Sunbury's Water Future

Community Panel Background Report

May-June 2019

WESTERN WATER

Melbourne Water

Enhancing Life and Liveability

Acknowledgement of Traditional Owners

Melbourne Water and Western Water respectfully acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Owners and custodians of the land and water on which all Australians rely. We pay our respects to Wurundjeri, their Elders past, present and emerging, as Traditional Owners and custodians of the land and water on which Sunbury's Water Future relies.

We acknowledge and respect the continued cultural, social and spiritual connections that all Aboriginal Victorians, and the broader Aboriginal and Torres Strait Islander community have with lands and waters, and recognise and value their inherent responsibility to care for and protect them for thousands of generations.

In the spirit of reconciliation, Melbourne Water and Western Water remain committed to working in partnership with Traditional Owners to ensure meaningful ongoing contribution to the future of land and water management.

Our challenge:

Sunbury's population is set to double in the next 20 years. We need to meet the growing demand for water, manage the increased wastewater and stormwater, and minimise environmental impacts.

What water management options are best for our community and the environment?

Thank you for taking part in Sunbury's Water Future community panel. Your role is important and one that we value.

By participating in this panel, you have an opportunity to make a meaningful contribution to shaping the future direction of water management in your community.

Contents

Welcome

Sunbury's Water Future is an important initiative for Western Water and Melbourne Water.

As water managers, we have a responsibility to provide the community with access to safe and reliable water supplies, as well as look after the health of our waterways, catchments and surrounding environment.

But with the population of Sunbury set to double in the next 20 years, and the impacts of climate change, the region faces some very real challenges. Water plays a critical role in this.

The effects of a changing climate are reducing the available water in our creeks, rivers and reservoirs. This means we'll need to find additional water sources to make up any gaps in water availability.

Sunbury's urban growth will increase demand for water. We'll need to continue providing a well-managed, safe and reliable water supply to enable the region's liveability and prosperity.

While these natural water supplies come under increasing pressure, urban growth will also result in higher volumes of wastewater and stormwater. We need to explore options for this excess water that could provide additional protection to our environment and waterways and which could utilise this water resource in a beneficial way.

To meet these challenges and safeguard our water resources and environmental values for the future, we have been exploring different water management options. We now need your help to explore these options in more detail and decide on a way forward.

Even though you may not know too much right now about water and its management, you are central to the way it is managed and will be managed in the future: you are provided with clean drinking water and reliable sanitation services; you are protected from floods, interact with healthy waterways and benefit from cooler, greener cities and healthier environments.

So, while we can share with you our knowledge of water management, it's just as important for you to share with us your ideas, priorities and concerns over future water solutions.

As a panel member you are making a valuable contribution to your community. Throughout the community panel sessions, you will learn about and discuss a broad range of topics specific to Sunbury's Water Future.

To help you gain a better understanding of these issues, we've put a number of processes in place. In addition to this background booklet, we've set up an online portal where you can access a range of information. Throughout the panel sessions, you will also have the opportunity to meet with subject matter experts and relevant authorities to talk through any questions or issues that may arise during deliberations.

All of us at Western Water and Melbourne Water appreciate the contribution you are about to make, and hope you enjoy the experience.

Emu Creek (Source: Western Water)

Summary

The information provided in this report is considered the starting point to help your understanding of water management in the Sunbury region. From this, further discussions, information and questions will take place around the best water management options for Sunbury's Water Future.

In working together on this project, Western Water and Melbourne Water have identified a number of challenges and consequences to continuing with the current water management approach (termed business as usual). In simple terms, the challenge is that more water will be needed for the water supply system and waterways, while urban growth will result in excess recycled water and stormwater.

The purpose of the panel is to understand the community's perspective on the best water management options given the above challenges.

The current Sunbury water system

The water supply is sourced from the Rosslynne Reservoir catchment area and the Melbourne system. When households use this water, it becomes wastewater, which is then piped to the Sunbury Wastewater Treatment Plant. This plant treats the wastewater to become recycled water, of which some is used locally for irrigation and the balance released to Jacksons Creek under a licence with the Environment Protection Authority (EPA). The licence sets a limit of the amount of water that can be released in order to protect the health of the waterway.

Additionally, rainfall runs off roofs, streets and hard surfaces. This runoff (stormwater) is piped to Jacksons Creek. In some areas (especially new developments) this runoff will flow through wetlands to reduce pollutant loads before flowing into Jacksons Creek.

Figure 1 outlines Sunbury's current water system (termed urban water cycle).

What's the difference between stormwater, wastewater and recycled water?

Rainfall that runs off roofs, roads and other hard surfaces into gutters, drains, creeks and rivers, and eventually into the sea, is called '**stormwater**'. In new growth areas, wetlands and basins are constructed to help filter stormwater.

Water that's been used in the home (laundry, toilets, sinks, etc.), a business, or an industrial process, and which flows into the sewerage system is called '**wastewater**'. It's captured in different pipes to stormwater.

When wastewater goes through a treatment process, it becomes '**recycled water**', which can be reused for other purposes. Recycled water can have different levels of treatment depending on what it's to be reused for. Recycled water is also released to waterways.

Both recycled water and stormwater are considered to be alternative water sources.

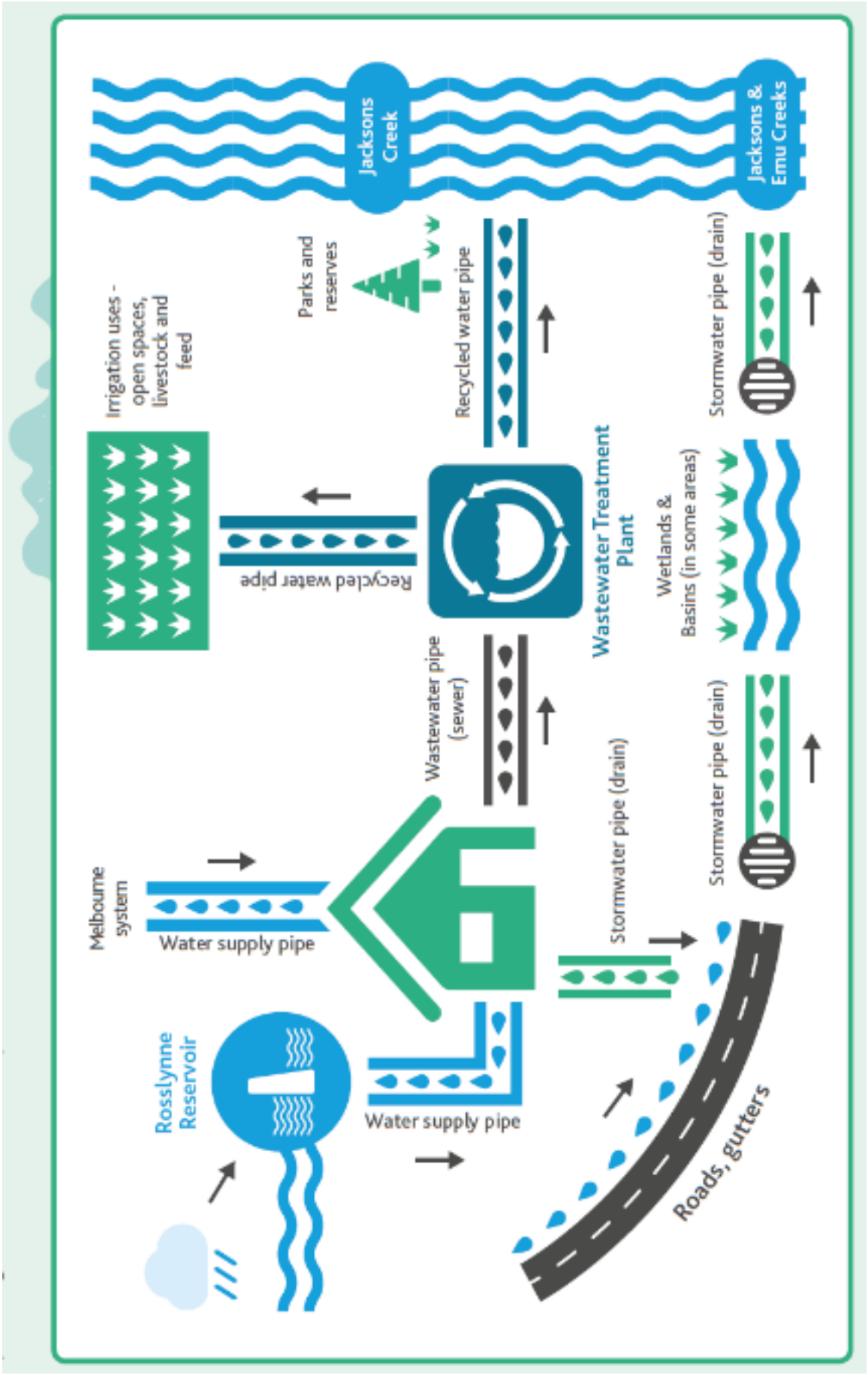


Figure 1: Current Sunbury water system (urban water cycle)

Under **the current water management** approach (business as usual) the water system is characterised by:

- lower inflows to Rosslynne Reservoir than in the past, requiring Western Water to purchase water from outside the region to meet demand
- more flow being required for the local **waterways** at certain times of the year to maintain waterway health
- demand for **water supply** exceeding what is available for the region
- a limit on releasing **recycled water** at its current quality to Jacksons Creek; this limit will be reached within the next 5-10 years
- limited local demand for **recycled water,** meaning more may have to be released to Jacksons Creek
- stormwater entering Jacksons Creek with high flows and poorer water quality adversely impacting waterway health and surrounding landscape.

