, Geelong, Ballarat and Bendigo, including the construction of the Wonthaggi desalination plant, the North-South pipeline, and the Melbourne-Geelong pipeline.
- Major irrigation modernisation projects, particularly in the north of the state, are minimising water losses and releasing additional water supplies for the environment and other uses.
- The ability to carry over or trade water has been a key tool in allowing Victorian farmers to manage water supply risks, while Victoria's system of water entitlements has improved water security for the environment.
- Victorians have demonstrated their ability to minimise water use in dry periods and manage water resources more carefully.
- Victoria's economic regulator has introduced a new model as part of its water price determinations, which places water customers at the centre of water business' planning decisions. This framework, known as 'PREMO' (Performance, Risk, Engagement, Management, Outcomes) incentivises water businesses to work with their customers and deliver outcomes that reflect customers' priorities.

Despite these efforts, it is likely that more needs to be done to ensure water supplies keep pace with growing demand and to improve customer engagement in decision-making.

As shown in Figure 1, under the increasingly likely scenarios of high demand and high climate change impacts, water shortages could emerge in Melbourne as soon as 2028, with potential shortfalls of over 450 GL per year by 2065.

Figure 1: Water supply and demand scenarios in Melbourne



Source: City West Water, South East Water, Yarra Valley Water and Melbourne Water, *Water for a Future-Thriving Melbourne*.

Some regional and rural areas are even more vulnerable to low levels of water security, particularly during extended dry periods, with the potential for water demand to outstrip supply as early as 2021 in areas served by Western Water,<sup>1</sup> and by 2025 in Bendigo<sup>2</sup> unless further action is taken.

To address threats to water security, there is a growing focus on the need to augment water supplies – through efficient long-term planning and investment decisions, and through the use of non-conventional sources of water, such as recycled water and stormwater, to meet water demand.

While there is already limited (but growing) use of non-conventional sources, they are currently under-utilised, yet appear to offer significant potential to mitigate water security risks in the future. For example, analysis undertaken by Melbourne Water of the water balance of Melbourne in 2015-16 indicated that around 337 GL per year of stormwater (which represents around 65 per cent of total water consumption in the Melbourne region) was being 'lost' to waterways, while 276 GL of treated wastewater (over 50 per cent of total consumption) ended up in the bays and ocean.<sup>3</sup> Given that Melbourne's annual consumption of drinking water is about 450 GL/year and the production capacity of the Wonthaggi desalination plant is 150 GL/year, increasing the use of treated wastewater and stormwater could increase the diversity and resilience of water supply.

In the 30-year strategy, Infrastructure Victoria proposed that Victoria's water security could be enhanced through improved systems of water 'governance'. Governance is a term that encompasses the rules, policies, practices, processes and institutional arrangements that drive decisions about achieving objectives around the management of urban water resources and services.

In Victoria, the roles and responsibilities for policy, regulation and service delivery are distributed across many different entities, including state government departments and agencies, local government, and multiple water corporations (see Table 1).

<sup>1</sup> Based on analysis in Western Water's 2017 Urban Water Strategy.

<sup>2</sup> Based on analysis in Coliban Water's 2017 Urban Water Strategy.

<sup>3</sup> See Figure 20 in Melbourne Water, 2017, *Melbourne Water System Strategy*.

Table 1: Key entities and bodies involved in the Victorian water sector

Entity	Summary of roles and responsibilities
<b>Department of Environment, Land, Water and Planning</b> (DELWP)	<ul style="list-style-type: none"> <li>• Legislation and regulation</li> <li>• Policy</li> <li>• Planning</li> </ul>
<b>Department of Health and Human Services</b> (DHHS)	<ul style="list-style-type: none"> <li>• Health legislation and regulation (e.g. administration of the <i>Safe Drinking Water Act 2003</i>, including the Safe Drinking Water Regulations 2015)</li> </ul>
<b>Environment Protection Agency</b> (EPA)	<ul style="list-style-type: none"> <li>• Environmental regulation (including best practice guidelines, primarily relating to treated waste discharges, sewer overflows, and large-scale use of recycled water)</li> </ul>
<b>Essential Services Commission</b>	<ul style="list-style-type: none"> <li>• Economic regulation (including independent price setting and performance monitoring)</li> </ul>
<b>Catchment management authorities</b> (CMAs) There are ten CMAs in Victoria	<ul style="list-style-type: none"> <li>• Waterway health</li> <li>• Floodplain management</li> <li>• Environmental water</li> </ul>
<b>Developers</b>	<ul style="list-style-type: none"> <li>• Construction of estate or multi-lot scale water infrastructure</li> </ul>
<b>Integrated water management forums</b> (IWMFs) There are five IWMFs for metropolitan Melbourne, and nine for regional Victoria	<ul style="list-style-type: none"> <li>• Integrated water management planning</li> </ul>
<b>Local government</b>	<ul style="list-style-type: none"> <li>• Urban stormwater management</li> <li>• Parks and gardens management</li> <li>• Onsite domestic wastewater management</li> <li>• Urban planning (including building and planning approvals)</li> </ul>
<b>National Health and Medical Research Council</b>	<ul style="list-style-type: none"> <li>• Maintains and updates the Australian Drinking Water Guidelines</li> </ul>
<b>Property owners, residents and businesses</b>	<ul style="list-style-type: none"> <li>• Meeting terms and conditions of services provided</li> <li>• Following permit conditions</li> <li>• Onsite water management (e.g. rainwater, stormwater)</li> </ul>
<b>Victorian Planning Authority</b>	<ul style="list-style-type: none"> <li>• Urban growth structure planning for Melbourne and (where invited) regional Victoria</li> </ul>
<b>Water grid partnership</b>	<ul style="list-style-type: none"> <li>• A partnership of water corporations, DELWP, CMAs and groups working to ensure Victoria's connected water grid contributes to water affordability and water security</li> </ul>
<b>Water corporations</b> There are 19 water corporations in Victoria	<ul style="list-style-type: none"> <li>• Water supply</li> <li>• Wastewater management (including sewerage and sewerage treatment) and trade waste management</li> <li>• Waterway and major drainage systems (Melbourne Water only)</li> </ul>

The large number of participants in the Victorian water sector can present challenges to robust and cohesive planning and decision-making. For instance, in the case of the non-conventional water supplies discussed earlier, the efficient use of stormwater may be impeded by the different roles, responsibilities, and priorities of water corporations and local government in the management of this resource. Box 1 draws on a case study that highlights some of the challenges resulting from the complex governance arrangements surrounding stormwater.

#### Box 1: Stormwater harvesting – Black Forest Road, Werribee

With rapid population growth, significant development is forecast across the western growth area in the coming years, which will lead to increased demand for water and increased urban runoff. As a result, City West Water is upgrading and augmenting water supply networks in the region.

A developer in the area identified an opportunity to create a stormwater-filled lake as part of the Black Forest

Road development and City West Water proposed an associated stormwater harvesting project, with stormwater to be collected in two proposed lakes.

Despite the potential for the project to deliver multiple benefits, there is uncertainty about whether it will proceed. A key risk is the uncertainty around the ownership of the proposed lakes and their ongoing management, given the different entities and objectives involved in the project.

For instance, ownership of the lakes confers maintenance and risk management responsibilities. While the management of reserves and parks are typically transferred from the developer to the local council as public open space, the lakes would have a public amenity function as well as an operating function if they were used for stormwater harvesting. This requires a different type of maintenance for the lake system, such as desilting, which is more expensive.

Developed lakes are not traditionally owned and operated by water authorities. Typically, councils take on maintenance costs for public space, but not water quality management. Melbourne Water could take on water quality management, but it is challenging for it to maintain lake water quality to a recreational standard (not core business), and the lake may pose a risk to downstream water quality which could pose an additional cost.

Moreover, the ability to raise revenue to recover costs is varied among the stakeholders. Water authorities can recover costs through the regulatory pricing arrangements which represent a user-pays system. However, there may be a barrier to share costs between water corporations. Councils raise funds for local infrastructure and services through rates, up to a capped limited, and can receive developer contributions. However, councils need to consider the priorities of the whole municipality which are driven by their council plan, developed through formal community consultation processes. This may mean that council is unable to consistently fund maintenance of a particular asset. While council receives an amenity benefit for residents from the lakes, this could be achieved without a stormwater harvesting scheme.

There are significant benefits from re-using stormwater in the urban water cycle, but there are some areas where different priorities from responsible agencies can inhibit investment. Where these arise, and this can be unavoidable because of the different purposes of the agencies, then a process which allows the following could alleviate some of the issues for future projects:

- Better shared understanding of forward planning and priorities of agencies, and input to each other, including through Precinct Structure Planning processes
- A process where value, risk and responsibilities can be exchanged, such as for maintenance, overcoming existing barriers. This would likely need a governance and funding agreement, which requires costs, benefits and risks to each entity to be known, valued and realisable. **Discussion on the sharing of risks across agencies would also be critical.**

*Source: See Appendix 1 for the case study on stormwater harvesting.*

In addition, regulatory restrictions on the use of some sources of water, and exclusion from Victoria's water entitlement framework can distort decision-making about the efficient use of water. This can undermine the objective of maximising the collective value of water resources for the Victorian community. Box 2 highlights that recycled water and stormwater are not currently incorporated within Victoria's water entitlement framework.

### **Box 2: Victoria's water entitlement framework**

In general, the main function of the water entitlement framework is to allocate water resources among consumptive water uses (such as irrigation, industry, urban, stock and domestic), and between consumptive uses and the environment. Water access entitlements provide water users with a right to extract water from a specific water resource. These arrangements aim to promote water supply security, investment confidence and sustainable and efficient water use.

Victoria's water entitlement framework is established under the *Water Act 1989* and provides the basis for how water resources are shared. These include:

- Bulk entitlements – a legal right to take and use water granted under the *Water Act 1989*. Typically, these enable the entitlement holder to take all or a portion of water flowing at a particular location.
- Environmental entitlements – a legal right to take and use water granted under the *Water Act 1989* for the purpose of maintaining an environmental water reserve or improving the environmental values and health of the water ecosystems and other users that depend on environmental condition.
- Water shares – an entitlement to a share of the water available in a declared regulated water system. Water shareholders have the rights to a share of water in storage.
- Water licences – fixed term entitlements to take and use water from a waterway, catchment dam, spring, soak or aquifer. Each licence is subject to conditions set by the Minister and specified on the licence (e.g.



type of use, volume, rate and timing of extraction allowed, and any monitoring and reporting requirements).

Victorian water markets enable eligible parties to buy and sell entitlements and allocations. Key market participants include the water corporations, the environmental water holder, irrigators, and commercial and industrial users of water, who can buy and sell entitlements to manage their supply risks and financial risks (e.g. entitlements that are not needed can be sold to increase revenue). The Minister for Water is also a market participant, who can control the supply of water into the market.

Stormwater and recycled water are not currently regulated under the entitlement system:

- Under current arrangements, stormwater cannot be actively harvested for drinking water, the ownership of stormwater is not explicitly stated, and third-party access arrangements are not well established. With no defined entitlement system, there is no market for stormwater in Victoria with the exception of some limited commercial arrangements (i.e. Melbourne Water's stormwater harvesting licence).
- The uses of recycled water are currently limited by governance settings that are both explicit (e.g. the Environment Protection Agency's guidelines for the use of reclaimed water) and implicit (e.g. government statements that it is "not government policy" for recycled water to be used for potable purposes).

Being outside the entitlement system constrains the economic value of stormwater and recycled water. These water sources can only be acquired through individual agreement, which reduces their tradability, while conditions on their use can add to costs. The different legal consideration and cost structures make comparisons of the relative value of stormwater and recycled water with water sources regulated under the entitlement system difficult. The lack of a consistent approach to the valuation of different water sources can distort decision-making about the efficient use of water, which can undermine the objective of maximising the collective value of water resources for the Victorian community.

*Source: See Appendix 1 for the case study on entitlements reform.*

Changes to the current Victorian governance arrangements have the potential to significantly defer the future need for expensive supply or distribution augmentation investments. All potential water supply augmentation options should be considered on their economic merit, and whether they meet minimum public health and environmental requirements. This is consistent with the Productivity Commission's recommendations in its 2011 report on Australia's Urban Water Sector and its 2017 report on National Water Reform.

In the 2016 30-year strategy, Infrastructure Victoria made a number of recommendations designed to enhance water security, which were designed to:

- increase efficiency in meeting water demands;
- conserve readily available water resources; and
- improve planning for the long-term availability of rainfall-independent water supply sources.

As highlighted in Table 2, improved governance featured strongly in our recommendations to the Victorian Government.

In its response to the 30-year strategy, the Victorian Government 'supported in principle' or 'partly supported' all the recommendations relating to water governance, although it specifically stated that it did not support the use of recycled wastewater for drinking purposes because it is not government policy.

Table 2: Summary of Infrastructure Victoria’s 30-year strategy recommendations in relation to water governance reform (2016)

High-level recommendation	Summary of recommended governance reforms
<p><b>Increase efficiency in meeting water demands</b> (Recommendation 14.1)</p>	<p>Recommendation 14.1.1 called for <b>clarity of roles, responsibilities and governance structures</b> in the water sector to enable efficient long-term planning and investment in the interest of customers. Such governance reform will:</p> <ul style="list-style-type: none"> <li>• increase transparency in the decision-making authority of water businesses and agencies, and provide appropriate regulatory oversight on aspects ranging from public health impacts to monitoring and pricing; and</li> <li>• enable innovative solutions to source and use water, accounting for all types of water use in a consistent manner, including water for firefighting and water for recreational use, and optimal use of existing infrastructure.</li> </ul>
<p><b>Conserve readily available water resources</b> (Recommendation 14.2)</p>	<p>Recommendation 14.2.1 called for the <b>increased uptake of recycled water</b> delivered through reticulated systems, while recommendation 14.2.2 proposed more consistent and comprehensive <b>investment in stormwater</b> harvesting projects and the incorporation of stormwater as a water resource in statutory instruments and water resource planning frameworks. In both cases, such measures should be adopted where this can significantly supplement demand from storages and contribute to delaying the need for major water supply augmentation projects.</p>
<p><b>Plan for the long-term availability of rainfall-independent water supply sources</b> (Recommendation 14.3)</p>	<p>Recommendation 14.3.1 called for trigger points for <b>major supply augmentation</b> to be determined transparently, in liaison with water businesses, within 0-5 years to enable timely community engagement and investment decisions in the long-term interests of the community. It is recognised that major water supply augmentation may be required in 15-30 years or beyond, and informed community discussion will be required to inform the choice and sequencing of rainfall-independent technologies.</p>

# The case for water governance reform

Since the release of *Victoria's 30-year infrastructure strategy* in 2016 (the 30-year strategy), major studies by the Productivity Commission and Infrastructure Australia have reinforced the need for governance and planning reforms in urban water sectors across Australia.

In December 2017, the Productivity Commission completed the first of its triennial assessments of progress towards achieving the objectives and outcomes of the 2004 National Water Initiative (NWI), as required under the *Water Act 2007* (Cwth).<sup>4</sup> The NWI, which built upon the 1994 COAG Water Reform Framework, is a shared commitment by all Australian governments to increase the efficiency of Australia's water use, provide investment confidence and supply security for rural and urban communities, and provide greater certainty for the environment. While the Productivity Commission noted the generally good progress made by states and territories in implementing the NWI, it identified areas where further action is required, including:

- fully implementing entitlement and planning reforms, and economic regulation in some jurisdictions; and
- the need to respond to challenges posed by population growth, climate change, and changing community expectations.

The reform priorities identified by the Productivity Commission included changes to governance arrangements by enhancing policy settings in:

- urban water management, including clearer roles and responsibilities for supply augmentation planning, improving economic regulation, enabling decentralised solutions and more outcomes-focused environmental regulation;
- environmental water management, including better integration with waterway management, strengthened and streamlined institutional, governance and management arrangements, and improved monitoring and evaluation for adaptive management; and
- new infrastructure, where the focus needs to be on ensuring environmental sustainability and financial viability before any government resources are committed for construction.

Changes to the governance and regulation of Australia's urban water markets were also proposed by Infrastructure Australia in December 2017.<sup>5</sup> Infrastructure Australia called on Australian governments to enhance urban water policy, regulation and governance settings so they can meet the changing needs of Australians, and highlighted the importance of objectives such as:

- a focus on the long-term interests of users;
- efficiency and affordability;
- independence, transparency and accountability; and
- security and resilience.