Under **a future Sunbury water system (with the current water management approach)** the following points highlight the changes that will arise from the combination of urban growth and changing climate in the Sunbury region and the problems this will create.

- Less rainfall and water runoff into Rosslynne Reservoir will require **more water** from elsewhere to balance the urban water system. Where this water comes from is part of our challenge.
- Less rainfall in waterway catchments will require even **more water** to maintain waterway health. However, the additional releases of recycled water and stormwater under a business as usual approach will not provide the right volumes of water at the right quality at the right times to ensure waterway health.
- Increasing costs to purchase **more water** from the Melbourne system.
- Increasing costs to treat wastewater to a higher quality to release more recycled water into Jacksons Creek (subject to environmental licence conditions) if no large-scale use of the recycled water is available.
- The significant **impact on waterway ecology** (plant and animal life) within Jacksons and Emu creeks from additional stormwater runoff from new urban areas. Higher-intensity rainfall events will accentuate the risks to waterway ecology and soil erosion .
- Less rainfall and higher temperatures will create drier soils and landscapes requiring more water to maintain green spaces for community health and liveability.

Figure 2 illustrates these issues.

These considerations have prompted us to think about whether we can do things differently with our future water management in the Sunbury region. From the challenges and problems, a number of objectives have been developed to help us think about what future water management options would be best for the community and the environment.

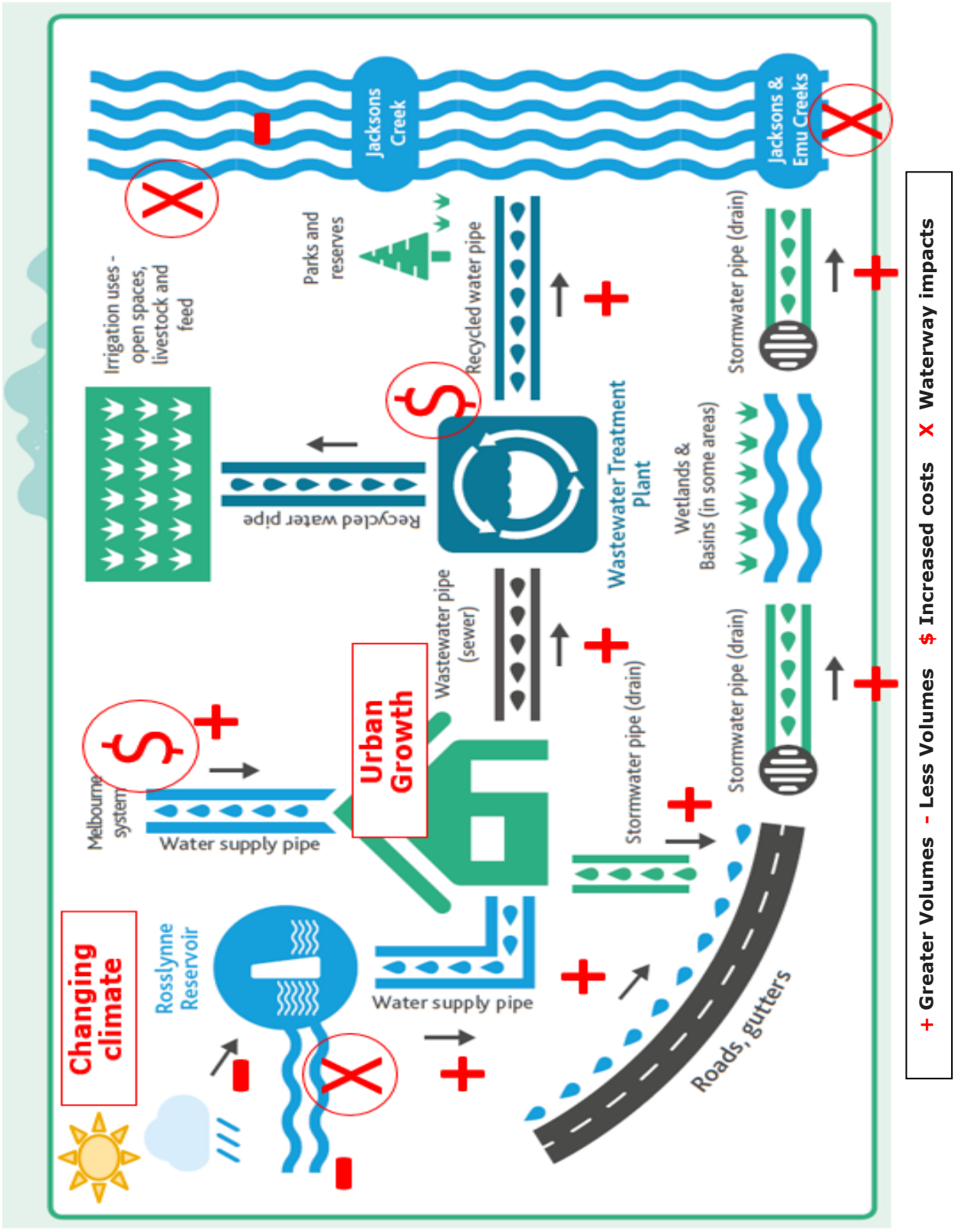
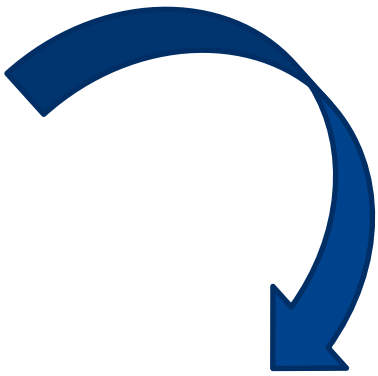


Figure 2: The key changes with Sunbury's future water system

Challenges and Problems

- *Urban growth & changing climate*
- *Less water flow into reservoirs and waterways*
- *Greater water demand from new households*
- *Increased costs for new water supply sources*
- *Increased wastewater volumes and treatment costs*
- *Increased volumes of recycled water and stormwater*
- *Impact on waterway health with less flow at the right times and more stormwater*
- *Drier soils and landscapes*



Objectives

- *Secure water supply*
- *Environmental health of waterways*
- *Healthy, liveable and sustainable communities*
- *Affordable water management options*
- *Agricultural and industrial productivity*
- *Inclusion of community & Traditional Owner values*

What water management options are best for our community and the environment ?

An **integrated water management (IWM)** planning approach) has been adopted for Sunbury's Water Future. In an IWM approach all components of the water system – **waterways**, **water supply**, **wastewater**, **recycled water** and **stormwate**r – are looked at together to assess costs and the wider range of benefits that may be available.

For example, an IWM solution might suggest excess recycled water or stormwater is used for high-value, productive uses such as supplementing the water supply, agriculture/industrial uses, etc., which could also provide waterway protection.

To assist with determining how the objectives could be achieved, we suggest the following criteria be considered.

A range of options identified to date are outlined later in this report and the panel is encouraged to think about what else might be possible.

Secure water supply

- Provide sufficient additional water to meet the extra water demand from the Sunbury growth area.
- Maximise the beneficial use of additional alternative water sources.

Environmental health of waterways

- Provide sufficient additional water of appropriate quality and at the right times to provide the environmental flow required for the waterways.
- Prevent most of the additional stormwater from the Sunbury growth area from entering the creeks.
- Maximise the beneficial use of recycled water.

Healthy, liveable & sustainable communities

- Sufficient water available for green spaces.
- Maximise the beneficial use of alternative water sources.
- Public health and wellbeing maintained.

Affordable water management options

- Maximise the economic benefits.
- Minimise the economic costs.
- Balance customer affordability with the system's long-term financial viability.

Agricultural and industrial productivity

- Maximise the beneficial use of alternative water sources.
- Maximise the economic benefits.

Inclusion of community & Traditional Owner values

- Community engagement outcomes.
- Traditional Owner engagement outcomes.

This criteria, along with other community-based values criteria, can be used to assess the range of options already identified as well as additional options identified by the panel.

Background information

Why we are doing this project now

In 2014, the Victorian State Government identified Sunbury as an urban growth area, with the population forecast to double over the next 20 years.

To support the region's development, the Victorian Planning Authority (VPA) has set out a plan for Sunbury that proposes future housing, transport, employment, open spaces, shopping and community services.

As we prepare for this urban growth, we also need to think about its broader implications on the environment and on community liveability, as well as the additional pressures that climate change will bring. Central to this is how we manage water.

To address these challenges, we've been exploring an integrated water management (IWM) approach for Sunbury. IWM is a collaborative approach that considers all elements of the urban water cycle.

The Sunbury growth area

Throughout this report and during the deliberations of the community panel, we will be referring to the 'Sunbury growth area'.

This area incorporates the proposed new urban growth areas within the Jacksons Creek and Emu Creek catchments, as shown on the map (see Figure 3).

This area corresponds to the precinct structure plans (PSPs) developed by the Victorian Planning Authority for:

- Sunbury South
- Lancefield Road
- Sunbury Nth.

We acknowledge that urban growth will occur in other parts of the region. To simplify our task, we refer to the Sunbury growth area where the majority of urban growth will occur and have the most impact on water management for the region.

To identify the impacts of urban growth, we determined volumes of water supply, wastewater, recycled water and stormwater in the Sunbury growth area.

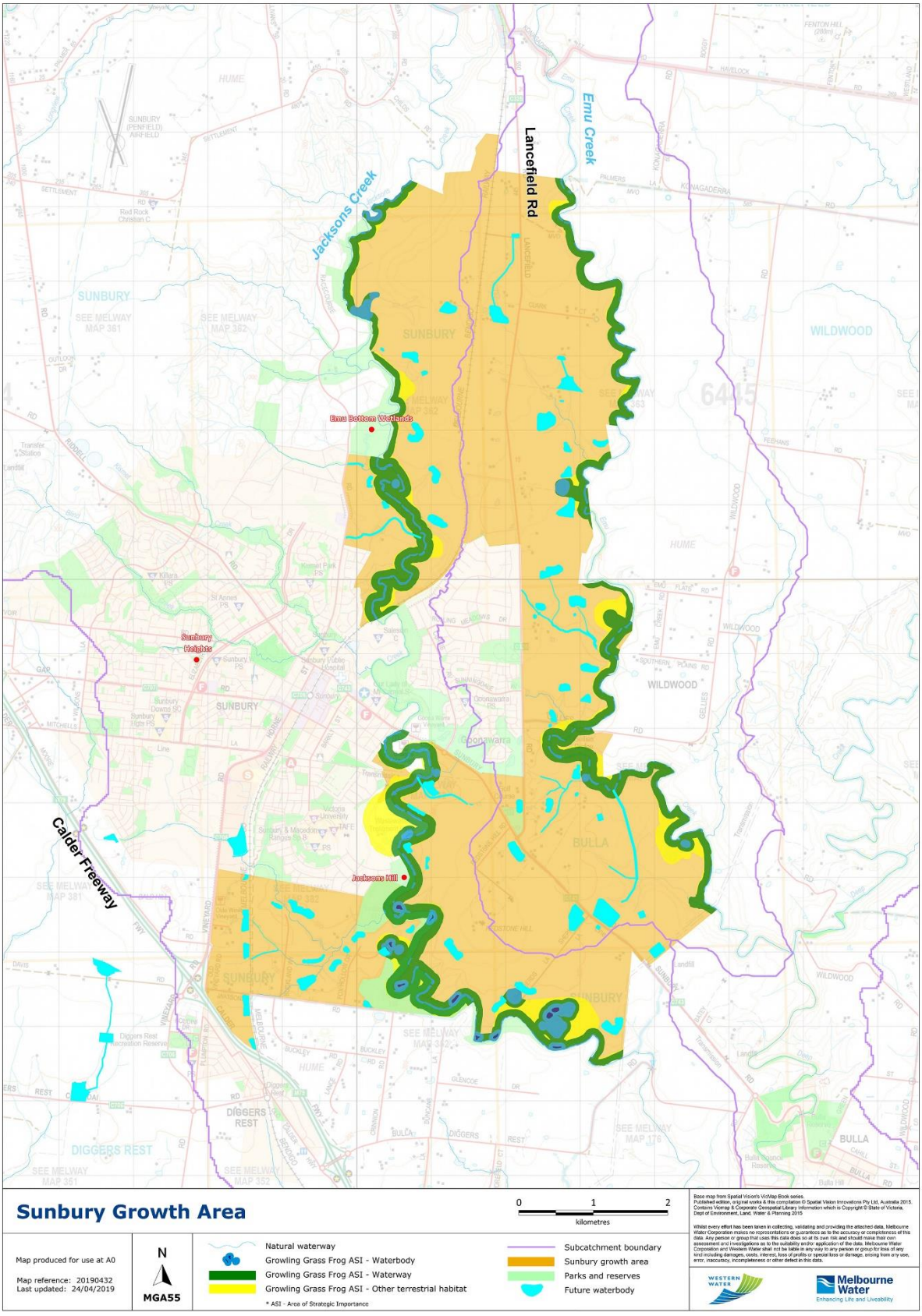


Figure 3: Sunbury growth area map

What is integrated water management?

Integrated water management (IWM) is a collaborative planning approach that brings together many stakeholders to explore ways of managing the different elements of the urban water cycle.

These include **rainfall** in the catchments for water supply**, wastewater** from households and **water recycled** from wastewater**, stormwater** that runs off roofs and roads and protecting **waterway** value**s**.

The planning process for new urban growth areas also considers environmental, economic and social impacts and benefits. It integrates the water cycle with other aspects of urban management such as land use, infrastructure, urban design and resources planning.

How is IWM different to traditional approaches?
IWM considers all aspects of the urban water cycle together rather than separately. (See Figure 4.) For IWM to be effective, water corporations, catchment management authorities, local government, developers, and the community work together to deliver water-related liveability benefits.

An important part of IWM is exploring the wider opportunities for alternative water sources and how these can benefit communities.

Adopting an IWM approach can be beneficial for Sunbury, with its drier climate and low rainfall, distance from Melbourne's centralised water supply network, highly valued waterways, planned urban growth, proximity of important irrigation districts, and its recycled water plant.

An integrated approach to water planning and management can provide **multiple benefits** to communities beyond water supply, sewage and drainage services:

- **Long-term resilience** – diversifying our sources of water so we can withstand future impacts and shocks caused by climate change.
- **Environment** – providing more water for healthy waterway flows and reducing stormwater impacts.
- **Liveability** – creating green open spaces, reducing the heat island effect and minimising flooding.
- **Economic** – supporting industry and agriculture.
- **Affordability** – balance customer affordability with long-term viability.

The Maribyrnong IWM Forum brings together 18 organisations from the Maribyrnong catchment area with an interest in water cycle management. The catchment contains several areas designated as urban and economic growth precincts, including the Sunbury growth area.

The Forum's objectives have been to consider ways of planning and delivering projects and strategies that will enhance the resilience and liveability of the Maribyrnong catchment area in the face of urban growth and climate change.

An outcome of the Forum is the **Strategic Directions Statement (SDS)**. This is a living document that will continually reflect on and articulate the regional context, shared vision and water-related outcomes for the Maribyrnong catchment. It includes a prioritised list of IWM projects, including the development of a Sunbury IWM Plan.

"The community and environment of the Maribyrnong catchment are healthy, thriving and resilient, and the catchment's unique characteristics are valued and celebrated."
Maribyrnong SDS vision statement

See Appendix B for more information on these and other IWM strategies, plans and frameworks.