Infrastructure Australia's recommendations included the implementation of transparent processes to improve collaboration on urban water, establish clear delineation of regulatory functions, and drive the achievement of common objectives. Infrastructure Australia also called for private participation through partnerships and contracts with government to bring increased focus on efficiency improvements, innovation and customer-focused service delivery.

In the Australian Infrastructure Audit 2019, Infrastructure Australia identifies an opportunity for governments and utilities to fully explore options for greater efficiency by households and industry, including potable reuse. In

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<sup>4</sup> Productivity Commission (2017), *National Water Reform, Report no. 87, Canberra*.

<sup>5</sup> Infrastructure Australia (2017), *Reforming Urban Water: A national pathway for change*.

particular, Infrastructure Australia identifies that recycled water for potable reuse is typically less costly to produce than desalinated water, with the difference in cost stemming from higher energy costs to treat seawater.<sup>6</sup>

As part of the process to update the 30-year strategy, Infrastructure Victoria is undertaking further work on water governance to build on the work of the Productivity Commission and Infrastructure Australia with a view to making more specific recommendations for reform to optimise water supply security in Victoria.

In keeping with some of the key themes of the 30-year strategy, we have been focussing on reforms that will:

- prioritise the better use of existing resources ahead of expensive investment in new infrastructure;
- facilitate more integrated planning processes; and
- allow for meaningful engagement with the Victorian community in decision-making to build trust and public acceptance for change (a concept that is sometimes referred to as a 'social licence').

We commissioned Marsden Jacob Associates (MJA), an economic consultancy with expertise in analysing water and other natural resource markets, to develop reform options under the above themes. This paper presents some of this work and seeks views from stakeholders on the options to improve current water governance. This will further inform the development of our recommendations for the updated 30-year infrastructure strategy.

MJA worked closely with more than 50 professionals with long-standing involvement in, and commitment to, urban water planning in Victoria – including representatives from government, water businesses, regulators and academics – to better understand the key issues and to help formulate draft reform options for further consultation. Views were sought from these professionals on matters such as:

- the adequacy of the current arrangements for urban water augmentation, planning, economically efficient use of resources, and delivering optimal long-term water security from all water sources in Victoria;
- potential long-term water supply options in Victoria;
- barriers to the use of different water supply options; and
- water planning governance issues, including role clarity, responsibility, authority and autonomy; performance monitoring and accountability to customers; and sanctions for non-performance.

To further support the investigations, MJA also undertook a community survey involving almost 1,000 Victorian households, asking them questions about:

- their expectations for being consulted in water supply augmentation decisions; and
- preferences for the use of recycled water (including their willingness to use recycled water as a drinking water supply).

The survey included two short videos, which provided respondents with information about Victoria's water supply and challenges for the future (i.e. population and climate change), and climate-independent water supplies (e.g. desalination and recycled water).

MJA's findings are discussed in the next section, and their final report can be found on our website at [infrastructurevictoria.com.au](http://infrastructurevictoria.com.au).

In addition, Infrastructure Victoria developed a number of case studies, with input from some of Victoria's water authorities, which highlight how governance issues can impact on planning processes and the use of water resources. These case studies demonstrate the need for further governance reforms and discuss potential new approaches.

The case studies can be found at Appendix 1 to this paper and a summary is presented in Table 3.

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<sup>6</sup> *Infrastructure Australia (2019), Australian Infrastructure Audit 2019.*

Table 3: Case studies prepared by Infrastructure Victoria with input from Victorian water authorities

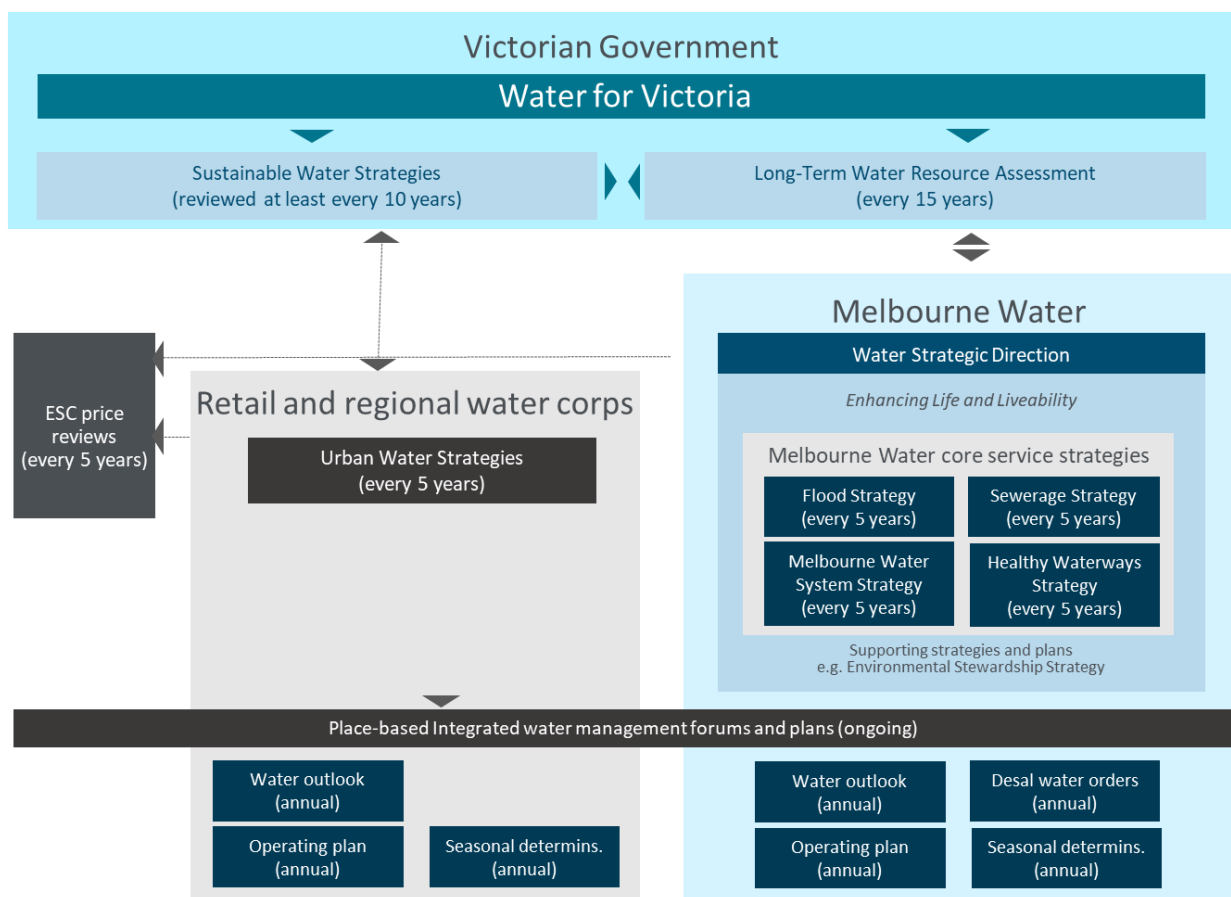
Case study	Summary
<p><b>Stormwater harvesting – Black Forest Road, Werribee</b>  <i>Input from City West Water and Melbourne Water</i></p>	<p>This case study outlines a proposed stormwater harvesting project that has the potential to defer future augmentation of the Western treatment plant and optimise the delivery of alternative water schemes. It could also reduce stormwater pollutant discharges and improve public amenity.</p> <p>However, the ownership and management of the proposed stormwater lakes involve multiples agencies, each with different priorities, which is creating uncertainty and inhibiting investment.</p>
<p><b>Entitlements reform</b>  <i>Input from Southern Rural Water and Western Water</i></p>	<p>This case study considers Victoria’s water entitlement framework under the <i>Water Act 1989</i>. It examines the characteristics of different types of water entitlements, and their value to users, to determine the potential scope for improved economic outcomes and regulatory efficiency.</p> <p>The discussion suggests the current regulatory system prevents the value of water from different sources from being appropriately compared and evaluated. This means different sources of water are not being used efficiently.</p>
<p><b>Integrated water planning</b>  <i>Input from Yarra Valley Water</i></p>	<p>This case study presents the benefits of a clearer and more robust framework for integrated water planning.</p> <p>It highlights how a lack of coordination between the different entities involved in planning processes may result in sub-optimal decision-making. To address this, the case study presents a proposed integrated water management planning methodology that incorporates considerations at the sub-catchment level.</p>
<p><b>Saline waste management strategy</b>  <i>Input from Coliban Water</i></p>	<p>This case study discusses the management of saline waste, focusing on northern Victoria. Current arrangements might be unsustainable and could constrain future economic development opportunities for the region.</p> <p>The case study highlights the difficulties of saline waste management, and discusses potential approaches to help overcome these challenges.</p>
<p><b>Western Irrigation Network</b>  <i>Input from Western Water</i></p>	<p>This case study focuses on recycled water. It discusses the options considered for managing growing recycled water volumes and describes a potential new recycled water reuse scheme that is being investigated by Western Water which would involve development of a new distribution pipeline system to support an irrigation scheme.</p> <p>This case study highlights the options considered to manage the growing volumes of treated sewage under current regulatory and governance settings.</p>

# Marsden Jacob Associates' key findings

The Marsden Jacob Associates (MJA) report, available on the Infrastructure Victoria website, describes the current arrangements for urban water planning and governance in Victoria, and outlines the challenges and opportunities for the water sector. It identifies the ways that Victoria has been responding to challenges through governance and planning reforms, including moving towards a more integrated, whole-of-cycle approach to water planning.

Victoria's current framework for planning, long-term augmentation and efficient use of water sources is summarised in Figure 2.

Figure 2: Victoria's framework for long-term water planning



Source: Melbourne Water (2017), *Melbourne Water System Strategy*

MJA highlights common themes emerging from recent independent reviews of Australia's urban water sectors over the past decade. This includes making clearer roles and responsibilities between utilities and governments, and government to create the necessary conditions for institutions to operate efficiently, ensuring utilities have the right level of autonomy to prudently and efficiently optimise their investments and operations based on customers' requirements and preferences.

The views gathered from the water sector professionals during this project align with the findings from other urban water governance reviews. The key messages from the consultation with water sector professionals are:

- Overall, those consulted consider that Victoria performs averagely in terms of urban water augmentation planning, the efficient use of all available water resources, and in delivering optimal long-term water security from all water sources in Victoria.
- There is in-principle support for considering all augmentation options as part of Victoria's potential long-term water supply mix.
- Governance, regulation and policy are perceived key barriers for some water supply augmentation options. For example, current Victorian government policy is that recycling wastewater for drinking purposes is not supported and not government policy. However, there appears to be support for indirect potable use, both from the urban water sector and from Victorian households (see below for the main findings from the community survey).
- There is a range of governance reforms that could improve Victoria's water sector planning and performance, and make better use of centralised and decentralised sources, including:
  - more clarity around planning for augmentation and the efficient use of all water sources;
  - more separation between government, operators, regulators and authorising environments; and
  - greater customer input into decision-making to better understand consumer preferences and trade-offs through all stages of urban water planning.

In formulating recommendations for Infrastructure Victoria's consideration, MJA also considered the main findings from its community survey, which indicate that:

- Victorian households are "somewhat concerned" about water security in Victoria, particularly about water shortages in rural areas.
- Around 60 per cent of Victorian households consider their current water bills are too high, suggesting that customers show little preparedness to pay more to secure future water supplies.
- Many households feel they have a good understanding of Victorian water supply and security issues. However, many have a low level of objectively assessed water literacy. Around 60 per cent of respondents thought or were not sure whether their drinking water included recycled water. These findings are consistent with recent Australian water literacy assessments for Victoria and Melbourne.
- There is generally low awareness of potable reuse in Australia, and that many Victorian households are already receiving indirect potable reuse water.<sup>7</sup>
- When faced with trade-offs, Victorian households support using indirect potable reuse for drinking and non-drinking uses. Specifically, they support using indirect potable reuse when it reduces or does not materially increase their water bills, and the investments help secure their household water supplies.
- Around 60 per cent of Victorian households said they wanted to be more engaged with long-term augmentation planning through urban water strategies, price submissions and ongoing deliberative processes.

These findings are broadly consistent with the feedback received by Victoria's water corporations from their customers during the development of their urban water strategies.<sup>8</sup>

## Summary of Marsden Jacob Associates' recommendations

Based on its work with the water sector professionals and the community survey, MJA identified a number of specific recommended actions to improve water governance in Victoria. These are summarised at a high level below – further details can be found in MJA's report, available on our website.

**It is important to note that, while these recommendations have been formulated by MJA, Infrastructure Victoria has not yet endorsed them for inclusion in the updated 30-year infrastructure strategy. Rather, we are presenting the work of MJA to facilitate further consultation with stakeholders, and to inform our analysis as we continue to work on the updated strategy.**

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<sup>7</sup> For example, households receiving water from Sugarloaf are receiving water from Yarra Valley Water treatment plants located upriver from the Yering Gorge pumping station.

<sup>8</sup> Urban water corporations, other than Melbourne Water, must develop an urban water strategy based on a long-term outlook of 50 years that looks at a range of climate change scenarios and future demands. These strategies include drought preparedness planning, and consider all drinking and non-drinking water sources and the appropriate use of each source to protect human health.

The recommendations are categorised by MJA under the following four headings:

- i. Reform Victorian urban water governance to **ensure all options are on the table**.
- ii. Reform Victorian urban water governance to **make supply augmentation planning processes more consultative and transparent**.
- iii. Reform governance so that **planning and delivery support effective consideration of the interaction of centralised and decentralised options**.
- iv. Reform governance so that **planning is more adaptive**.

These recommendations are discussed below.

### Ensure all options are on the table

To ensure that all potential water sources are given appropriate consideration in managing water security, MJA recommends that current policy bans, such as indirect potable reuse, are removed and these supply options are objectively considered on their merits, customer support for the option, and assessed against the same health standards as other water sources.

To give effect to this recommendation, MJA has proposed amendments to letters of expectations, and statements of obligations issued by the Minister for Water to the water corporations under the *Water Industry Act 1994* to ensure that all technically feasible centralised and decentralised augmentation options have been considered, and how investments have been prioritised to optimise shared benefits and avoidable costs. It is also suggested that, as part of the water price determination process, the Essential Services Commission publishes guidelines around its expectations for demonstrating customer willingness and ability to pay for liveability and community investments as part of prescribed service delivery.

### Make supply augmentation planning processes more consultative and transparent

To support decisions that support delivery of the outcomes that are most valued by Victorian water customers, MJA recommends that augmentation planning and the efficient use of water sources should better reflect customer preferences. More specifically, urban water planning in Victoria should reflect customers' preferred service levels and their willingness to pay for these service levels.

MJA's over-arching recommendation is that longer-term augmentation and source planning processes are more aligned with the Essential Services Commission's PREMO approach to customer engagement.<sup>9</sup> This would involve a more structured evaluation of alternative augmentation planning with the community, and greater demonstration of how the long-term augmentation plans directly link to what consumers have told planners during consultation.

Establishing a clearer link between customer preferences and long-term augmentation plans is expected to have a 'trickle-down' effect on urban water governance. It will allow strategic planning decisions to link more to longer term plans. It will also help to clarify objectives and trade-offs between objectives, which will make planning governance easier.

Future engagement processes for the development of sustainable water strategies and urban water strategies provide an opportunity for seeking and giving greater consideration to customer preferences.

MJA further recommends that evidence used to make decisions around augmentation is made more transparent (for example, by publicly releasing advice issued to the Minister for Water by Melbourne Water on orders for desalination water).

### Planning and delivery should support the effective consideration of the interaction of centralised and decentralised options

While MJA notes that the momentum of urban water planning in Victoria is already strongly shifting towards greater integration of centralised and decentralised investment decisions, their position is that more could be done to facilitate better outcomes.

MJA has identified a number of specific recommendations that focus on ensuring that longer-term augmentation and source planning process achieve greater integration at critical decision stages within Victoria's existing long-term planning framework, and that the right participants are involved. For example, this could be achieved by

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<sup>9</sup> The Essential Services Commission has designed a new framework for implementing their approach to water pricing in Victoria. This framework, entitled 'PREMO' (Performance, Risk, Engagement, Management, Outcomes), incentivises water businesses to work with their customers and deliver outcomes that reflect customers' priorities.



making amendments to the statements of obligations issued by the Minister for Water to require water corporations to work with water resource management agencies, the Victorian Planning Authority, integrated water management representatives, water grid partnership representatives, and indigenous representatives during the development of urban water strategies.