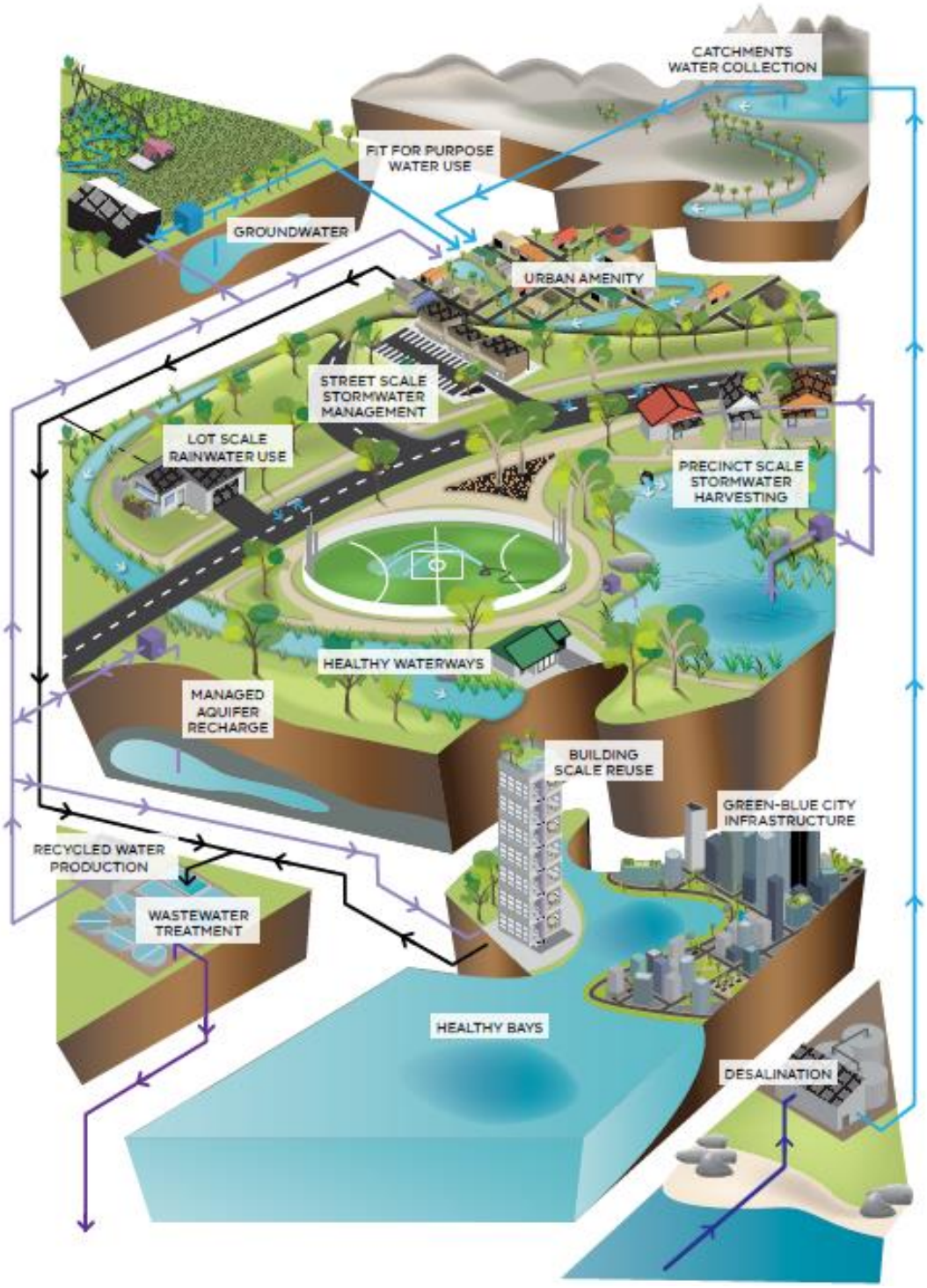


Figure 4: Integrated water management elements within the urban water cycle

Sunbury's water systems

The challenges for Sunbury's water systems

Two overarching challenges will impact Sunbury's Water Future:

Climate change

Climate change will further reduce inflows to Rosslynne Reservoir, further reduce environmental flows in Jacksons Creek and create a drier landscape. Regardless of population growth, we will need to access more water for the region for water supplies, landscapes and environmental flows.

For more general information on climate change refer to Appendix E.

Urban growth

Urban growth will increase water demand; it will also generate higher volumes of wastewater, recycled water and stormwater. Urban growth - and the changes to the land that comes with urban growth - will also place pressure on Sunbury's unique landscape and waterway environments.

A trend towards smaller yards in new homes also places greater importance on the role of water and waterways to provide green open space for the community.

For more general information on urban growth refer to Appendix E.

Sunbury's water systems

The following information outlines the key characteristics of the water required and produced through planned urban growth in Sunbury.

Additional volumes for the Sunbury growth area are shown in the boxes below.

What is a megalitre (ML) ?
A megalitre is one million litres.

What is a gigalitre (GL) ?
A gigalitre is one thousand megalitres and is the equivalent to 400 Olympic-size swimming pools.

A negative volume is additional water required.

A positive volume is excess water.

Water Supply

- Water currently sourced from Rosslynne Reservoir and Melbourne system.
- Additional urban water demand from Sunbury growth area will be 3.5 Gigalitres per year.
- For more info refer to Appendix C.

- 3.5 (Gigalitres per year)

Wastewater to Recycled Water

- Wastewater currently treated at Sunbury treatment plant to Class B recycled water quality.
- 0.9 Gigalitres per year is currently used by customers including irrigation of public recreational areas.
- 1.3 Gigalitres per year is currently released to Jacksons Creek.
- The Sunbury growth area will generate an additional 3 Gigalitres per year of recycled water.
- For more info refer to Appendix C.

+ 3.0 (Gigalitres per year)

Stormwater

- Most existing stormwater flows to Jacksons Creek.
- New growth area will generate additional stormwater.
- Additional stormwater will flow to both Jacksons and Emu creeks.
- Threatened species and waterway values are at risk with additional stormwater.
- Approximately 3.4 Gigalitres per year of the excess stormwater needs to be removed to protect the waterway .
- For more info refer to Appendix C.

+ 3.4 (Gigalitres per year)

Waterways

- Jacksons Creek & Emu Creek flow into the Maribyrnong River system.
- Jacksons Creek flow regime impacted by upstream reservoir and agricultural activity.
- Emu Creek does not currently receive urban stormwater and has relatively high natural values.
- Jacksons Creek requires more flow, mostly over winter and spring (3.1 Gigalitres per year approx.).
- Highly erodible soils, environmental flow stressed waterways and steep escarpments along waterway corridors.
- Both creeks provide habitat for fish, frog and platypus species which are at threat from additional stormwater.
- For more info refer to Appendix D.

- 3.1 (Gigalitres per year)

The water equation for the Sunbury growth area indicates the total extra water required for water supply and waterways of around 6.6 GL/yr and a total excess of around 6.4 GL/yr of recycled water and stormwater. It is noted that these volumes are for the Sunbury growth area only and do not include volumes for other urban growth within the Sunbury region.

Under this future scenario:

- Western Water will need to determine where it will access water to make up for the future shortfall in water supply.
- Through the Central Region Sustainable Water Strategy, the State Government will need to determine where extra water can be sourced to make up for the shortfall in environmental flows.
- Western Water will need to determine the best management options/uses for the extra recycled water.
- Melbourne Water will need to determine how waterways can be protected from the extra stormwater. (In the order of 80-90 per cent of the excess will need to be prevented from entering the waterway to protect the waterway ecology).

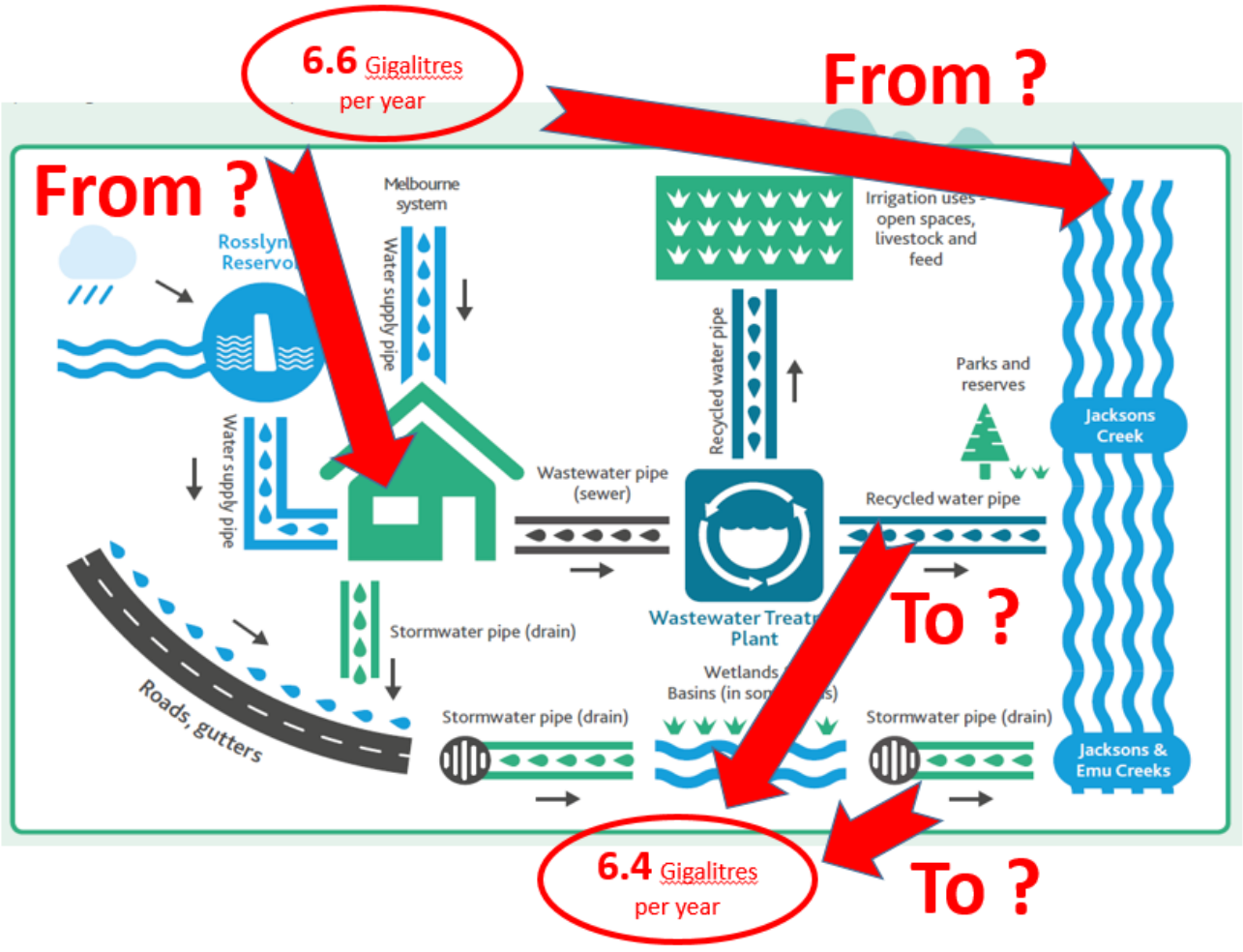


Figure 5: Future scenario where additional sources and uses of water will need to be determined.

What are the options available and how do we assess them?

The work done to date

Most of the options identified by water authorities and through discussions with the community,[1] address the impacts of climate change and urban growth in various ways and to various extents.

The dilemma for Sunbury is how to deal with additional water required (water supply and waterway flows) and the water excess (recycled water and stormwater) while protecting the environment, particularly local waterways.

The challenge as a first step is to identify options – usually a combination of single options to address all of the objectives – that are technically feasible and economically viable.[2]

Initial work[3] was undertaken in 2015 and identified and assessed IWM opportunities compared to a 'business-as-usual' approach. The purpose of the work was to identify the options that offer the greatest potential from an economic, environmental and social perspective.

In general terms, those options that offer greater potential as an alternative to a business as usual approach:

- **use the largest volume** of the additional water (recycled water and stormwater) to protect the waterways, provide more water for the waterway when needed and reduce the requirement for more water supply; and
- involve **high-value uses** of the additional water (e.g. supplementing drinking water, high-value irrigation crops/industrial use).

The work identified a combination of options that could provide the greatest potential: harvesting and treating the additional stormwater for supplementing drinking water supplies; and using recycled water for irrigation in summer and releasing at the right times to Jacksons Creek to provide environmental benefit over winter and spring.

Despite these identified opportunities, and well before any decisions are made, additional factors must also be taken into consideration. This includes approvals from regulators and statutory authorities, adherence to Government policy, equitable funding arrangements and community input.

For example, the Department of Health and Human Services' position on using treated alternative water sources for non-drinking purposes,[4] and the policy on the use of recycled water for supplementing waterway flows as identified in the Victorian Waterway Management Strategy[5] must be considered.

Even so, it's important to note that at this stage no option has been ruled in or out; the panel is encouraged to consider all possible options. A list of options identified to date is included below for consideration and the pros and cons of each option will be considered as part of the deliberation process.

[1] 'Community Engagement Report'. MosaicLab, April 2019 (access in online portal)
[2] For further explanation of these terms, see 'Glossary'
[3] Sunbury Growth Area Integrated Water Management Analysis – Final Report'. E2D, April 2015 (access in online portal)
[4] See 'Glossary' for definition.
[4] 'IWM for Health and wellbeing – Water Program Communique'. DHHS, 2012 (access in Appendix F)
[5] 'Victorian Waterway Management Strategy', Policy 8.10, page 108 (2013)

Options for water supply

A. New dam

B. Pipeline connection from areas where more water is available

C. Utilise alternative water sources to supplement water supply

D. Use less: enforce water restrictions and water conservation programs

E. Develop groundwater sources

F. Use more household rainwater tanks

Options for wastewater/recycled water

A. Collect and treat from where it is generated (i.e. at housing estates) for local reuse (e.g. open spaces)

Collect and treat (at treatment plant) to Class B (current) or higher quality to:

B. Release to waterway

C. Irrigate open spaces and recreation areas

Irrigate suitable farm crops on:

D. Existing farms

E. Find/create new farms

F. Help create new industries

G. Install dual pipe to dwellings for garden, toilet and laundry

H. Store and release to waterway at the rights times when environmental flows are needed

Options for stormwater

A. Collect at home (via rainwater tanks) for garden, toilet, laundry

B. Collect in housing estate for open spaces or evapotranspiration

C. Store and release to waterways at the right times when environmental flows are needed

Collect and treat centrally to:

D. Irrigate open green space/recreation areas

Irrigate suitable farm crops:

E. On existing farms

F. Find/create new farms/areas/industries

G. Install dual pipe to dwellings for garden, toilet and laundry

H. Supplement drinking water system

Options for healthy waterways, soils and landscapes

A. Build stormwater basins, wetlands and infrastructure to improve stormwater quality, reduce the impacts of high flow events on waterway ecology and control erosion (this is the current approach in new housing developments)

B. Collect, treat, store and release additional stormwater to the waterway at the right times when environmental flows are needed

C. Collect, treat store and release additional recycled water to the waterway at the right times when environmental flows are needed

D. Release more water from Rosslynne Reservoir at the right time when environmental flows are needed

E. Collect, store and treat recycled water centrally (at treatment plant) to irrigate open spaces and recreation areas

F. Collect, store and treat stormwater centrally to irrigate open green space/recreation areas

As noted previously, the suggested options are not considered as a complete list of options.

As part of the deliberative panel process we would like to know:

'What else do you think should be considered ?'

With the options that are identified we need to understand the differences between them and the extent to which they would meet the outcomes we are seeking for Sunbury's Water Future.

Appendix G of this report includes some information around the pros and cons of the options identified to date.

Further work is being undertaken to assist the panel to understand the relative contributions of the options to achieving the outcomes. This information will be provided via the online portal prior to Day 1, as well as via paper copies on that day. It is noted that Traditional Owner values will be determined as part of a separate engagement process and this, along with the outcomes from the community engagement, still need to be factored into our decision making.

Appendices

Appendix A

Who we are

Sunbury's Water Future is jointly led by Western Water and Melbourne Water, with support from Hume City Council and the Department of Environment, Land, Water and Planning (DELWP). We are also engaging with a range of other stakeholders as required on this project.

Western Water provides drinking water, sewerage and recycled water services for towns in its service region including Sunbury, Melton, Bacchus Marsh and most of the Macedon Ranges. Melbourne Water is responsible for managing local waterways, such as Jacksons Creek and Emu Creek in Sunbury, and providing drainage and flood management services for the area. Hume City Council provides drainage and stormwater management services on a more localised scale. DELWP is providing general direction on the management of climate change effects, urban development and land use change that affect water management and waterways. This includes policy, standards and guidelines.

Because we each manage different aspects of the urban water cycle and bring different knowledge and expertise, it's important to work together to ensure our planning is well coordinated. Our aim for Sunbury's Water Future is to make the most of all available water resources and to minimise impacts on the environment so that this growing region continues to thrive and prosper.

Western Water services one of the fastest growing regions in Australia. As one of Victoria's thirteen regional urban water corporations, it provides drinking water, sewerage and recycled water services to 69,371 properties over an area of 3,000 square kilometres. .

For more information refer to Western Water's website: www.westernwater.com.au/home

Melbourne Water's role is to manage and protect Melbourne's major water resources on behalf of the community. Owned by the Victorian Government, it works closely with retail water companies to ensure supply of affordable high-quality water, reliable sewerage, healthy waterways, integrated drainage, and flood management.

For more information refer to Melbourne Water's website: www.melbournewater.com.au

Appendix B

Our strategies: a holistic approach

Understanding the bigger picture

Even though the issues we're asking for your help with are unique to the Sunbury region, Sunbury's Water Future is not a stand-alone project. It's part of a broader, holistic remit developed by the Victorian State Government to ensure a future of a sustainable and secure water supply across the state.

To support this broader remit, targeted strategies, frameworks and plans have also been developed by and in collaboration with a wide network of stakeholders. This includes commitments by water managers, such as Melbourne Water and Western Water, state government agencies and regulators such as the Department of Environment, Land, Water, and Planning (DELWP); the Department of Health and Human Services (DHHS), Environment Protection Authority (EPA), and Victorian Planning Authority (VPA); as well as research institutes, local councils and the wider community.

Another important component underpinning these State and regional initiatives is the understanding that collaborative engagement is key to successful delivery.

We know that no single organisation can decide the best way forward for the many and complex issues of future water management and waterway protection. It requires a broader process of information gathering, reflection, research, analyses and shared decision making.

Likewise, working in close collaboration with government regulators and agencies helps ensure that national, state-wide and regional legislation, policy, regulation and programs are advanced.

But it is also vital that this work relies on the lived experience of a much larger cast including waterway managers, planners, scientists and engineers, as well as developers, Traditional Owners, community groups, ecologists, social scientists, and members of the public like you, to fully understand and then action the bigger picture.

Read on to find a summary of some of the water strategies, frameworks and plans in place, the work done to date, and how they are linked to Sunbury's Water Future. (See also Figure B3.)

Tip: You can read in more detail about these and other relevant strategies in the online portal.

Water for Victoria is the State government's policy to prepare for a future with less water as Victoria responds to the impact of climate change and a growing population.

It is the overarching policy that drives all other strategies.

The plan supports a healthy environment, a prosperous economy with growing agricultural production, and thriving communities. It does this by encouraging the use of diverse water sources, including recycled water and stormwater, to support urban greening and reduce pressure on our precious drinking water supplies.