MJA also recommends that centralised and decentralised investment planning use the same investment planning tools and frameworks so there is a common framework for evaluating centralised and decentralised investment. Such a framework has been under development since 2017 and MJA feels this should be progressed as a matter of priority.

MJA also proposes the merging of water security and integrated water management teams into a single group with a single governance structure, and the linking of water management with urban planning – for example, by identifying centralised and decentralised options through growth corridor plans and precinct infrastructure plans.

### Planning is more adaptive

MJA notes that the current governance arrangements for adaptive planning, as defined in the urban water strategies and the Melbourne Water System Strategy, provide an adaptive framework to guide decisions on water security. The framework consists of a water outlook, drought management plan and drought preparedness actions. In the short term, these plans provide a list of actions to ensure water security is maintained.

However, according to MJA, the current adaptive framework action plan does not provide clarity on how the *sequencing* of actions is determined. It is unclear if the actions are defined according to an economic framework or whether they consider customer preferences.

MJA recommends that an economic framework be developed to assess the short-term actions in response to changing short-term water supply conditions. This framework should include economic costs and benefits of supply options, including whole of water cycle costs and positive and negative externalities, as well as customer willingness to pay for preferred supply options and demand side interventions. This will enable water corporations to assess the sequencing of response actions based on economic merit and customer preference.

MJA also proposes that the Minister for Water should delegate short-term and long-term decisions on water security (including desalination water orders, operation of the North-South pipeline, the water grid/market and triggers) to the water corporations responsible for augmentation planning for centralised and decentralised sources. Water corporations are ultimately responsible for purchasing water supply, and are arguably best placed to manage risks and make informed choices. Such a delegation would need to be supported by appropriate checks and balances, such as ensuring any decisions by the water corporations are made public.

# Where to from here?

As a signatory to the National Water Initiative, Victoria is committed to increasing the efficiency of water use and providing supply security for rural and urban communities. While Victoria has been at the forefront of governance reforms designed to achieve the objectives of the National Water Initiative, further action will likely be required to meet the challenges posed by population growth and climate change. Meanwhile, there is a need to adapt to changing community expectations where water is increasingly considered as part of a broader liveability framework, and where water customers want to be more meaningfully engaged in decision-making processes.

When taken together, Infrastructure Victoria's earlier work, the current case studies and the supporting Marsden Jacob Associates' (MJA) report suggest a range of reform options aimed at improving the sustainability of Victoria's water supply. This paper seeks to facilitate further discussions about water governance in the context of updating *Victoria's 30-year infrastructure strategy*.

Specifically, Infrastructure Victoria would welcome feedback from stakeholders about the suitability of various reform opportunities across three broad areas:

- Better use of existing infrastructure and efficient use of all water sources
- More integrated and adaptive planning processes
- Need for community involvement in decision-making

## Better use of existing infrastructure and more efficient use of all water sources

Ensuring that the full range of water supply opportunities are considered – including non-conventional options, such as recycled water and stormwater – could significantly defer the need for high-cost major supply augmentation (such as a second desalination plant). Box 3 draws on the case study on the Western Irrigation Network, which highlights the range of uses currently considered for recycled water. However augmentation of Western Water's potable supply is not currently able to be considered as a use of this water. This means that a potentially efficient use of a finite and valuable resource is being excluded from consideration.

### **Box 3: Management of treated wastewater by Western Water**

Urban growth across Western Water's region is resulting in rapidly growing volumes of sewage. The existing approach to managing the resultant treated wastewater is to produce recycled water to standards set by Environment Protection Authority (EPA) and either reuse the treated water for local agricultural, recreational or residential non-potable purposes; or dispose of the treated water to waterways, in accordance with strict EPA discharge licence conditions.

Based on current trends, the volume of treated water generated by Western Water customers will exceed the current customer demand through existing recycled water supply schemes and waterway disposal capacity by 2023 if no additional action is taken. Without change, such as the removal or relaxation of the current constraints on the use of recycled water, the current approach cannot accommodate forecast growth in sewage volumes.

Western Water has had to consider other options to manage the growing volume of wastewater from its customers, including:

- **purchase of additional land by Western Water for irrigation with excess recycled water**
- **supply of excess recycled water to Melbourne Water's Western Treatment Plant**
- **disposal of raw sewage to the Western Treatment Plant**
- **disposal of recycled water to the City West Water network**
- **additional investment in Class A third pipe schemes in growth areas**
- **treatment of recycled water to Class A++ to release to waterways for environmental benefit, and**
- **combinations of the above options including partial and phased Western Irrigation Network project**

### options and adaptive management approaches.

Western Water's current preferred solution under existing policy settings is a proposed Western Irrigation Network that involves the development of an irrigation scheme in Parwan-Balliang, supplied by recycled water from the Sunbury, Melton and Bacchus Marsh recycled water plants. The proposed project includes the construction of a series of pipelines from Western Water's recycled water plants to a main storage at the boundary of the proposed irrigation district. A distribution pipeline system would be constructed within the Parwan-Balliang district to supply recycled water to the farms.

This option is technically feasible, was assessed against many options and will deliver benefits. However, an option to use the recycled water to augment Western Water's supply was not able to be considered.

*Source: See Appendix 1 for the case study on the Western Irrigation Network.*

Strong consideration should be given to reforms that remove the barriers and correct distortions that currently constrain effective planning and decision-making about the use of all available water sources. Potential reform measures include:

- the inclusion of *all* water sources – including recycled water and stormwater – within Victoria's entitlement framework – to enable their proper evaluation and appropriate management;
- the removal of current policy 'bans', such as the restrictions on the indirect potable reuse of water;
- clearer delineation of roles and responsibilities, particularly around the ownership of stormwater assets;
- clear expectations that the Department of Environment, Land, Water and Planning, and water corporations consider all technically feasible centralised and decentralised supply augmentation options; and
- improved water literacy and greater transparency so that water customers, the media, and other stakeholders better understand the costs and benefits of different supply options (as discussed in more detail below).

## More integrated and adaptive planning processes

While the momentum of urban water planning in Victoria is already strongly shifting towards greater integration of centralised and decentralised investment decisions, there is more that could be done to improve this integration, and to strengthen the interface of water planning with urban development and broader land and resource management processes. Furthermore, there are opportunities to modify planning frameworks so that the management of water resources is more adaptive to changing circumstances (e.g. short-term supply solutions or demand-side interventions in the event of drought).

Potential reform measures include:

- more consistent evaluation of centralised and decentralised solutions using common investment tools and frameworks. This will help ensure that centralised and decentralised options are assessed on a level playing field, and within the same planning cycle and timing;
- the integration of water planners responsible for centralised and decentralised solutions, and the inclusion of other relevant parties in planning processes;
- greater integration at critical stages within Victoria's long-term planning framework, so there is better coordination with land use and other authorities who influence urban planning (e.g. centralised and decentralised solutions are identified through growth corridor and precinct infrastructure plans); and
- the development of an economic framework to assess short-term actions in response to changing short-term supply conditions, which should enable water corporations to assess the sequencing of responses based on economic merit and customer preferences.

Box 4 draws on the case study on integrated water planning which highlights some of the benefits that can result from a stronger and clearer framework for integrated water planning.

### Box 4: Integrated water planning

The management of water resources is influenced by more than one organisation, and broader outcomes can be found outside of traditional administrative boundaries. For instance, wastewater from new residential areas in inland metropolitan areas can make its way into Port Phillip Bay and contribute to increasing nitrogen levels, impacting on the Bay's environmental health. There can sometimes be an unwillingness to transfer funding between organisations to optimise outcomes or get the most beneficial use of collective public funds without a shared planning arrangement.

Investment decisions could be better optimised across a catchment by coordinating investment with others or contributing to another organisations' investment that meets a shared outcome. There could also be

improvements in:

- coordinating with land use authorities who influence zoning and precinct structure planning, so that organisations are more proactive to new development, rather than reactive; and
- decision-making processes, which can sometimes exclude or fail to adequately engage partners, such as Traditional Owners and the community.

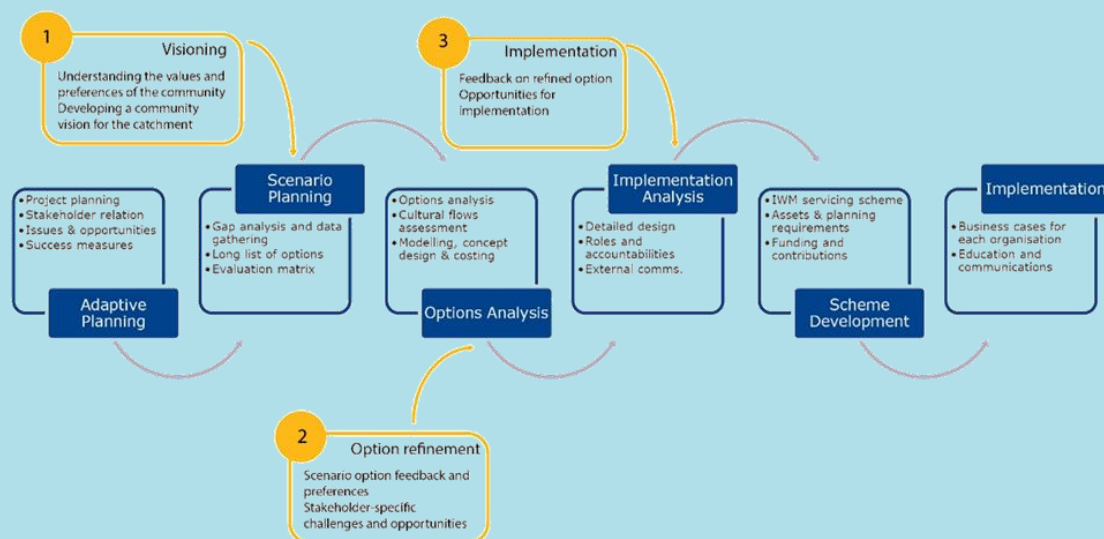
An integrated planning process is one proposed approach to address the coordination issue and to optimise investments on the basis of broader outcomes and taking a regional perspective to infrastructure that has a regional function. For water, it is important to consider the full water cycle in planning and catchments are a relevant spatial consideration. Integrated water management on a sub-catchment basis is a form of integrated planning that considers the water cycle.

An integrated water management scheme considers how to make the most out of the water supply system, through planning and delivering services by considering the whole water cycle and its key interfaces with urban development and broader land and resource management processes.

At a catchment and sub-catchment level, there are multiple organisations with some overlapping roles and responsibilities related to water, but all with an interest in making best use of water resources to deliver public value. By undertaking integrated water management planning together, organisations can identify issues at scale and then develop an optimised approach and investments to deliver economic, social and environmental outcomes, such as promoting water sensitive areas.

Planning at a sub-catchment level also helps to better identify placement of infrastructure investments and position water organisations to engage in a proactive way in precinct structure processes for new urban developments by having common upfront planning.

A proposed methodology for integrated water planning is presented below:



Source: See Appendix 1 for the case study on integrated water planning.

## Need for community involvement in decision-making

The community wants to be – and needs to be – more involved in decision-making about water supply augmentation options.

In order to engage meaningfully in water planning decisions, Victorians need access to open, impartial, and transparent information. Transparency and consultation are already hallmarks of Victoria's urban water planning processes which, in many ways, are recognised as being among the best in Australia. The recent adoption of the PREMO framework, which puts customers at the centre of a water business's decision-making during the independent water price determination process, is further evidence of the growing role being played by the community in influencing water supply decisions.

However, we believe more could be done to facilitate planning decisions that support the delivery of the outcomes that are most valued by Victorian water customers – through a better understanding of consumer preferences about how water augmentations are planned, how decisions are made in relation to the use of water from different sources, and the trade-offs that customers are prepared to make between different supply options

and impacts on their household water bills. Community surveys suggest there is currently a low level of literacy among many water customers – for example, a generally low awareness of potable reuse of water in Australia, and the fact that many Victorian households are already receiving indirect potable reuse water. And customer attitudes towards different options can shift after improved access to information. For example, on the basis of information provided through a short video to participants in MJA’s community survey, many water customers supported using indirect potable reuse for drinking and non-drinking purposes – particularly if this would reduce (or not materially increase) their water bills, and would help to secure their household water supplies into the future.

Potential reform measures include:

- more proactive communication and provide education, guidance, reminders and reassurance about the future for water supplies in Victoria.
- greater transparency in planning processes and involving the community more in key decision-making through meaningful engagement so their preferences are respected. This should lead to greater acceptance of proposed solutions, granting government and water corporations a ‘social licence’ to implement reforms, and/or deliver large infrastructure projects in the future.
- more education and improved information to improve the water ‘literacy’ of water customers, the media and other key stakeholders to enable effective community engagement which could support major changes to the way that we use water.

## Next steps

This paper and supporting work – including the Marsden Jacob Associates’ report – are being publicly released to facilitate further discussions about water governance in the context of the update to *Victoria’s 30-year infrastructure strategy*

We will be undertaking further targeted consultations as part of the process to update the strategy to ensure we gather all views before release of our draft recommendations in 2020. These consultations will have the objective of testing the proposed reform options outlined in this paper, and ultimately prioritising them for inclusion in the next 30-year infrastructure strategy.

To stay informed, visit us at [infrastructurevictoria.com.au](http://infrastructurevictoria.com.au).

# Appendix – Case studies

This Appendix presents five case studies developed by Infrastructure Victoria with input from some of Victoria's water authorities. These case studies are:

1. **Stormwater harvesting – Black Forest Road, Werribee** Input from City West Water and Melbourne Water
2. **Entitlements reform** Input from Southern Rural Water and Western Water
3. **Integrated water planning** Input from Yarra Valley Water
4. **Saline waste management strategy** Input from Coliban Water
5. **Western Irrigation Network** Input from Western Water

## Case study 1 - Stormwater Harvesting Black Forest Road, Werribee

City West Water and Melbourne Water

This case study examines the Black Forest Road stormwater harvesting project to discuss how different priorities held by responsible authorities can inhibit investment.

### Background to the need for a project in the Western Growth Area

Between 2017 and 2018, Wyndham's population grew by 5.9 per cent, the largest growth for a Victorian municipality after the City of Melbourne.<sup>10</sup> Significant development is forecast across the western growth area in the coming years which will lead to increased demand for water (potable and non-potable) and increased urban runoff. As a result, City West Water is upgrading and augmenting water supply networks in the region.

In particular, the size of anticipated urban development planned in the Lollypop Creek Catchment is from around 570 hectares to over 2,600 hectares.<sup>11</sup> Development will result in a significant increase in impervious area, which means that water runoff will increase – water runoff is estimated to increase by around 4.8 G/L per year by 2040.<sup>12</sup> If this water runoff is not managed well, it ends up as stormwater. Too much stormwater can damage and degrade urban waterways as it carries litter and other pollutants.