> *"Water is fundamental to our communities. We will manage water to support a healthy environment, a prosperous economy and thriving communities, now and into the future."*
>
> Water for Victoria strategic vision

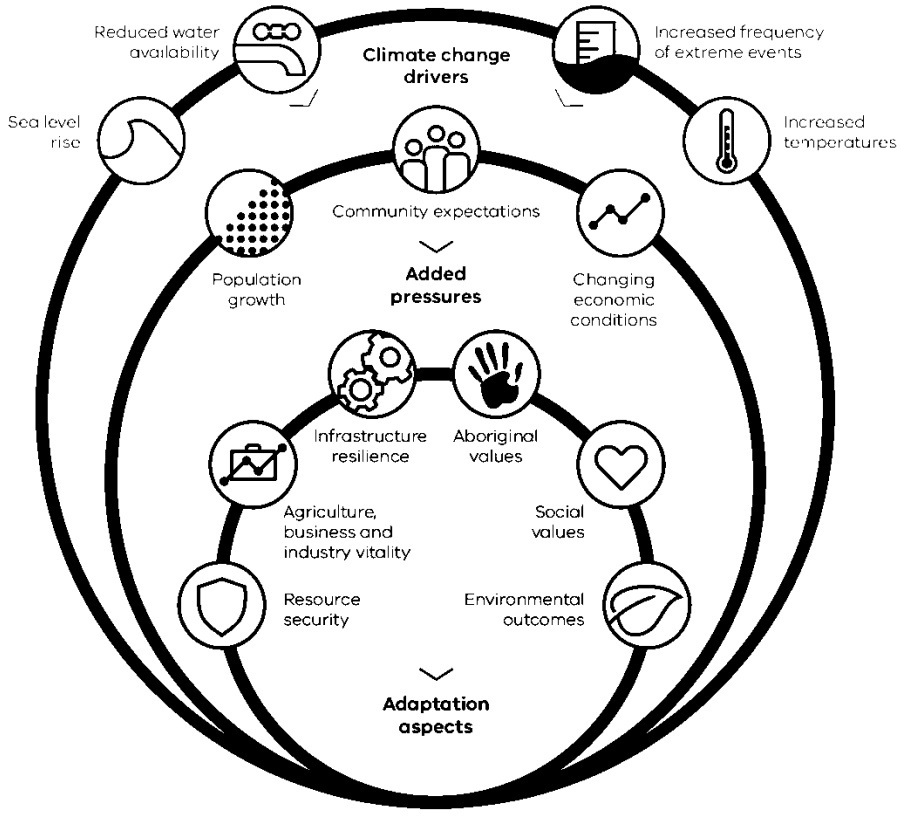


Figure B1: Water for Victoria's aspects of climate change adaptation for the water sector

Integrated Water Management Framework Victoria, an Australian first, was developed to help government, the community and the water sector work together to plan, manage and deliver water in Victoria's towns and cities. The goal is to plan for water use in the most efficient way throughout the entire water cycle to deliver greater community value, including innovative solutions such as stormwater harvesting and greater use of recycled water.

This Framework draws on the knowledge and experience of water sector organisations in applying integrated approaches to water cycle planning. It also:

- complements and feeds into existing water and land planning processes
- encourages collaboration where it will be beneficial, and
- links between water planning and other planning processes that contribute to improving Victoria's resilience and liveability (including land use, transport and economic development).

Figure B2 shows how water-related outcomes can build resilient and liveable cities and towns. The Framework identifies how integrated water management (IWM) can contribute to these outcomes through collaboration-led innovation.

An important outcome of the Framework has been the establishment of collaborative IWM Forums. The forums bring together water sector organisations and other interested parties to explore, prioritise and oversee opportunities to be developed into local projects and servicing strategies across the State. IWM Forum members also identify any barriers to effective implementation of IWM across the State.

Figure B2: Water-related outcomes to deliver resilient and liveable cities and towns.

The Maribyrnong IWM Forum brings together 18 organisations from the Maribyrnong catchment area with an interest in water cycle management. The catchment contains several areas designated as urban and economic growth precincts, including the Sunbury growth area.

Some of the organisations involved in the Maribyrnong IWM Forum include Western Water, Melbourne Water, Hume City Council, Wurundjeri Land & Compensation Cultural Heritage Council Aboriginal Corporation (Traditional Owners), DELWP and the VPA.

An outcome of the Forum is the **Strategic Directions Statement (SDS)** (see background report and online portal for further information).

One of the prioritised projects as identified in the Maribyrnong SDS is the development of a Sunbury IWM Plan.

This plan has the following strategic IWM outcomes:

- Safe, secure and affordable supplies in an uncertain future
- Effective and affordable wastewater systems
- Healthy and valued waterways
- Healthy and valued landscapes
- Community and traditional owner values are reflected in place-based planning.

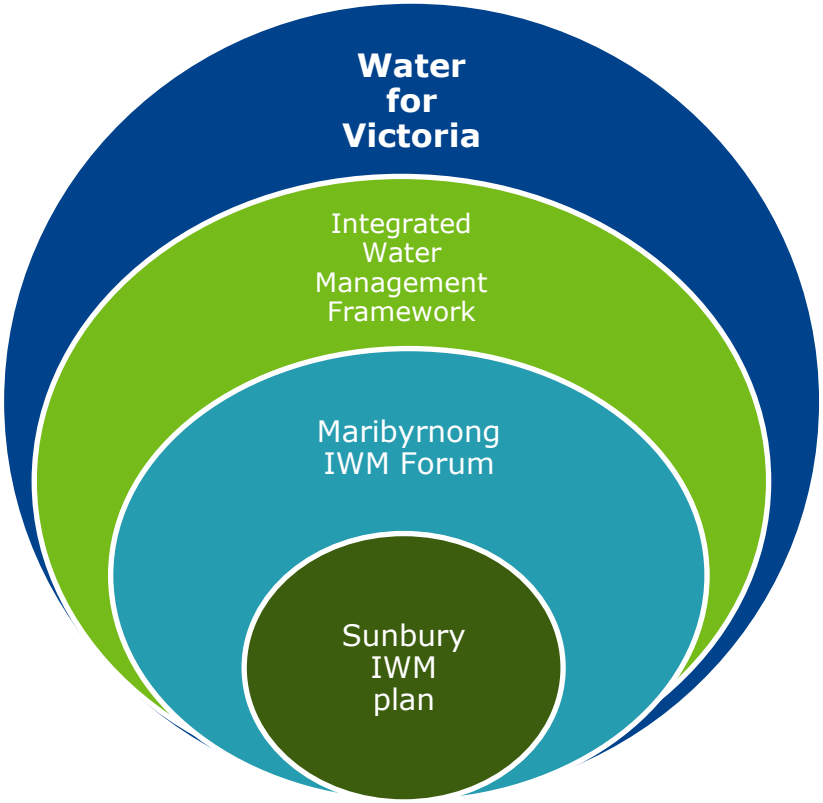


Figure B3: Linking Sunbury to the bigger picture

The **Urban Water Strategy** (2017) is Western Water's 50-year outlook of the integrated water supply system and water resource management for the Western Water region.

With a focus on water supply and sewerage systems, it was developed in tandem with the **Melbourne Water System Strategy** (2017). This strategy explores two key challenges affecting Melbourne Water's management of water resources:

• our growing and changing region

• our changing and variable climate.

Community and stakeholder engagement played an important part in the Urban Water Strategy's development, reflecting Western Water's core vision of 'strong communities, working together' to deliver affordable, reliable and cost-efficient services for today's community, and for future generations.

"We engage with our community on the provision of water services to enable regional economic growth and resilience in a climate-changing environment."
Western Water Urban Water Strategy vision

Western Water Integrated Water Management (IWM) Strategy (2014) is a region-wide strategy developed to safeguard the region's water resources for the future.

At its foundation is the need to work closely with regional partners and stakeholders to develop innovative, sustainable, integrated opportunities for managing the urban water cycle to benefit the community and the broader region. The strategy is aligned with the Victorian Government's Water for Victoria, and the Integrated Water Management Framework, and aims to deliver the following key outcomes:

- Optimisation of local water supplies
- Maximised beneficial use of recycled water
- Enhanced waterway health
- Economic prosperity
- Liveability.

Western Water's 'Sunbury IWM planning for the future' is focused on the Sunbury growth area and follows on from the region-wide strategy.

It aims to deliver on strategic outcomes in collaboration with key stakeholders and with ongoing engagement with customers and the community.

Three overarching goals have been established for the IWM Planning for Sunbury:

- Keep waterways healthy
- Keep soils and landscape healthy
- Create new water supplies.

The **Healthy Waterways Strategy (2018)** – coordinated by Melbourne Water and co-designed by water managers across the region – offers a shared vision and shared goals for protecting and improving waterways across our region. The Port Phillip and Westernport region covers a total catchment area of almost 13,000 square kilometres, containing more than 25,000 kilometres of rivers and creeks, 33 estuaries and in excess of 14,000 natural wetlands.