### Black Forest Road development

Developers identified an opportunity to create a stormwater-filled lake as part of the Black Forest road development in Werribee. This was in lieu of a retarding basin and subsequently included in the Precinct Structure Plan along with a need to address flooding issues. The design and use of the lake was left open, and three competing objectives emerged:

- amenity and recreation purposes for the lake – developer and council
- stormwater harvesting for use in the recycled water network – City West Water
- treatment and waterway health – Melbourne Water

City West Water has proposed a stormwater harvesting project. The scheme would consist of stormwater being collected in two proposed lakes. Stormwater would be diverted into the lakes from the Lollypop Creek catchment (approximately 7,000 hectares), targeting excess runoff from existing and future urban areas only. The captured

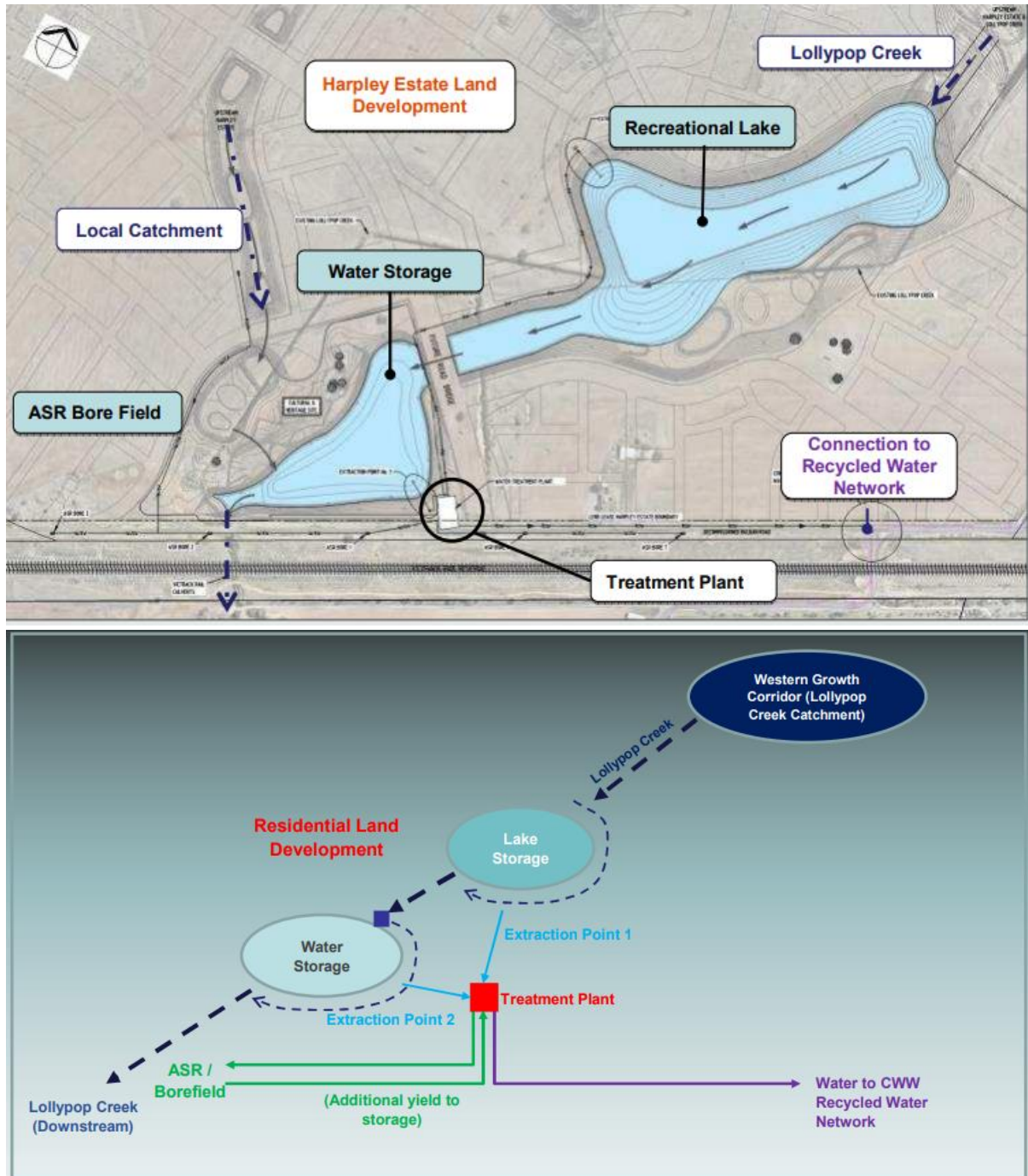
<sup>10</sup> ABS, 3218.0 Regional Population Growth, Australia, released 27 March 2019.

<sup>11</sup> City West Water (2017), unpublished slides.

<sup>12</sup> E2DesignLab (2017), Wyndham Integrated Water Cycle Management Plan: Summary Report Version 4, June 2017, prepared for Wyndham City Council. Accessed at <https://www.wyndham.vic.gov.au/sites/default/files/2017-07/Wyndham%20Integrated%20Water%20Cycle%20Management%20Plan%20-%20Summary%20Report%20-%2020%20July.pdf>.

stormwater in the lakes could then be treated prior to supply through City West Water's Western Growth Area recycled water network for non-potable use, such as gardens. Figure 1 is a design overview of the proposed stormwater harvesting scheme from Wallbridge & Gilbert Consulting Engineers, commissioned by City West Water.

Figure 1: Design overview of the proposed Black Forest Road stormwater harvesting scheme



Source: [https://www.stormwater.asn.au/images/Conference\\_Papers/2016\\_SIAVIC\\_Symposium/Emma\\_Hendy.pdf](https://www.stormwater.asn.au/images/Conference_Papers/2016_SIAVIC_Symposium/Emma_Hendy.pdf)

## Discussion of issues

The project has the potential to deliver multiple benefits. Up to 2.8 billion litres of stormwater could be harvested per year at full development of the estate. This has the potential to defer future augmentation of the Western Treatment Plant's Class A supply<sup>13</sup> and could optimise the overall delivery of alternative water schemes, in particular the West Wyndham Recycled Water Project<sup>14</sup>. The harvesting also provides a way to significantly reduce stormwater pollutant discharges into the receiving environments and the lakes can provide public amenity.

However, the ownership and ongoing management of the proposed lakes are uncertain due to different priorities for the lakes held by the responsible agencies.

The Black Forest Road stormwater harvesting scheme is listed as an uncertain major capital project in City West Water's 2018 price submission to the Essential Services Commission. An uncertain project means that there is a risk that the project may not proceed if key issues are not addressed to the satisfaction of the stakeholders (i.e. in this case study, if the responsibility for the ownership and the ongoing management of the proposed lakes cannot be resolved). The current cost estimate for the project by City West Water is around \$9.8 million in 2017 prices.

While the stormwater harvesting scheme is expected to deliver multiple benefits to multiple stakeholders, it also involves additional costs and risks due to its complexity. The costs of the scheme can be attributed to the infrastructure required, as well as the operation of the infrastructure, treatment costs and ongoing maintenance. A key risk is the uncertainty with the ownership of the proposed lakes and their ongoing management<sup>15</sup>.

Ownership of the lakes confers maintenance and risk management responsibilities. While the management of reserves and parks are typically transferred from the developer to the local council as public open space, the lake would have an operating function as well as a public amenity function if it is used for stormwater harvesting. This requires a different type of maintenance for the lake system, such as desilting, which is more expensive. Developed lakes are not traditionally owned and operated by water authorities. Typically, councils take on maintenance costs for public space, but not water quality management. Melbourne Water could take on water quality management, but it is challenging for it to maintain lake water quality to a recreational standard as the maintenance regimen differs from the requirements for environmental and ecological treatment purposes (not core business), and the lake may pose a risk to downstream water quality which could pose an additional cost. There are however examples of lakes designed for aesthetic and recreational purpose which are governed by body corporates and managed by specialised service providers in developments. However, given the size of the lake, consideration of risk sharing and management, equity and inter-agency compensation requires further exploration.

The ability to raise revenue to recover costs is varied among the stakeholders. Water authorities can recover costs through the regulatory pricing arrangements which are a user pays system; however, there may be a barrier to share costs through uncertain regulatory treatment of cash grants. Councils raise funds for local infrastructure and services through rates, up to a capped limited and can receive developer contributions. Councils need to consider the priorities of the whole municipality which are driven by their council plan, developed through formal community consultation processes. While council receives an amenity benefit for residents from the lakes, this could be achieved without a stormwater harvesting scheme.

## Conclusion

There are significant benefits from re-using stormwater in the urban water cycle, but there are some areas where different priorities held by responsible agencies can inhibit investment. Where these arise, and this can be unavoidable because of the different purposes of the agencies, then a process which allows the following could alleviate some of the issues for future projects:

- Better shared understanding of forward planning and priorities of agencies, and input to each other, including through Precinct Structure Planning processes
- A process where value, risk and responsibilities can be exchanged, such as for maintenance, overcoming existing barriers. This would likely need a governance and funding agreement, which requires costs, benefits and risks to each entity to be known, valued and realisable and discussion on inter-agencies sharing and risk trade-offs.

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<sup>13</sup> City West Water (2017), 2017-18 Annual report.

<sup>14</sup> City West Water (2017), Urban Water Strategy.

<sup>15</sup> City West Water (2017), 2018 price submission to the ESC, accessed at <https://www.esc.vic.gov.au/sites/default/files/documents/2018-water-price-review-city-west-water-price-submission-20170928.pdf>



It could be worth developing a governance model for future projects, as an 'off-the-shelf' governance model can create familiarity and clarity or provide a starting point for further discussion. Establishing governance early is desirable and an established model would help to save time and enable timely investment through clearer decision making principles and roles.

## Case study 2 - Entitlements reform

### Southern Rural Water and Western Water

This case study examines the characteristics of different types of water entitlements, and their value to users, to determine the potential scope for improved economic outcomes and regulatory efficiency. The hypothesis is that the current regulatory system prevents the value of water from different sources from being appropriately compared and evaluated, and reduces the ability for different types of water to be applied to their best/most efficient use.

#### Project background

Water markets have existed in Victoria since 1991, with trading rules evolving as the market has developed. Ongoing reforms have led to an active market in northern Victoria involving entitlement holders in Victoria, South Australia and New South Wales. While markets exist in southern Victoria, they are less active due to their limited scale. The Victorian water markets enable eligible parties to buy and sell entitlements and allocations.

Victoria's water entitlement framework is established under the *Water Act 1989* and provides the basis for how water resources are shared. This includes:

- Bulk entitlements;
- Environmental entitlements;
- Water shares; and
- Water licences.

In addition to the entitlements listed above, the *Water Act 1989* allows individuals to take water for domestic and stock purposes from a range of surface water and groundwater sources without a licence. The entitlement and licensing system is generally administered by water corporations as the Minister's delegate.

Stormwater and recycled water are not currently regulated under the entitlement system, which conceptually limits their economic value as they can only be acquired through agreement and makes comparison with water regulated under the entitlement system difficult due to differing legal considerations and cost structures.

Entitlements (total licensed volume) in groundwater and surface water systems across Victoria are generally fully allocated and capped. For new entrants or those looking to increase their water allocation, markets are the primary mechanism.

The Victorian government commissioned a water market review in 2017 and is currently designing a Southern Market Trial. Both the 2017 review and the Southern Market Trial have identified areas where access to and sharing of water resources can be improved. Issues identified range from poor availability and understanding of relevant information to the appropriateness of aspects of the resource allocation and entitlement system.

#### Discussion of issues

##### What is the market

A market is a group of buyers and sellers for a product. The product is water in Victoria. Market participants include:

- Rural water corporations;
- Urban water corporations;
- Environmental Water Holder;
- Irrigators (agriculture); and
- Commercial & industrial users.

All of these participants buy and sell entitlements in order to manage their supply risks for their productive uses of the water and their financial risks (e.g. entitlements can be sold when not needed to increase revenue).

In addition, the Minister for Water is a market participant who can supply (or reduce the supply of water) into the market. Further, the Minister for Water can influence other market participants either directly (through Ministerial Directions) or indirectly (through market rules). The water corporations also have a role in the development and application of water management rules. Potential conflicts of interest must be managed.

## Relevant regulatory/governance settings

### Bulk entitlements

A bulk entitlement is a legal right to take and use water granted under the *Water Act 1989*. Typically, these will enable the holder to take all or a portion of water flowing at a particular location. Passing flow requirements may be applied to protect environmental values and other water users downstream.

Bulk entitlements can be held by water corporations, the Victorian Environmental Water Holder and other specified bodies defined in the *Water Act 1989*. Bulk entitlements may be transferred under section 46D of the *Water Act 1989* provided the holder has applied for and obtained approval from the Minister for Water.

Water allocation made available under bulk entitlements may also be assigned to another person under Section 46A of the *Water Act 1989* in accordance with trading rules.

Minor amendments can be made to the bulk entitlement by the Minister in limited cases (prescribed in the Act) only after consulting with the entitlement holder and other relevant entitlement holders. Bigger amendments can only be made on the application of the holder of the entitlement, or another authority with the support of another Minister.

Bulk entitlements are generally held in perpetuity, generally reflect the population size and distribution at the time they were created and are not adaptive. Trading in bulk entitlements is very limited and markets are not well defined or efficient. The effectiveness of entitlement water markets is currently being explored by DELWP through the South Central Victoria Water Market trial.

### Water shares

A water share is an entitlement to a share of the water available in a declared regulated water system. Water shareholders have the rights to a share of water in storage. Water shares are ongoing, and may be reviewed by the Minister on application from the owner of a water share. Conditions can be imposed on water shares when they are granted and again when reviewed.

Water shareholders also pay charges to water corporations for water delivery. They only receive a portion of their entitlement (their allocation) based upon the resource's availability.

Features of a water share include the relevant water system, its reliability and volume. The volume of a water share is defined as the maximum amount of allocation that can be made against it each year. Water shares can be bought and sold separately from land, and do not have to stay with the property if it is sold. Water shares may be held independently of owning land. Water shares are separate assets that can be mortgaged, just like land.

To use water on land, a water use licence is needed. A delivery share is also required to have water delivered to land in an irrigation district. Trading of water shares is much more common than delivery shares, particularly in water systems dominated by irrigation uses.

### Take and use licences

Take and use licences in unregulated surface water systems or groundwater systems have not been "unbundled" and converted into water shares and delivery shares, as in regulated surface water systems.

A take and use licence is a fixed term entitlement to take and use water from a waterway, catchment dam, spring, soak or aquifer. Each licence is subject to conditions set by the Minister and specified on the licence. Typical conditions include the type of use (irrigation, industrial use etc.), volume, rate and timing of extraction allowed, and any monitoring and reporting required to better understand associated risks. When land is transferred to a new titleholder, that person must reapply to the Minister for a take and use licence to replace the previous one. These licences do not automatically transfer with land.

The Minister can review and vary the conditions of the licence at any point during the term of the licence (with three months' written notice to the licensee), but only in accordance with a statutory resource management plan. The Minister may revoke a licence if the conditions of the licence are not met. Three months' notice is required for a revocation. Licence conditions can also be amended upon renewal of the licence (as part of the application process). In practice, this means a high level of certainty for the licence holder but low flexibility for the water resource manager whom may wish to make simple changes to the system management as conditions change and new information becomes available.

The default term of a take and use licence is 15 years although shorter term licences may be issued where uncertainty around the sustainability of the take is high. In practice, licences are renewed unless there is a very significant reason not to. Conditions may be added or removed to manage risk and as more information becomes available (but only in accordance with the constraints above). Tenure (i.e. 15 year licences rather than “in perpetuity”), and the ability to mortgage against a licence is increasing as an issue for people. As enterprises grow, they seek to finance against their licence but credit providers may not accept fixed term licences as a mortgage-able asset. Leasing or similar arrangements to enable water users to manage their risks through increasing flexibility is also problematic under the current licensing regime; the larger, more corporate enterprises are less interested in “owning” water, if only they could access a licence with some longer tenure than the 5 year temporary trade.

### Recycled water agreements

Recycled water is water that is supplied from wastewater treatment plants or industry processes which has been treated to a standard that is appropriate for reuse.

Recycled water is not as flexible in its application as other water entitlements because it is often subject to restrictions on its use, as outlined in EPA Guidelines for the Use of Reclaimed Water. These and associated guidelines are currently under review with anticipated completion in mid-2019. Recycled water can be a more predictable source of water (within defined quality parameters and volume) than surface water or stormwater. Where recycled water is discharged to a waterway upstream of a surface water collection or extraction system, recycled water is in reality a component of surface water, though it is not recognised as such in regulations.

The uses for recycled water are currently limited by both implicit and explicit governance settings but there is significant grey area. For example, the EPA Guidelines for the Use of Reclaimed Water specify uses to which they apply (and do not prohibit any particular uses) while the Australian Drinking Water Guidelines allow for the risk-based management of any water source; there is no written policy which prohibits the use of recycled (or storm) water for potable use but there are instances on record of the government stating that this is “not government policy” (Victorian Infrastructure Plan, State of Victoria, 2017).

The terms and conditions of recycled water agreements vary depending on a range of factors including the degree of treatment and therefore quality of the water, how the water will be used, and the risks to the receiving environment. A recycled water agreement is typically determined on a case-by-case basis between a water corporation and an end user. The terms and conditions of agreements evolve over time and may be different between different recycled water supply schemes.

### Stormwater

Stormwater cannot be actively harvested for drinking water under current regulatory settings.

A stormwater harvesting licence is required from Melbourne Water if connecting to new or modified stormwater drains, watercourse or open channel to harvest any quantity of stormwater from a waterway or stormwater infrastructure controlled by Melbourne Water.

Local Councils own and manage local stormwater infrastructure.

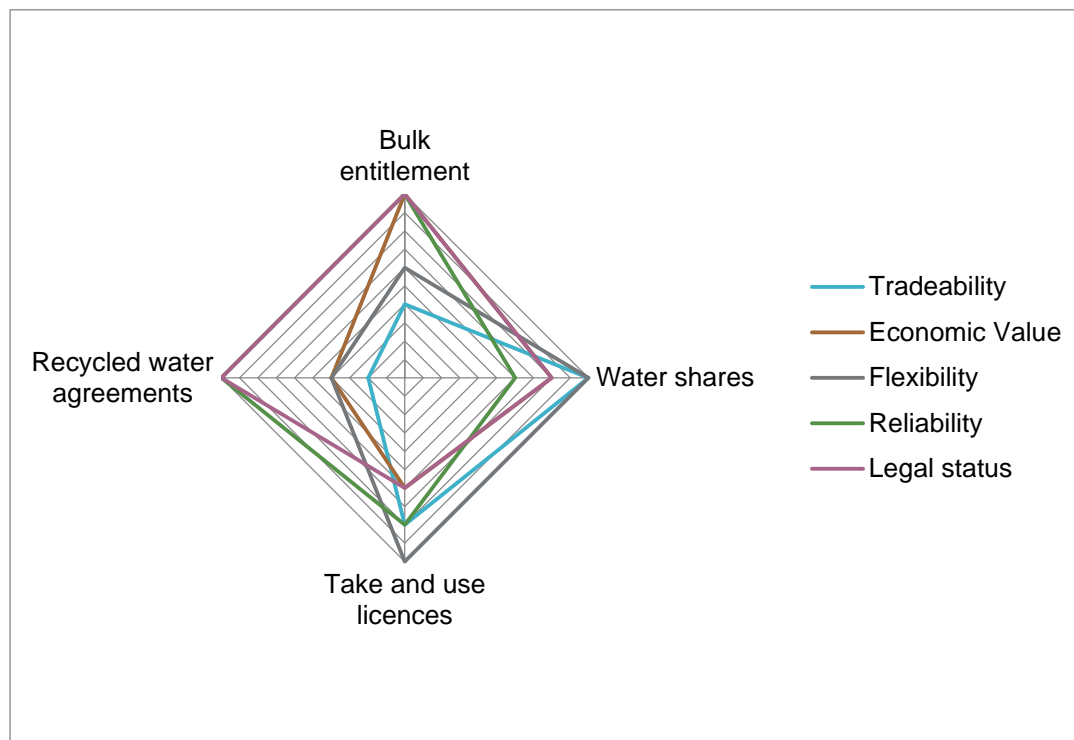
The ownership of stormwater is not explicitly addressed by the current governance settings and third party access arrangements are not well established. With no defined entitlement system, there is no market for stormwater in Victoria.

The Improving Stormwater Management Advisory Committee delivered short- and long-term reform recommendations at the end of 2018. In addition, there will be reviews of associated guidelines and regulations including the Best Practice Environmental Management (for stormwater).

## Evaluation

Figure 1 provides a summary assessment of some of the key factors in different elements of the water entitlement system. While bulk entitlements have high reliability and legal status, which contributes significantly to their high economic value, they have low flexibility and tradeability. While recycled water agreements also have high reliability and legal status, they have lower economic value because of their lack of tradeability and additional conditions (which add cost) on their use. Water share and take and use licences have higher flexibility and tradeability but can have lower reliability and legal status. The economic value of both of these fluctuates according to market conditions and resource availability.

Figure 1: Summary assessment of various water entitlements



### What could an alternative solution look like?

An alternative solution could seek to regulate all types of water consistently and enable more informed, objective consideration and valuation of all water sources with an ultimate objective of maximising the collective value of all water resources. The language used is also important. For example, “entitlement” can have positive associations while “contract” can have negative associations.

The instrument used could depend upon the volume of the water under examination.

For example:

- a. A bulk entitlement may be appropriate for large volume surface water entitlements for water corporations and irrigators, a bulk entitlement for recycled water may then also be created, which then sits with the water corporation. The water corporation may then be able to use this water to participate in a market for all water, not just surface waters.
- b. A declared system which incorporates the total water available within a given water system. This includes surface water, recycled water and stormwater. Rights to this water could be allocated to water users based on their end use of that water (with the highest quality water allocated for the most sensitive/highest value end uses) and/or proximity to the water source.
- c. Entitlements tied to land might also be reviewed, with the possibility to tie a recycled water entitlement to land in a similar way that surface water is. Such an approach may also increase clarity with regards to water that falls on or flows through private land (this has farm dam implications). Such an approach would allow the market to value water on a volumetric basis as other considerations such as terms of agreements, are consistent.
- d. An integrated market could be established for all water sources, including surface water and recycled water, and users could buy whatever available water they want. Urban water corporations would possibly pay a premium for surface water for potable supply (especially where it is still cheaper than desalination plant water), while providing recycled water at a price set by the market to provide greatest return on investment for infrastructure.

In addition, integrated water management outcomes should be achieved through and/or enabled by the entitlement framework.

Security and reliability for all users can be increased with diverse sources. All users need increased security around volume, quality and timing for a set, or at least predictable, price. Currently, this is not always achievable through trade where surface water is unreliable and access to other sources (like recycled water and

groundwater) is constrained or restricted, for example, in the Werribee catchment. To exacerbate the situation, trades to the Werribee system from the Thomson system are very difficult under existing rules and a total trading cap is applied. Further, the trade processes expire annually and require Ministerial sign-off. A Bulk Entitlement for Werribee irrigators to trade/store/carryover more flexibly, cheaply and easily could assist to manage water security risks.

It may also assist to achieve integrated water management outcomes if the trade-off between users is valued. For example, in the Werribee catchment, Western Water's discharge compliance costs could be considered as part of recycled water provision costs for their or SRW customers. SRW's primary drivers are reliability and quality of water supply for urban and irrigation customers. Within the catchment, there is significant overlap with Western Water's primary drivers to manage treated waste water and meet potable demand.

## Conclusion

Access to water is highly contested. In peri-urban areas there is a tension between urban and rural use of water. Urban users have a much higher ability to pay, and as such, rural users are very protective of their resources.

However, if we look holistically, and incorporate recycled water into the market, we can let the market decide how different water sources are valued, and this will drive economic efficiency.

Economic factors are also significant in the design of an effective solution that is equitable for all water users. The maximum agricultural water price is significantly less than an urban water corporation's capacity to pay due to the differing economic conditions in the agricultural sector and particularly where high system costs being shared by a small number of customers.

Revision of the attribution of costs and benefits is needed to achieve integrated water management outcomes. For example, a pipeline to transfer Western Water Melton Recycled Water Plant discharge to the Western Treatment Plant to supply the Werribee Irrigation District with low salinity recycled water would by itself be a relatively costly infrastructure project. It would, however, increase reliability and quality of supply to the Werribee Irrigation District. Further, it could also enable increased environmental flows or use of surface water for potable water if irrigators were willing to give up their river water allocations to increase their security through recycled water. This would be reliable water, but may have restrictions to its use. There is no market to purchase recycled water entitlements or shares. How would these costs and benefits be appropriately shared, particularly where there are multiple water corporations and other stakeholders involved?

## Case study 3 - Integrated water planning

### Yarra Valley Water

The objective of this case study is to examine the potential benefits of a stronger and clearer framework for integrated water planning.

### Background

Where there is significant growth and/or numerous water planning processes occurring simultaneously but not necessarily integrated, there is a significant risk that a range of decisions will not be optimised leading to negative (or less positive) impacts on customers, the community, stakeholders and the environment.

Melbourne is growing and this urban growth places pressure on the health of various waterways through increased urban runoff and waste water generation. Furthermore, densification or urbanisation has the potential to increase urban heat island effects and diminish the liveability of our communities – through a range of well researched and documented adverse impacts. It also means increased demand for water, which is a finite resource that is affected by climate variability. To manage this, to ensure supply and sanitation in new areas, and to enable a range of liveability outcomes (such as managing localised flooding, minimising impacts on local waterways and ensuring green open spaces are accessible), infrastructure investment is required to connect with existing networks as well as better use of water resources.

Water resources and management are influenced by more than one organisation and broader outcomes can be found outside of traditional administrative boundaries. For instance, stormwater from new residential areas in inland metropolitan areas can adversely impact on waterways while making its way into Port Phillip Bay and contribute to increasing nitrogen levels, impacting on the Bay's environmental health. Centralised, rather than localised, servicing approaches can direct wastewaters through existing suburbs taking up capacity in older infrastructure thereby limiting or significantly increasing the cost of infill development and missing opportunities to irrigate public open space to achieve social benefits and/or reduce demands for potable supplies. There can

sometimes be an unwillingness to transfer funding between organisations to optimise outcomes / most beneficial use of collective public funds without a shared planning arrangement.

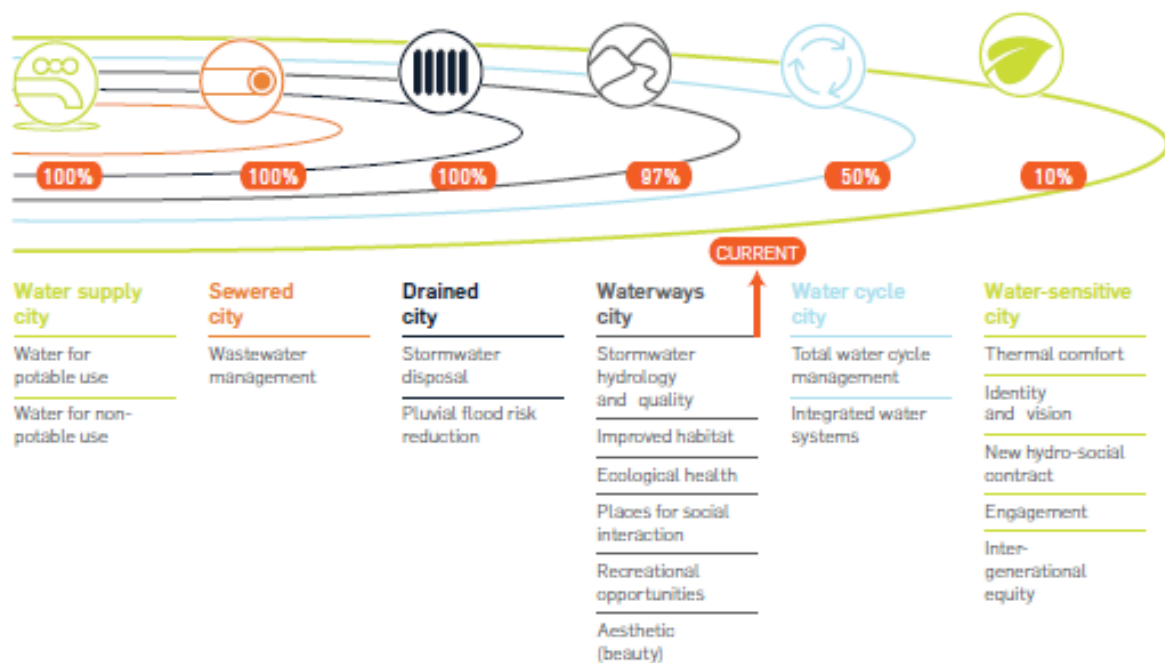
Investment decisions could be better optimised across a defined local area, such as a sub-catchment, by coordinating investments with partnering organisations or transferring funds between organisations to deliver a shared outcome.

There could also be improvements in:

- coordinating with land use authorities who influence zoning and precinct structure planning, so that organisations are more pro-active to new development, rather than reactive – this would be likely to significantly reduce planning referral response time and increase transparency for the development industry
- decision-making processes which can sometimes exclude or fail to adequately engage partners, such as Traditional Owners and the community, and consequently may fail to deliver on public expectations.

For water, moving beyond traditional approaches for managing water supply and sewerage services, drainage and waterways separately towards management of the full water cycle is a big step closer to the ideal water sensitive city. Water can be an enabler for many broader policy objectives such as increased liveability, social equity and jobs creation. Figure 1 provides a diagram of what success can look like for the water sector.

Figure 1: Path towards success for the water sector – moving towards a water sensitive city



Source: Yarra Valley Water (2017), *Urban water strategy*. Adapted from CRC Water Sensitive Cities.

### Proposed approach to address the problem

A collaborative, integrated planning process, taking a sub-catchment (geospatial area) perspective to infrastructure that has a regional function, is one proposed approach to address the coordination issue and to optimise investments on the basis of broader outcomes. For water, it is important to consider the full water cycle in planning and catchments at a relevant spatial scale to allow optimisation of collective investment while maintaining the nexus with development and local communities. Integrated water management on a sub-catchment basis is a form of integrated planning that considers the water cycle in a scale that makes sense for communicating with local communities, planning and development requirements and linked infrastructure investments.

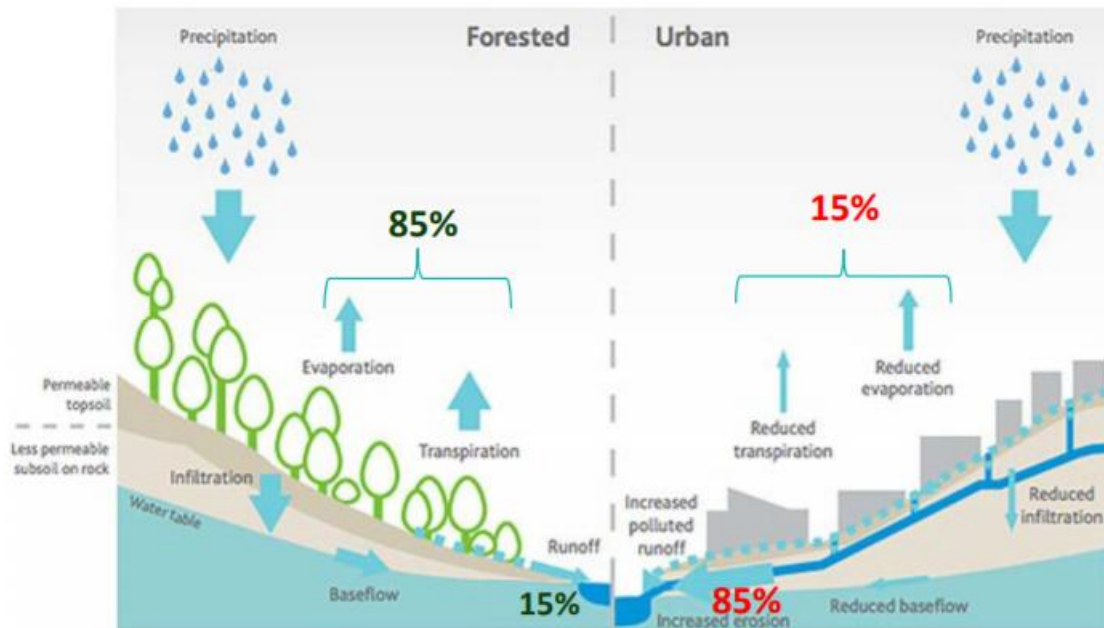
The Department of Environment, Land, Water and Planning (DELWP) defines integrated water management as:

“A collaborative approach to planning that brings together organisations that influence all elements of the water cycle, including waterways and bays, wastewater management,

alternative and potable water supply, stormwater management and water treatment. It considers environment, social and economic benefits.”<sup>16</sup>

The traditional water resources servicing approach involves importing water, exporting wastewater and diverting stormwater to the nearest waterway. This involves planning and delivering services in isolation from one another. An integrated water management scheme considers how to make the most out of the water supply system, through planning and delivering services by considering the whole water cycle and its key interfaces with urban development and broader land and resource management processes. Figure 2 provides a comparison between a forested area and a developed urban area and illustrative impacts from a water perspective.