Ensuring waterways are healthy, liveable and accessible for future generations is a complex task – one that community members are playing an important role in. In developing the strategy, Catchment Collaboration Communities (comprising organisations and individuals knowledgeable about a particular catchment area) worked together to create key components of each catchment program. The Maribyrnong Catchment Program includes goals forthe **sub-catchments of Jacksons Creek** and **Emu Creek** that flow through the **Sunbury** region.

"Over 630 individuals representing over 220 organisations via 23 workshops partnered to shape the Strategy, from project inception in September 2016 to formal consultation on the draft in July 2018."
Healthy Waterways YourSay page

Appendix C

Understanding the urban water supply system

The water supply system has developed over the years to meet the needs of our communities. Local, regional and state-wide water supply systems operate both independently and together to allow water to be moved from where it is captured and stored to where it is needed. We **call this interconnected system the water grid**.

The Melbourne system gets most of its water from large forested catchment areas to the east of the city and from the Victorian Desalination Plant when it is operating.

What are our local water sources and uses?
The Sunbury region[6] relies on diversified water sources, including water from local catchments, recycled water and water from the Melbourne supply system.

Figure C1: Sunbury Recycled Water Plant

[6]In this context, the 'Sunbury region' is defined as primarily the town of Sunbury and nearby towns including Diggers Rest, Bulla, Clarkefield, and, more broadly, Gisborne, New Gisborne, Macedon, Mount Macedon and Riddells Creek.

Reservoirs and catchments

"The harsh Millennium Drought (1997 to 2009) that followed the wet decades of the 1950s and 1970s had an extreme impact on Sunbury's water storage – our reservoirs and dams almost dried up. Western Water constructed pipelines that connected local towns to Melbourne's water supply system. This helped to meet immediate water needs."
Western Water Urban Water Strategy

For Sunbury, water supply has traditionally come from Rosslynne Reservoir. However, due to population growth and lower runoff into this reservoir, Sunbury now mainly receives its water from the Melbourne supply system. Rosslynne Reservoir is managed by Southern Rural Water, and the reservoir now supplies water to towns in the Macedon Ranges.

Drinking water is regulated under the *Safe Drinking Water Act 2003* and the *Safe Drinking Water Regulations 2015.* The Act places obligations on water suppliers and water storage managers to provide safe, clean, high-quality drinking water. The quality of water supplied by water corporations such as Melbourne Water and Western Water is independently regulated by the Department of Health and Human Services in accordance with the Act.

Figure C2: Rosslynne Reservoir

Alternative sources of water

Alternative sources of water are any water sources other than those from the treated drinking water supply. It includes water such as recycled water, stormwater, rainwater and groundwater that is appropriately treated for specific purposes.

Currently, these alternative water sources are most commonly used for things like watering green spaces, irrigating crops, and dust suppression, which do not require the highest quality water. But in some areas alternative water is also being used on things like gardens and for flushing toilets. This is possible when it is treated to a higher level such as Class A recycled water.

Western Water has implemented a stormwater harvesting scheme in Melton (see 'Case study: Melton Stormwater Harvesting Project'). In Orange, NSW, there is also a scheme in place to harvest stormwater for storage and treatment to drinking water quality standard for the local water supply system.

Examples of alternative water use across Melbourne and Sunbury include:

- private rainwater tanks used in many dwellings
- larger 'dual-pipe' schemes in Melbourne's growth areas in the north, west and south east.

Sunbury has its own recycled water scheme that connects several council properties, local schools, vineyards, sporting facilities and private landholders to its Class B recycled water supply.

Figure C3: Melton Stormwater Basin

Recycled water in Sunbury

Figure C4: Sunbury Recycled Water Plant (Source: Western Water)

Recycled water is produced by treating wastewater. Wastewater is the term for used household water that flows in the sewerage system. It includes the water from kitchens, bathrooms, laundries and toilets. Wastewater must be treated to a suitable quality so it can be reused. The use of recycled water is regulated by Victoria's Environment Protection Authority (EPA).

In Sunbury, Western Water currently produces Class B recycled water from its recycled water plant, the largest recycling plant in the region. This class of recycled water is supplied to customers for suitable non-drinking purposes (e.g. irrigation of certain crops, sports ovals and recreation areas). The plant operates to limits set by EPA, and, throughout treatment, recycled water is continually monitored and tested to ensure a safe, quality supply.

In 2017/18, the total volume of recycled water produced from Sunbury was 2.2 GL/yr. Customer demand is currently .9 GL/yr of the total recycled water produced.

Currently, around half the recycled water produced in Sunbury is reused for irrigation and the remainder is released to Jacksons Creek under the conditions specified in the Sunbury Recycled Water Plant's EPA licence. To protect the waterway, this licence has a set limit to the amount of recycled water that can be discharged to the creek each day.

The Sunbury Recycled Water Plant has recently undergone a major upgrade to increase its capacity and treatment processes to keep pace with the growing population and higher water quality compliance requirements from EPA.

As the population grows, we will have extra wastewater to manage. There are alternatives to future wastewater management including where it's treated, to what quality it's treated and where it's reused. Some of these will cost more than others.

The Sunbury Recycled Water Plant currently generates more recycled water than is required by the local community for open space and agricultural irrigation. Population growth will further increase the amount of excess recycled water produced.

Opportunities may exist to reuse excess recycled water. See Appendix G for further information.

Tip: For further information see EPA's Guidelines for reclaimed water use – publication 464.2 in the online portal's document library.

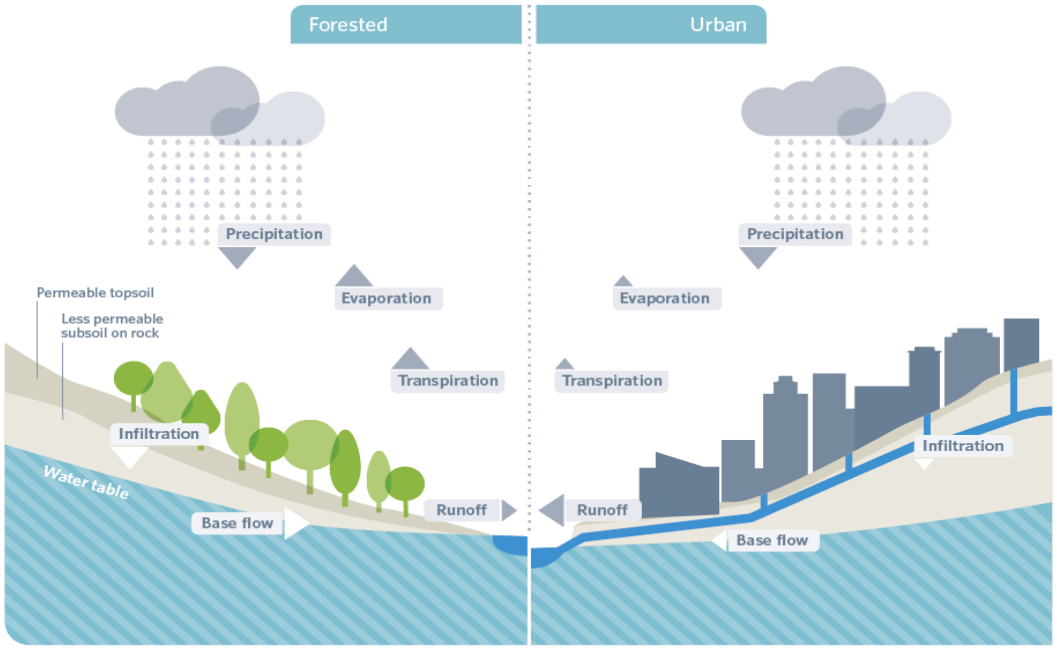


Figure C5: Stormwater flow in natural and urban environments (Source: Healthy Waterways Strategy)

Stormwater

The stormwater system is designed to take rainwater and other urban water runoff from our streets and drains into the closest waterway. For Sunbury, this is currently Jacksons Creek, but with the Sunbury growth area, both Jacksons Creek and Emu Creek will receive additional stormwater flows.

An increase in urban growth will result in more dwellings being built and more expanses of constructed hard and impervious surfaces like roads, driveways, car parks, roofs and paving. (See Figure C5.) This will result in larger and faster volumes of stormwater from roofs and roads flowing into local streams, in turn impacting water quality, aquatic biodiversity and soil and natural landscapes.

Additionally, changing climate conditions mean less frequent but more intense storms, which further affects the volume of stormwater entering waterways when it does rain.

Urban stormwater also discharges pollutants into waterways. These pollutants come from many different sources including fuel and oil on our roads, commonly used fertilisers, soaps and chemicals, litter dropped on our streets and sediment from building sites.

Without adequate stormwater management, the waterway quality and habitat of Jacksons Creek and Emu Creek are at risk of being impacted by these more frequent and faster flows and discharged pollutants.

Managing stormwater can help protect the environment and produce a new alternative water source for certain uses. Now is the time to think about what we can do with stormwater from the new housing estates being developed around Sunbury.