Figure 2: Illustrative impact of urban development on water resources



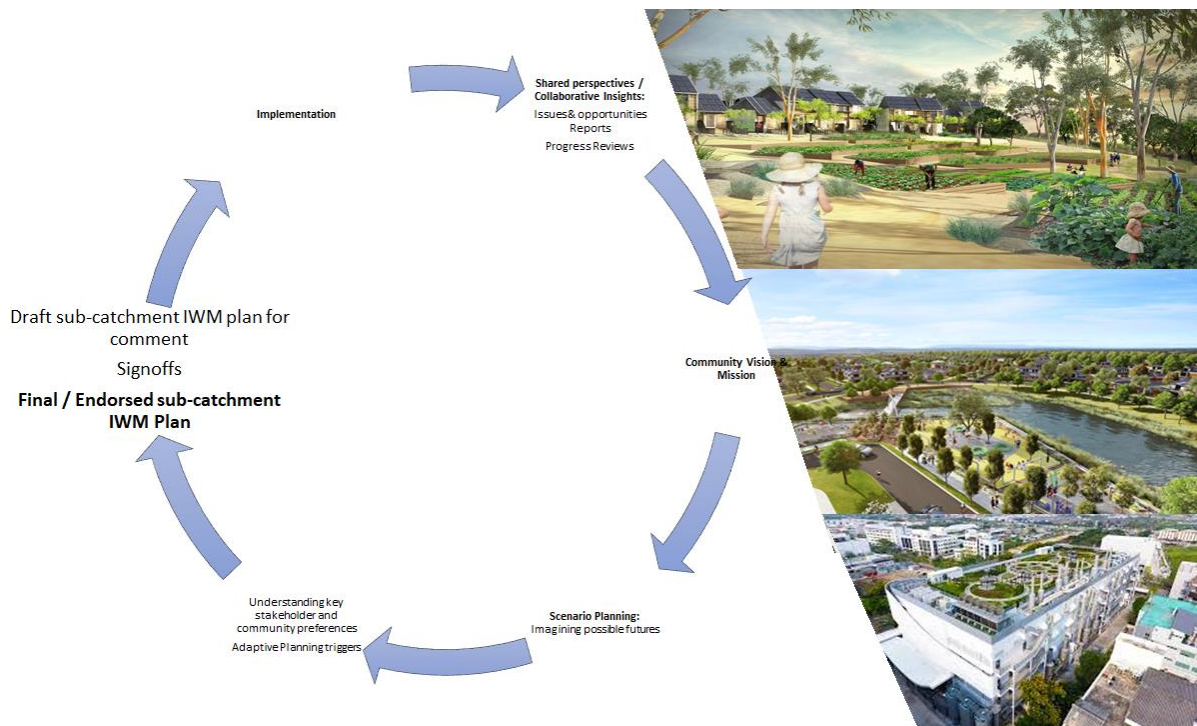
Source: Victorian Department of Environment, Land, Water and Planning (2018), *Issues paper for the Improving Stormwater Management Advisory Committee*. Adapted from Walsh et al. (2004).

At a catchment and sub-catchment level, there are multiple organisations with some overlapping roles and responsibilities related to water, but all with an interest in making best use of water resources to deliver public value. By undertaking integrated water management planning together, organisations can identify diverse but interconnected issues at scale and then develop optimised approaches and investments to deliver economic, social and environmental outcomes. Planning at a sub-catchment level also helps to better identify placement of infrastructure investments and position partnering organisations to engage in a proactive way which informs consistent inputs to existing precinct structure and planning processes for new and infill urban developments by having common upfront planning.

Figure 3 provides an overview of the ongoing iterative approach to integrated water management planning being piloted in the Upper Merri Creek sub-catchment which incorporates Melbourne’s northern growth area. This process is proposed to be both flexible and adaptable for other sub-catchments in both greenfield and infill areas.

<sup>16</sup>Department of Environment, Land, Water and Planning (2017), *Integrated Water Management Framework for Victoria – An IWM approach to urban water planning and shared decision making throughout Victoria*.

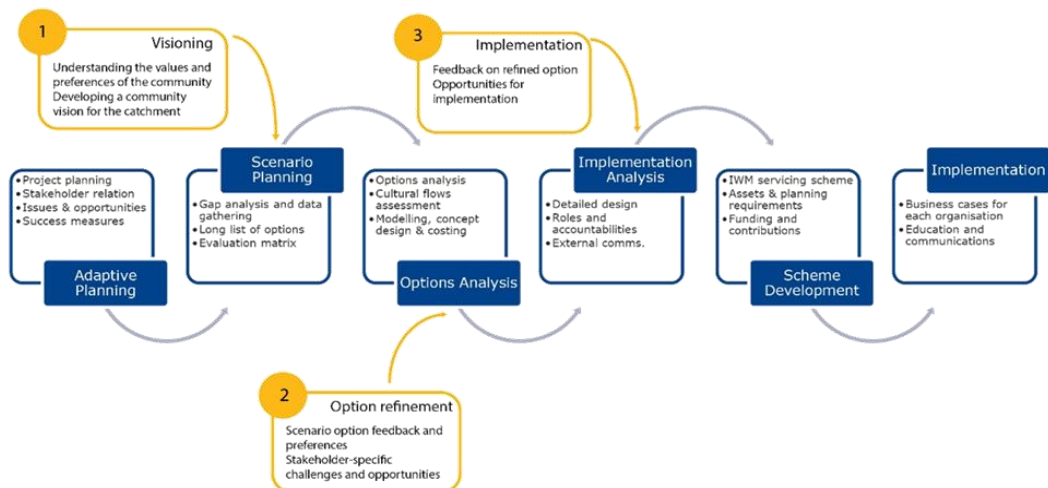
Figure 3: Integrated water management planning concept



Source: Yarra Valley Water.

Figure 4 provides a proposed methodology. As the integrated planning involves multiple organisations, how the planning will proceed is important to highlight. Sub-catchments or management units in Victoria represent areas that have aligned hydrological characteristics. They have been adopted as integrated water management areas as they overcome artificial, organisational boundaries. It is anticipated that the scale of these management units will ensure that individual plans will incorporate the local and catchment or regional scale issues and opportunities, and also reflect the particular preferences of communities living there now and into the future.

Figure 4: Proposed integrated water management planning methodology



Source: Upper Merri Creek IWM pilot project<sup>17</sup>

<sup>17</sup> Project Partners: Hume City Council, City of Whittlesea, Mitchell Shire Council, Wurundjeri Woi Wurrung Aboriginal Corporation, Melbourne Water, Yarra Valley Water and the Victorian Planning Authority.



The intent of this approach is to embed Traditional Custodians and community engagement into planning processes to create a mandate for changed approaches and drive optimised outcomes. The key outcomes expected from an integrated water management plan using this methodology are:

- Transparent planning & development requirements including infrastructure sequencing information
- Streamlined development servicing
- Integration and extension of existing management and funding frameworks
- Flexible and adaptive framework to support long term and evolving community objectives and the adoption emerging knowledge and technologies

In particular, the proposed methodology builds layers of information in each of the defined sub-catchments to develop a plan document that outlines the specific issues and requirements to achieve agreed objectives. Much of the information required to establish the initial iterations of an integrated water management plan already exists. Focused effort involves collating information from a variety of sources, layering it on defined geo-spatial areas (sub-catchments) and creating a water balance which interprets the collective issues and opportunities to support stakeholder and community discussions in scenario planning processes. Communicating technical information effectively is a fundamental requirement of the process.

The contents of the integrated water management plans will be translated into planning controls, development conditions and sequencing plans. Defined funding arrangements are endorsed prior to being made publicly available on a shared or consolidated website which links back to the respective websites of partnering organisations with consistent information and messaging. From specified dates, land use planning requirements and funding contribution rates will apply. It will be possible to generate automated referral responses and preliminary servicing advice which links to relevant integrated water management plans.

It is proposed that each integrated water management plan details:

- Planning / development requirements aligned with a catchment Strategic Directions Statement e.g. on-site retention, low infiltration pipelines
- Shows all community water assets and projected timing for construction e.g. retarding basins, alternative supply treatment plants, water & sewer networks
- Incentives based funding, such as incentives for households to use less potable water or plant indigenous species that contribute to biodiversity objectives; incentives to install green rooftops to reduce heat island effects and/or capture and filter rainwater for reuse or install solar panels
- Contribution rates for growth related network augmentations \$/ha<sup>18</sup>
- Infrastructure investments funded by partnering organisations

As part of any good planning process, each plan will be periodically reviewed and updated through ongoing processes which check currency of information, assumptions and community attitudes.

## Conclusion

The integrated water management approach at a sub-catchment level is purposely focused on embedding a pro-active and iterative (adaptive planning) approach that has the following potential benefits:

- Fosters a collaborative framework which supports water management towards water sensitive city outcomes
- Positions the water industry to collaboratively move to pro-active planning for greenfield, infill and renewal development – which facilitates input to PSP processes as they occur
- Incorporates coordinated planning, development and infrastructure responses to collectively agreed issues and objectives at a sub-catchment level
- Infrastructure is built not just to service individual development site needs, but also to service broader public objectives
- Facilitates optimised and coordinated infrastructure investments and transparent cost sharing to achieve agreed outcomes, as well as more equitable funding
- Development contributions more aligned with the costs of developing in defined (sub-catchment) areas
- Specifically engages all partnering organisations equitably with an influence on water, and formalises engagement with Traditional Custodians in water planning and management processes and embeds the community / customers in collaborative decision-making processes

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<sup>18</sup> *Developers fund the cost of development. At present, developers pay contributions to Councils, Melbourne Water and retail water companies separately. Through this process, a sub-catchment contribution rate could be developed which provides more equitable funding of all IWM infrastructure required to cater for growth. This could be within the sub-catchment or to fund downstream impacts. E.g. sewerage heading south from the Upper Merri Creek will take up capacity in existing networks that could impact on future infill developments.*

- Has the potential to significantly improve planning referral response times as upfront sub-catchment planning has occurred and been agreed to, meaning that any planning permit conditions requested by water authorities are likely to be known in advance
- Better shared understanding on the infrastructure sequencing information, meaning more streamlined and transparent development servicing
- Flexible and adaptive framework to support long term objectives and adoption emerging knowledge and technologies

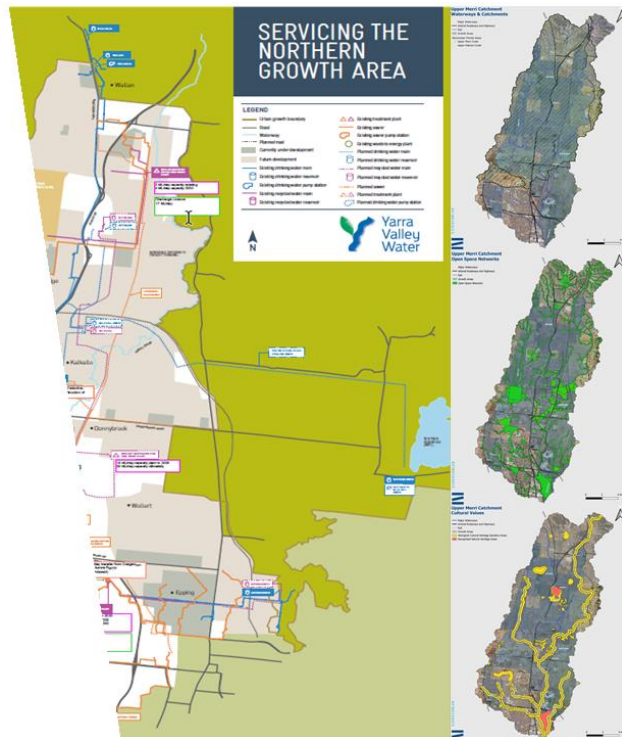
There are also potential costs to this approach, such as:

- More upfront investment in planning
- Collaboration takes time, and agreement can mean compromise from an organisational perspective
- Reduction in individual organisations' control as need to take into consideration agreements with other collaboration partners
- If there are unforeseen circumstance which results in one organisation not able to deliver, then it impacts on the plan and other organisations' planning

An integrated water management sub-catchment plan is currently under development for Upper Merri Creek as a pilot project in a predominantly greenfield setting (see [www.uppermerricreek.com.au](http://www.uppermerricreek.com.au)). The intent for the plan is to clearly convey planning requirements and the infrastructure investment sequencing information.<sup>19</sup> Evaluation is a key component of the pilot.

#### Upper Merri Creek Tasks List

TASK	PRIORITY	STATUS	DUE DATE	% COMPLETE
Statement of Commitment	High	In Progress	16/05/2019	75%
Information Sharing Agreement	High	In Progress	10/05/2019	75%
Partners Briefing Note	Normal	In Progress	17/05/2019	100%
Collaborative Adaptive Planning	Normal	In Progress		50%
Workshop 1	Low	Complete		100%
Workshop 2	Low	Complete		100%
Cultural Flows Assessment	High	In Progress		50%
Discussion Paper	High	In Progress	3/06/2019	75%
Technical Paper	Normal	In Progress	14/06/2019	25%
Scenarios graphics	High	In Progress	31/05/2019	25%
Fit-for-purpose Water Balance	High	In Progress	7/06/2019	50%
Stakeholder Engagement Plan	High	In Progress		75%



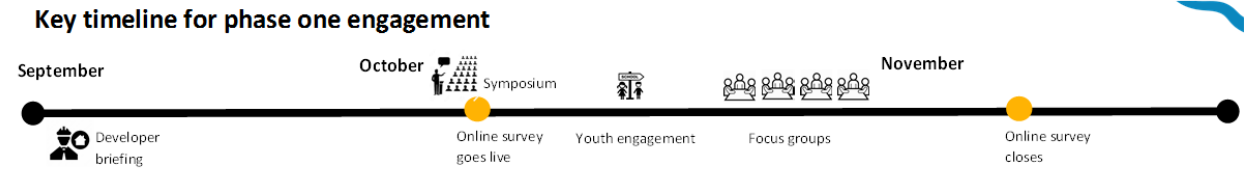
Source: Yarra Valley Water.

As at September 2019, the next steps include:

- Partnering organisations sign Partnership Agreement with Wurundjeri Woi Wurrung Aboriginal Corporation
- Information Sharing Agreement executed for Upper Merri Creek IWM online platform
- Complete papers, water balances and scenarios development to support stakeholder engagement processes
- Input information from community co-design forum (held 21 September 2019) and Cultural Flows Assessment into options analysis

<sup>19</sup> Yarra Integrated Water Management Forum, Yarra Strategic directions statement September 2018, accessed on 16 April 2019 at [https://www.water.vic.gov.au/\\_\\_data/assets/pdf\\_file/0018/412416/10696\\_DEL\\_IWMF\\_Yarra\\_SDS\\_web\\_UPDATED-FEB-2019.pdf](https://www.water.vic.gov.au/__data/assets/pdf_file/0018/412416/10696_DEL_IWMF_Yarra_SDS_web_UPDATED-FEB-2019.pdf)

- Draft IWM plan document for public consultation and endorsement by partnering organisations
- Implementation



Source: Upper Merri Creek IWM pilot project

## Case study 4 - Saline Waste Management Strategy

### Coliban Water

The objective of this case study is to examine the potential approaches to saline waste management in the region to determine the lowest social cost approach and identify what, if any, barriers there are to achieving this outcome.

### Background

Dairy processing is a large industry in the northern Victoria region and by-products include saline wastes. In addition, there are other industries in northern Victoria that produce saline waste including the residential sector. The management of saline wastes in northern Victoria is considered an intrinsic requirement of economic activity. The total volume of sodium waste produced is uncertain but in the order of thousands of tons per year.

There are concerns that:

- The current disposal arrangements might be unsustainable and could lead to long-term damage to productive land through raised sodicity<sup>20</sup>
- The limitations on current disposal options could constrain future economic development opportunities for the region.

Salinity refers to the concentration of soluble salts in soil or water. If saline wastes are not managed properly, then salinity can lead to a reduction in the productive capacity of land, degradation of the environment and loss of water quality.

Salt can be separated from water and other materials to some extent by various treatment processes which vary in cost and technical difficulty. The treated salty water, which still has some residue of salt or other materials, can be recycled and reused. However, the removed salt or excessive salty water often has limited value and few disposal or management options. In coastal areas, the most economic option is often to pump the concentrated salt into the ocean via purpose built pipelines and dispersal systems. In inland areas, however, this is not possible and transport to coastal areas can be prohibitively expensive. The most common option is therefore to concentrate the salty wastewater into a highly saline brine solution and put the brine into a suitable evaporation pond (i.e. constructed with an impermeable liner to prevent leakage and with appropriate licensing and management). Water in the brine solution further evaporates in the pond, reducing to a salt concentrate. The salt concentrate can then be removed and disposed of to a suitable landfill or the evaporation pond could be capped, closed and monitored like an old landfill. Eventually evaporation ponds reach capacity.

In northern Victoria, saline waste streams can be classified based on their salt concentration, which determines the management options.

Table 1: Saline waste streams and current management approach

Saline waste category	Description and where it comes from	Current management approach
<b>Highly-saline</b>	Waste streams with very high concentration of saline (4,000 – 40,000 EC). These waste streams come from brine produced by cheese processing and brine produced by reverse osmosis treatment of groundwater (i.e. removing salt from groundwater)	The current management approach by industry is disposal. The effluent is transferred, by tanker or pipeline, from the processing plant to a disposal site. Evaporation basins or pads are used to reduce the volume of waste through passive evaporation processes, leaving smaller salty crystalline waste. This waste can either be: <ul style="list-style-type: none"> <li>• Left there as a long-term storage facility, or</li> <li>• Transferred to landfill.</li> </ul>

<sup>20</sup> Sodidity refers to the amount of sodium held in soil.

Saline waste category	Description and where it comes from	Current management approach
<b>Saline</b>	Waste streams with a moderate concentration of saline (1,500 – 4,000 EC). These waste streams come largely from cleaning processes from dairy plants.	The current management approach by industry is to recycle.  Solid waste is separated out from the wastewater, with the water discharged to a storage lagoon. This may be mixed with other water to achieve a suitable saline concentration and then re-used by farmers during irrigation season or held in winter storages.
<b>Salty wash</b>	Waste streams from wastewater treatment plants operated by Goulburn Valley Water. The salt comes from residential customer wastewater and trade customers that discharge waste into the reticulated sewer network.	The current management approach by the water corporation is to re-use and recycle.  There are two ways, depending on the salinity of the wastewater: <ul style="list-style-type: none"> <li>• In Shepparton, the volume of wastewater from residential properties can dilute the saline discharge from trade customers. The water can be used on pasture or discharged to the river.</li> <li>• In Tatura, the residential wastewater is not sufficient to dilute the discharge from trade customers. Therefore, Goulburn Valley Water mixes in other water before use on pasture.</li> </ul>

Source: RMCG (2018), Saline Wastes in Northern Victoria – Management Strategy. Final report to Dairy Australia.

## Waste regulations

The Environment Protection Authority provides a framework on reusing and recycling water, as well as a guide on Industrial Water Reuse.<sup>21</sup> In these guidelines, industrial water is not considered suitable for drinking, food preparation, personal washing, swimming pools and spas and laundry trough uses. EPA approval must be sought where more than 5,000L/day of industrial waste will be reused offsite for a purpose that discharges or deposits to the environment (i.e. irrigation). EPA approval is also required for the facility where the industrial waste is discharged or deposited.

Additionally, there are several solid waste categories that the EPA regulates, including three categories of Prescribed Industrial Waste. The categories have increasing regulatory obligations and disposal costs (i.e. risk based regulation).

Because of their limited treatment and disposal options, salty wastes (particularly highly concentrated salts) may be classified as high-level Prescribed Industrial Wastes. However, the classification of some saline wastes in northern Victoria is not straight forward. Generators may therefore stockpile these wastes on their own land to avoid costly waste classification and disposal.

The Water (Trade Waste) Regulations 2014 prescribe certain waste as trade waste for the purposes of the *Water Act 1989* and conditions to be included in agreements for the receipt and disposal of trade waste by a water corporation. Trade waste under this regulation includes, but is not limited to:

- Superfluous matter derived from, or that is a by-product of, a trade or industrial activity (among other activities)
- Any waste matter that consists solely or partly of food, or which results from any process connected with the preparation of food
- Superfluous matter derived from, or by product of, desalination process (includes reverse osmosis processes).

In addition, water corporations require a licence under the *Environment Protection Act 1970* for the reprocessing, treatment, storage, containment, disposal or handling of waste.

<sup>21</sup> See [https://www.epa.vic.gov.au/~/\\_media/Publications/IWRG632%201.pdf](https://www.epa.vic.gov.au/~/_media/Publications/IWRG632%201.pdf)

## Waterway regulations

State Environment Protection Policy (Waters) underwent a review<sup>22</sup> and a new policy came into effect on 19 October 2018<sup>23</sup> providing for one statutory instrument to guide water quality management in Victoria, including the management and discharge of waste water and salts to waterways. It requires that discharges are managed and accounted for so as to manage salinity in the Murray River and its tributaries.

## Discussion of issues

A number of options have been considered for each type of saline waste which are summarised in table 2.

Table 2: Saline waste management options Saline waste category	Options	Constraints
<b>Highly-saline</b>	<ul style="list-style-type: none"> <li>Minimise waste generation</li> <li>Dispose of the waste to evaporation basin</li> <li>Relocate the waste to areas with access to an existing ocean outfall (Warrnambool, Leongatha and Western Treatment Plant]</li> </ul>	In all categories and with all management approaches, the <b>management constraints are the costs</b> of: <ul style="list-style-type: none"> <li>Disposal to prescribed landfill</li> <li>Disposal to evaporation basins</li> <li>Discharge to sewers</li> </ul>
<b>Saline</b>	<ul style="list-style-type: none"> <li>Control waste generation at source</li> <li>Manage production</li> <li>Dispose of waste efficiently after dilution</li> </ul>	
<b>Salty wastes</b>	<ul style="list-style-type: none"> <li>Use standard management approach for irrigation</li> <li>Waste disposal charging</li> </ul>	

### Highly-saline waste

Highly-saline wastes are the most difficult to manage. From the analysis undertaken, the most viable option appears to be local treatment and disposal via evaporation basins and landfill (status quo). There are a number of limitations with this (it is a high cost solution and it is questionable as to whether it can continue as a long-term management solution), but it is considered to be a more viable option than the others considered due to cost and regulatory approval.

The best option from a salt management perspective is to transport the waste to a direct ocean outfall. However the saline effluent is classified as a 'prescribed' waste and this incurs a penalty in terms of transport cost and the limited number of sites within Victoria that are licensed to receive this waste. There are also indirect costs (e.g. carbon emissions) associated with waste transport.

### Saline waste

The current methodology involves irrigation to neighbouring properties with dilution of the salt from irrigation channel water supply ("shandying"). An alternative option explored was to use the full channel supply as a shandying fraction. This would involve disposal of the full effluent stream into a major supply channel with the resulting diluted waste-stream then being supplied to all customers downstream. On this basis, the sodium and phosphorus would be dispersed over a far wider area than at present.

This option raises a number of issues:

- There are few incentives on Goulburn Murray Water (the rural water corporation) which manages the channels to participate – other than to add a small marginal volume to their total available resource. However, the current bulk entitlement system does not allocate a specific value to the loss allowance that Goulburn Murray Water is assumed to hold. That means that Goulburn Murray Water cannot gain value from any additional flow into its system. Otherwise, the contribution of an additional 1,000 ML is equivalent to the gifting of \$2.5-3 million to Goulburn Murray Water, which is the estimated cost of entitlements based on high reliability water shares at current market value.

<sup>22</sup> See <https://www.epa.vic.gov.au/our-work/setting-standards/environmental-standards-reform/water> and <https://engage.vic.gov.au/seppwaters>

<sup>23</sup> See <http://www.gazette.vic.gov.au/gazette/Gazettes2018/GG2018S499.pdf>

- The approach would need to take account of stock and domestic customers within a defined mixing zone downstream of the discharge point. It would probably be necessary to provide a piped D&S supply for a 2 to 5 km distance to manage the salinity for water users in close proximity to the salt discharge.

Whilst this form of management would be a significant change from what is currently considered acceptable, it is feasible and has precedence. For instance, Saputo Dairy Australia, a dairy manufacturing company, owns a processing plant in Maffra. Saputo has a licence from the EPA which enables it to discharge its treated wastewater directly into the nearby waterway known as the Main Eastern Channel. Application of this model may provide industry and water corporations in northern Victoria with multiple benefits including reduced cost of infrastructure, potentially improved environmental and agronomic compliance (i.e. removal of land-based salinity/sodicity and phosphorus loading issues), and the ability for this solution to be scaled up or down easily to meet the wastewater flows from the factory.

### Salty wastes

There are two recommendations for this waste source:

- Expand the application of irrigation shandyng regimes. An automatic shandyng capacity should ensure that the end-user manages the soil condition to ensure sustainable long-term health. However, the use of low salinity water to dilute saline waste water might not be acceptable, particularly during a drought with low allocations and high allocation prices.
- Establish a trade-waste pricing regime to send strong price signals to current and future trade-waste customers to ensure that the costs of sustainable disposal controls are taken account of in business investment and disposal decisions.

### Saline groundwater

In another example within northern Victoria, saline groundwater is pumped out of the former Deborah gold mine near Bendigo. Doing nothing would result in significant environmental harm: if nothing was done, the tourist attraction mine would flood, building foundations in town would decay, an unpleasant sulfur smell would proliferate and salt damage could be caused to soil, waterways, agriculture and ecosystems.

Following a period of focussed collaboration, led by the Department of Environment, Land, Water and Planning (DELWP) to generate solutions, an interim solution is now being managed by Coliban Water on behalf of DELWP. Salty groundwater is pumped from north (“upstream”) of the mine, arsenic contamination is reduced then the salty waste water is disposed to an evaporation pond. It is unclear what will happen when the pond eventually fills up. The arsenic must be treated separately. Although the salty waste water is more benign, it does contain heavy metals and so options for management, disposal or reuse are limited. Innovative solutions to the problem are being sought via an Expression of Interest process with the private sector. It is uncertain whether this will come up with a good fix.

### Conclusions

To support ongoing prosperity in the region, management of saline wastes will continue to be required. Even if further structural change in irrigated agriculture leads to relocation of the dairy processing industry, wastes of this type will be generated by others. A regional solution with the lowest reasonable economic, environmental and social cost is required. There are likely to be a suite of ‘best solutions’ depending on the site, circumstances, and waste stream characteristics. The ‘best option’ could be the one(s) that sustainably manages high strength saline wastes either on a site by site basis or through a shared regional facility.

There are technologies under development that may help increase the viability of these in northern Victoria. Organic material in some of the region’s saline waste streams creates some challenges but may be manageable on a larger scale.

Any alternative would have to be economically and environmentally sustainable over the long-term. Ideally it would minimise the energy/carbon budget on a whole-of-life-cycle basis. For example, any evaporation basin would have a finite life since at some point it would fill up. Transporting concentrated brine to an ocean outfall also has a large carbon footprint, made even larger by having to concentrate the saline waste stream. A new ocean outfall at Barwon Water’s Black Rock wastewater treatment plant would help reduce transport distances from northern Victoria but this is still a high cost. Relocating these industries to southern Victoria may partially solve the waste management issue but the job losses would be significant, not to mention the stranded industry assets. While we do not have a figure for replacement cost of all assets in the area, recent investments are significant including \$125 million by Fonterra to double the size of its Stanhope plant<sup>24</sup>, \$55 million for a new dairy

<sup>24</sup> This also followed \$140 million investment to rebuild and expand the plant after a fire in 2014. See <https://www.fonterra.com/au/en/our-stories/media/fonterra-invest-125-million-to-double-stanhope-cheese-plant.html>

processing plant in Girgarre by Australian Consolidated Milk<sup>25</sup> and \$91 million by Murray Goulburn Cooperative for a new cheese plant at Cobram in 2016.<sup>26</sup>

Salt is just one example of a wicked problem to be solved. Where there is a complex problem that crosses jurisdictional boundaries, collective decision-making is required. Saline waste management in northern Victoria could be considered to be similar to Integrated Water Management, which is currently experimenting with new frameworks to support collective planning and decision-making. In another example, government is establishing a water infrastructure grid oversight function to enable ongoing, collective planning to maximise benefits and minimise costs.

A more efficient process to deal with these types of wastes in inland settings may enable individual “best solutions” to be developed and delivered in a timely and cost-efficient manner. For any regulatory matters that need to be addressed, the spirit of the regulation should be accommodated. However meeting a requirement comes at a social cost and even here the relevant regulator needs to make a determination about what is a socially acceptable outcome e.g. use of Class B recycled water in lieu of the preferred Class A to irrigate public open space, or recycled water in lieu of potable water.

Where there is a collective social good, cross-jurisdictional compromise is necessary in order to save time and money. Naturally, every organisation has its own objectives and authority. A cross-cutting view with appropriate authority could enable more paid problem solving in these types of cases. For example, a regional Coordinator-General with decision-making powers that brings together those of multiple agencies.

## Case study 5 - Western Irrigation Network

### Western Water

The Western Irrigation Network (WIN) is a new recycled water reuse scheme that is being investigated by the regional water corporation Western Water to sustainably manage a growing volume of treated sewage and contribute to regional economic prosperity. The case study explores the costs and benefits of a range of options for reuse of the recycled water.

### Background

Western Water provides water supply and sewage management services to households and businesses across its region. It services many townships across the region including Gisborne, Bacchus Marsh and Woodend, and the rapidly growing suburbs of Melton and Sunbury in the north-west of metropolitan Melbourne. Urban growth is occurring across Western Water’s region resulting in rapidly growing sewage volumes, particularly across Sunbury, Gisborne, Melton and Bacchus Marsh. There are also several waterways in the region which hold significant environmental values, including the Werribee River and Jacksons Creek.

Western Water’s existing approach to managing sewage is to treat effluent to produce recycled water<sup>27</sup> to standards set by Environment Protection Authority (EPA) Victoria and either:

- reuse the treated water for local agricultural, recreational and residential non-potable purposes; or
- dispose of the treated water to waterways, in accordance with strict EPA discharge licence conditions, which set limits on the quality, volume and timing of disposal to minimise impact to environmental health in the receiving waterways.

Based on current trends, the volume of treated wastewater generated by Western Water customers will exceed the current customer demand through existing recycled water supply schemes and waterway disposal capacity by 2023, if no additional action is taken. Without change, the current approach cannot accommodate forecast growth in sewage volumes for several reasons, including:

- Existing temporary discharge licence at Melton Recycled Water Plant will expire in July 2022.
- Some sewage is treated to Class A recycled water at Melton Recycled Water Plant, and used in third pipe networks such as the very successful Eynesbury Scheme. However, the policy change to decrease minimum lot sizes has rendered outdoor water demand too small to justify the business case for future Class A

<sup>25</sup> See <https://www.premier.vic.gov.au/investment-in-girgarre-to-create-new-dairy-jobs/>

<sup>26</sup> See <http://www.mgc.com.au/media/43234/devondaler-december-2016.pdf>

<sup>27</sup> Recycled water in Victoria is highly treated waste water that can be used for a range of typically non-drinking purposes. Recycled water is used for fire-fighting, irrigating crops, watering parks, gardens and sports grounds, flushing toilets, washing cars and doing the laundry.



recycled water schemes. Furthermore, residential demand for Class A would still leave substantial excess recycled water volumes to be managed.

- Sunbury Recycled Water Plant has a permanent discharge licence, but is expected to reach the volumetric limit in 2023 meaning the increased treated sewage volumes from growth cannot be discharged to the waterway (Jacksons Creek).
- Western Water owns insufficient land on which additional recycled water volumes could be used for irrigation. Obtaining the quantity of land required is challenging due to urban encroachment which means that large parcels of land in the required locations have become rare and are more costly.

### Relevant regulatory/governance settings

In 2008, the Council for Australian Governments adopted the National Urban Water Planning Principles which Victoria is a signatory. These principles include managing water in the urban context on a whole-of-water-cycle basis and to consider the full portfolio of water supply and demand options.

In addition, the National Water Initiative sets out the principles for regulatory approvals for water use and works, which includes that the authority responsible for the regulatory approvals needs to be separate from water users and providers. In Victoria, the Environment Protection Authority is the relevant authority for regulatory approvals for environmental health including discharge to waterways and recycled water use. The Department of Health and Human Services regulates the quality of drinking water and associated risk management.

The Melbourne Sewerage Strategy, collaboratively developed between the urban water corporations and Western Water, has a vision to be “a resilient and adaptable system that supports thriving, healthy communities and a liveable, flourishing environment”. One of the Melbourne Sewerage Strategy’s five goals is leveraging resources, in particular that “Melbourne will be recognised as a world leader in advancing the circular economy through our commitment to beneficially using 100% of our water and resources while ensuring affordability for current and future generation of Melbournians.”<sup>28</sup>

Under current policy settings in Victoria, recycled water is able to be used for non-potable applications<sup>29</sup>. It can be inferred that water corporations are constrained in the potential uses of recycled water to disposing of it into waterways, onto land (i.e. irrigated agriculture or public open space) or into third pipe systems for gardens, laundries and toilets in a residential setting, or for commercial and industrial applications such as cooling and dust suppression, in a non-residential setting. Western Water has found that irrigated agriculture will likely provide the most beneficial use in the current policy environment.

### Local governance settings

The Western Water region has two main water storages, the Rosslynne Reservoir, in the Maribyrnong River Catchment, and Merrimu Reservoir, in the Werribee River catchment. Both reservoirs are managed by Southern Rural Water. Merrimu Reservoir supplies Melton and Bacchus Marsh, while the Rosslynne Reservoir supplies the Macedon Ranges (including Gisborne) and Sunbury districts.

Surface water irrigation services are traditionally a function undertaken by rural water corporations in Victoria. Southern Rural Water operates the Bacchus Marsh Irrigation District and Werribee Irrigation District, both of which source water from the Werribee River catchment.

### Feasibility study

As the volume of wastewater generated by Western Water customers will exceed the water demand<sup>30</sup> of current recycled users within Western Water’s region and waterway disposal capacity by 2023, Western Water looked at what it could do. Western Water considered:

- i. Buying more land to dispose of the treated water.
- ii. Finding more demand for recycled water in the region.
- iii. Connecting to a marine outfall for the recycled water.

A marine outfall connection through Western Treatment Plant (WTP) would enable disposal of the recycled water to Port Phillip Bay. However, this would involve transferring treated recycled water or raw effluent from Melton Treatment Plant over 20 kilometres to WTP. While this option would be a technically straight forward solution it does not align with Western Water’s strategic goal to reuse resources.

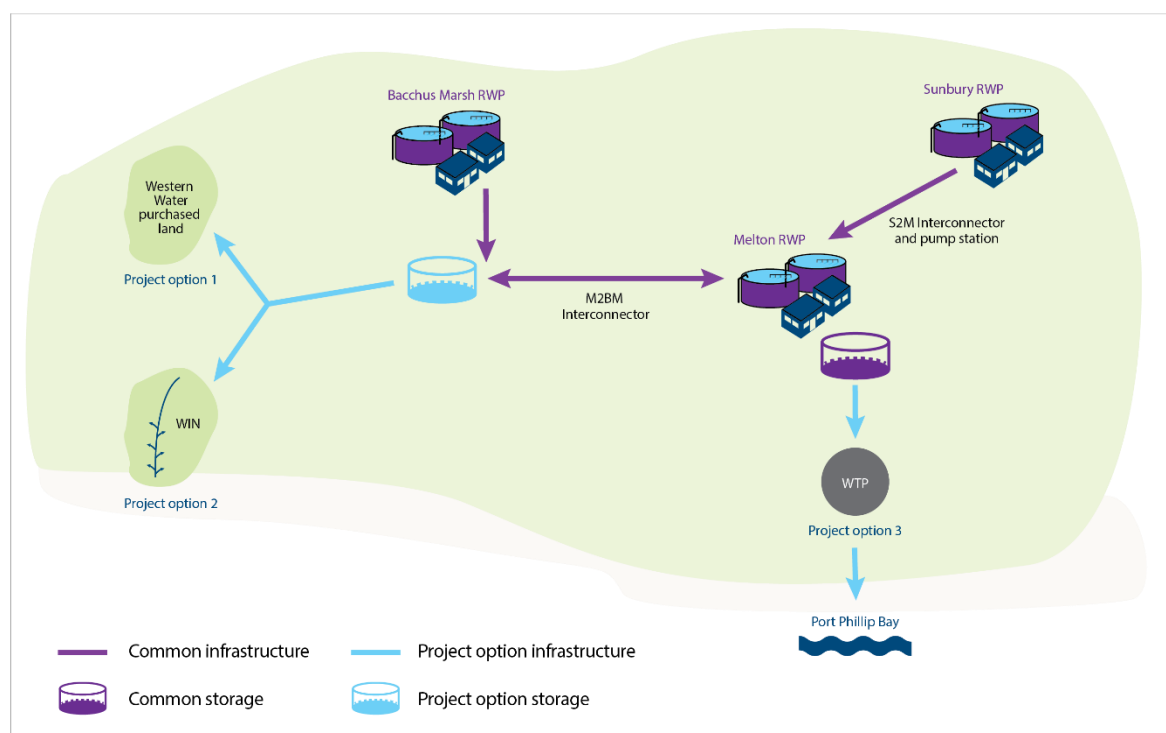
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<sup>28</sup> Melbourne Water (2018), *Melbourne Sewerage Strategy*.

<sup>29</sup> See Victorian Government (2017), *Victorian Infrastructure Plan*, page 172.

<sup>30</sup> Recycled water demand is a subset of all water demand.

Figure 1: Options for managing excess recycled water volumes



Source: Western Water

To explore options that utilise the recycled water resource, Western Water sought expressions of interest from parties potentially seeking access to recycled water at the current treatment level provided by their plants (Class C). A concentration of potential Class C recycled water demand was identified in the Parwan-Balliang region. Parwan-Balliang is a dryland farming district located on the south eastern boundary of Western Water’s area of operations, located 14km to the south of Bacchus Marsh. Additional water supply would enable privately owned dryland farms to move to irrigated farming and expand their production potential. Recycled water demand was also identified in the Werribee Irrigation District; however, those parties required a Class A recycled water because of EPA requirements for the type of crops they grow.<sup>31</sup>

In assessing the feasibility of buying more land and/or piping recycled water to where there is demand, Western Water’s current preferred option is piping recycled water to the Parwan-Balliang region which would create a Western Irrigation Network<sup>32</sup>. Western Water is currently completing a detailed business case, including cost-benefit analysis, for the Western Irrigation Network project to determine in more detail whether the investment is sound.

The Western Irrigation Network project aligns with Western Water’s Strategic Plan and the Melbourne Sewerage Strategy in that it seeks beneficial use of the treated waste water which is done through applying the water for agricultural purposes. The benefits of the project also include enhancing productive capacity of agricultural land, enhancing the local economy and creating a new revenue stream for Western Water.

### Details of the Western Irrigation Network – current preferred solution

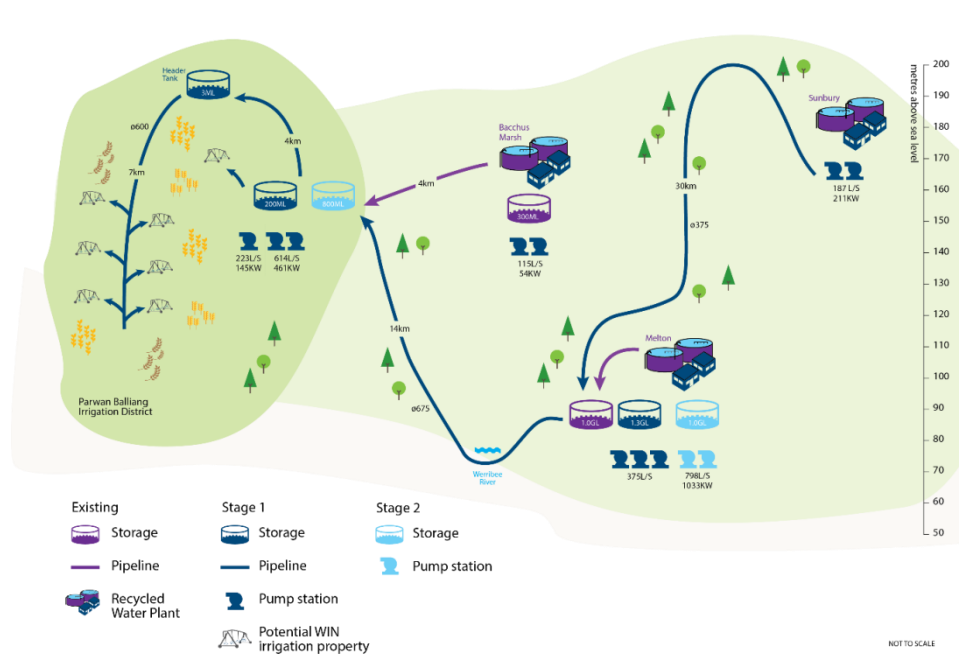
The proposed Western Irrigation Network involves the development of an irrigation scheme in Parwan-Balliang, supplied by recycled water from the Sunbury, Melton and Bacchus Marsh recycled water plants. The proposed project includes the construction of a series of pipelines from Western Water’s recycled water plants to a main storage at the boundary of the proposed irrigation district. A distribution pipeline system would be constructed

<sup>31</sup> Class A can be used to irrigate food crops that may be consumed raw; Class B may be used for dairy cattle grazing; Class C can be used for human food crops that can be cooked/processed, and for grazing/fodder for livestock; Class C can be used for non-food crops such as instant turf, woodlots and flowers. See the EPA Guidelines for Environmental Management – Use of Reclaimed Water, <https://www.epa.vic.gov.au/-/media/Publications/464%202.pdf> – accessed 6 September 2019.

<sup>32</sup> The feasibility study also examined an option for the Western Irrigation Network which includes a connection to the Western Treatment Plant. This is similar to a project option in case demand does not eventuate or growth in wastewater, driven by population growth in the area, occurs at a faster rate than currently forecast.

within the Parwan-Balliang district to supply recycled water to the farms. Figure 2 provides a schematic layout of the scheme.

Figure 2: Western Irrigation Network project base case - high level schematic layout



Source: Western Water

This solution was identified as a technically feasible approach for managing Western Water’s excess recycled water problem. In the future, the base case can be added to with an additional interconnector pipeline, connecting the Gisborne Recycled Water Plant to the Western Irrigation Network, as well as the additional option of connecting to the Western Treatment Plant.

A number of alternative short term and longer term solutions for addressing the region’s excess recycled water problem are being assessed using cost benefit analysis in the detailed business case. The alternative solutions include:

- purchase of additional land by Western Water for irrigation with excess recycled water
- supply of excess recycled water to Melbourne Water’s Western Treatment Plant, which could assist Melbourne Water mitigate salt issues at the Western Treatment Plant
- disposal of raw sewage to the Western Treatment Plant
- disposal of recycled water to the City West Water network
- additional investment in Class A third pipe schemes in growth areas
- treatment of recycled water to Class A++, which includes nutrients removal, and release to waterways for environmental benefit, and
- combinations of the above options including partial and phased Western Irrigation Network project options and adaptive management approaches.

The business case assessment includes an evaluation of option costs and benefits and a rigorous assessment of the options against objective criteria and the goals established for the project. The evaluation includes:

- engineering feasibility and scoping studies
- concept level design
- hydraulic network and water quality modelling
- site survey and investigations
- agronomic analysis and concept irrigation design
- environmental and cultural heritage impact studies and assessments
- cost estimation
- stakeholder and landowner consultation, and

- engagement with water corporations, departmental agencies and local government.

As with any project, there are risks and uncertainties. For the Western Irrigation Network, there is a risk which comes from uncertainty in demand forecasts for the irrigation district. This relies on the future financial viability of the farms that the Western Irrigation Network would serve. Several measures could help to mitigate or manage this risk:

- staging the project, which provides flexibility to match demand or not proceed certain parts, or to choose a different investment if irrigation demand does not eventuate.
- creating a contract with the Western Irrigation Network customers to allocate an annual recycled water amount and a condition that it must be used in all years and paid for each year on their water bills.
- creating mechanisms to ensure that if properties are sold, then the recycled water contract remains with the land passing these water use requirements onto the new owner.

## Benefits and costs

If the detailed planning phase confirms the Western Irrigation Network is the best solution for managing recycled water supplies in the region, key Western Irrigation Network milestones are:

- Jul 2019 - Detailed plan approved and submitted for funding
- Mid 2020 - Melton RWP 1.3GL recycled water storage completed
- Dec 2020 - Melton RWP-Bacchus Marsh RWP interconnector completed
- Jul 2022 - WIN constructed and fully operational<sup>33</sup>

The Western Irrigation Network benefits farmers in the proposed new irrigation district through increased agricultural production (and therefore gross margins). There are also secondary benefits through local regional economic flows from increased agricultural production, including employment. While Western Water would receive a new revenue stream, this is used to meet the operational costs of the irrigation scheme.

On the cost side, there are both capital and operating expenses. Capital expenditure cost estimates and staging for the proposed Western Irrigation Network project are outlined in Figure 3.

Figure 3: WIN Base Case Project – Preliminary Forecast of Capital Expenditure (\$m 2019 values)

Stage	Works	Capital cost
<b>Stage 1</b>	Commercial arrangements, design and approvals	3.9
	Melton – Bacchus Marsh pipeline, pump station and storage	44.0
	PBID pipelines, pump stations and storage	29.3
	<b>Stage 1 sub-total</b>	<b>77.2</b>
<b>Stage 2</b>	Sunbury – Melton pipeline	29.0
	Sunbury pump station	2.0
	<b>Stage 2 sub-total</b>	<b>31.0</b>
<b>Stage 3</b>	WIN pump stations, and storage capacity upgrade	24.4
	<b>Stage 3 sub-total</b>	<b>24.4</b>
<b>Grand total</b>		<b>132.6</b>

Source: Western Water

The levelised operating and maintenance (O&M) costs for the proposed project, annualised over a 30 year period, is approximately \$127/ML.

<sup>33</sup> Western Water, Western Irrigation Network detailed planning phase fact sheet, May 2018. Accessed on 21 March 2019, <http://www.westernwater.com.au/files/assets/public/documents/fact-sheets-and-brochures/win-project/win-project-update-may-2018.pdf>.

Western Water has undertaken a detailed assessment of the likely demand for recycled water for irrigation purposes and has found that farmers in the Parwan-Balliang Irrigation District that convert to irrigated agriculture as a result of the scheme are likely to be better off from increased yield and higher value crops, even when accounting for higher input costs associated with the recycled water supply. As a result, it is likely that the scheme will be a viable irrigation district in the long run and will attract the required demand and deliver a significant economic benefit to the region.

### Who pays?

Who	Costs and benefits
<b>Western Water Sewage Services Customers</b>	<p>Customers typically source water from Western Water and pay fixed and variable charges as determined by the Essential Services Commission. A portion of this use will be discharged to the sewer, for which a sewer customer pays an annual fixed charge. This revenue pays for infrastructure and operational costs associated with providing this service including:</p> <ul style="list-style-type: none"> <li>• Transfer to a treatment plant – pipes and pumps</li> <li>• Treatment – Recycled Water Plant</li> <li>• Reuse or Disposal – pipes and pumps</li> </ul>
<b>Irrigation district</b>	<p>If an irrigation district is created, then the associated recycled water supply directly benefits the irrigation district customers. Those who benefit should pay.</p> <p>Irrigation customers would receive water that is a certain quality, which would be reflective of the treatment costs. Irrigation customers may also be required to take water at certain times of the year to fulfil usage obligations, and therefore may need onsite storage. Individual supply agreements will be in place with the irrigators outlining prices and usage requirements.</p> <p>The price charged for recycled water supply need not necessarily cover 100% the cost of providing the recycled water supply service. As the recycled water supply is also used to manage recycled water volumes, the customers who generate the recycled water can be reasonably expected to cross-subsidise the use of the water.</p>
<b>Water corporation</b>	<p>Western Water will be revenue neutral in the long run as prices for services are set to ensure cost recovery.</p>

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Infrastructure Victoria is an independent advisory body, which began operating on 1 October 2015 under the *Infrastructure Victoria Act 2015*.

Infrastructure Victoria has three main functions:

- preparing a 30-year infrastructure strategy for Victoria, which is refreshed every three to five years
- providing written advice to government on specific infrastructure matters
- publishing original research on infrastructure-related issues

Infrastructure Victoria also supports the development of sectoral infrastructure plans by government departments and agencies.

The aim of Infrastructure Victoria is to take a long-term, evidence-based view of infrastructure planning and raise the level of community debate about infrastructure provision.

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