How is stormwater managed?

Unlike recycled water, stormwater is currently not treated before it enters our waterways. In most existing urban areas stormwater flows directly from our streets, through our drains and into our creeks, rivers, bays and the ocean.

However, in many new growth areas, stormwater is filtered by sediment basins and wetlands – usually located at the end of the pipe system. (See Figure C6, for example.)

In addition, in some new developments and in the redevelopment of other urban areas, measures are being incorporated to increase stormwater infiltration and further reduce adverse impacts on our waterways.

These include, for example, grass swale drains, vegetated filter strips and porous pavements that allow more stormwater to soak into the ground. (See

Clause 56.07-4 of the Victorian Planning Provisions, commonly referred to as Clause 56, sets stormwater management objectives that residential subdivisions must meet. These objectives are designed to reduce the harm to our waterways, bays and ocean.

Case study: Melton Stormwater Harvesting Project

Western Water will soon be harvesting treated stormwater generated in the new Atherstone residential estate south of Melton.

Stormwater will be collected from roofs, streets and other hard surfaces for treatment in nearby wetlands.

The treated stormwater will then be transferred to Melton Reservoir for storage and reuse by irrigators downstream on the Werribee River.

By supplying irrigators with stormwater from Melton Reservoir, irrigation demands for water from Merrimu Reservoir are reduced thereby saving more water for drinking water use.

At full development, the Atherstone estate will generate 1,000 million litres (1 GL) of treated stormwater each year.

Western Water is investigating the feasibility of harvesting additional stormwater volumes from other new residential estates in the Melton growth area where there is potential to harvest in excess of 3,000ML of treated stormwater per year.

Additional treated stormwater may be used to enhance the Werribee River through environmental releases, keeping water flowing through the river system to keep it healthy as a habitat for wildlife, in addition to supplementing irrigation demands.

The Melton Stormwater Harvesting Project demonstrates the significant benefits of integrated water management planning for new residential estates in our service region.

To ensure the success of this project, Western Water has collaborated with the Department of Environment, Land, Water and Planning (DELWP), Southern Rural Water, Melbourne Water, Environment Protection Authority, Melton City Council and local developers including the joint venture by Melton City Council and Lendlease.

The initial stage of the project is jointly funded by DELWP and Western Water.

Figure C6: Melton stormwater basin (Source: Western Water)

Appendix D

The Sunbury landscape, its local waterways and values

The land and waterways of Sunbury encompass the traditional lands of the Wurundjeri, who have lived in the Maribyrnong River valley for at least 40,000 years. This area has always held deep spiritual and cultural significance for its Traditional Owners.

To date, more than 5,800 Aboriginal cultural sites have been recorded in the overall Maribyrnong catchment, with a majority of these found near waterways. Archaeological evidence shows Aboriginal people have lived in the Sunbury region for at least 17,000 years.

The Sunbury Rings Cultural Landscape along the Jacksons Creek corridor is one of Australia's most important archaeological areas and includes the Sunbury Earth Rings. The three rings, circular earth structures believed to be the site of ceremonial activities, are included on the Register of the National Estate. It is estimated that they are approximately 1000 years old and were created by continual scraping back of earth and grass from the circles centre.

A key feature of the Sunbury region is the sensitive landscape, characterised by highly erodible soils, flow stressed waterways and steep escarpments along waterway corridors. (See, for example, Figure D1.)

The main waterways for Sunbury are **Jacksons Creek** and **Emu Creek**. Both creeks are highly valued by the community. The value of their ecosystems and recreational importance are also identified in the Healthy Waterways Strategy.

Water flows in both creeks have been modified from their natural state. This is due to an upstream reservoir on Jacksons Creek and extensive land clearing across both catchments, primarily for cropping and grazing, but increasingly due to urban development. The creeks are in different physical and ecological conditions.

Figure D1: Jacksons Creek (Source: Melbourne Water)

Water quality in **Jacksons Creek** is impacted by agricultural activities, discharges from recycled water plants, stormwater flows and urban development. The land surrounding the creek is also highly degraded in most places. Despite this degradation Jacksons Creek retains social and ecological values.

Emu Creek, less degraded than Jacksons Creek, flows only parts of the year. The creek supports significant ecological values that rely on the current water flow pattern. Protecting and enhancing these values are important strategic priorities in the Healthy Waterways Strategy.

The deeply incised valleys of Jacksons and Emu Creeks and their numerous smaller tributaries and local wetlands also provide habitat for significant native flora, frog and fish species, and other fauna.

Species such as the endangered Growling Grass Frog and native fish like the common galaxias are supported in both creeks. Platypus are known to inhabit Emu Creek. A large group of platypus also inhabit Jacksons Creek, downstream of the recycled water plant, as identified by Melbourne Water's Platypus Census.

Did you know?

The Growling Grass Frog is known to inhabit Emu Creek and Jacksons Creek, as well as other waterways in the region. Listed as an 'Endangered' species in Victoria and 'Vulnerable' nationally under the *Environment Protection and Biodiversity Conservation Act,* areas that support its habitat have been identified for protection across the Sunbury Growth Area. These habitat protection

Figure D2: Growling Grass Frog (Source: Peter Robertson)

Figure D3: Platypus inhabit both Emu and Jacksons creeks (photo source: Melbourne Water)

Wildlife species identified in Jacksons and Emu creeks

Table D1: Key species and conservation status in Jacksons Creek (source: 1: Alluvium (2015a); 2: CAPIM (2015); 3 - Alluvium and Biosis (2014))

Common name	Species	Conservation Status
Short Finned Eel [1]	*Anguilla australis*	
Common Galaxias [1]	*Galaxias maculatus*	
Ornate Galaxias [1]	*Galaxias ornatus*	
Southern Pygmy Perch [2]	*Nannoperca australis*	
Platypus [1]	*Ornithorhynchus anatinus*	
Growling Grass Frog [3]	*Litoria raniformis*	Vulnerable (EPBC Act); Threatened (FFG Act)
Striped Legless Lizard [3]	*Delma impar*	Vulnerable (EPBC Act); Threatened (FFG Act)
Rakali or water rat [2]	*Hydromys chrysogaster*	

Table D2: Key species and conservation status in Emu Creek (source: 1: Alluvium (2015a); 2: CAPIM (2015); 3 - Alluvium and Biosis (2014))

Common name	Species	Conservation Status
Short Finned Eel [1]	*Anguilla australis*	
Common Galaxias [1]	*Galaxias maculatus*	
Ornate Galaxias [1]	*Galaxias ornatus*	
Flat-headed Gudgeon [1]	*Philypnodon grandiceps*	
Platypus [1]	*Ornithorhynchus anatinus*	
Growling Grass Frog [3]	*Litoria raniformis*	Vulnerable (EPBC Act); Threatened (FFG Act)
Common Bent-wing Bat	*Miniopterus schreibersii oceanensis*	Threatened (FFG Act) (NB. eastern spp.)

Why are our waterways important?

"Waterways are important and valued places for Victoria's diverse community and environment."
Healthy Waterways Strategy

The health of waterways, and the vegetation and wildlife they support, underpins our region's amenity, biodiversity and economy. Waterways across the Port Phillip and Westernport region support a range of environmental, social, cultural and economic values that are central to the lifestyle we share and enjoy.

The plants and animals that rely on rivers and creeks live together in a delicate balance. This can be upset by human activities that change a waterway's natural state, sometimes with damaging results.

Waterways provide habitat for plants and animals and play a critical role in sustaining much of our region's biodiversity. They are important for our wellbeing, allowing us to spend time in nature away from the urban landscape. And culturally, they are places of memories, spiritual connection and ancestral history.

Our waterways face increasing challenges. Climate change is affecting the flow of water through them, which directly impacts their suitability as habitats for wildlife. Many waterways and waterway environments in urban areas are highly modified from their natural state. They also experience constant pressure from people, urban expansion, poor land management and land development practices, and changes to land use adjoining the waterways.

In recent decades, extensive land clearing for development along waterways and rural areas has also reduced the beneficial cooling effects provided by native vegetation.

As the Sunbury region becomes more urban, and climate change results in less rainfall and a drier climate, waterways will be impacted in a number of ways.

Who is responsible for local waterways?

Melbourne Water is the manager of waterways in the Port Phillip and Westernport region. This includes the Maribyrnong catchment, which Jacksons Creek and Emu Creek flow into.

Western Water has a role to make sure they don't negatively affect local waterways with discharges from their treatment plants or sewer spills. Southern Rural Water is the agency responsible for releasing environmental flows to waterways from Rosslynne Reservoir.

Councils and Melbourne Water share responsibility for stormwater that drains to the waterways.

Urban growth will:

- increase the amount of hard, impervious surfaces like pavements, roads and buildings. Water runs quickly off these surfaces, instead of soaking into the ground
- increase stormwater volumes and intensity, the rapid runoff impacting aquatic habitats and the increase in volumes introducing more urban pollutants, including oils, dirt, nutrients, heavy metals, pesticides and litter into the waterway
- produce increased volumes of wastewater/recycled water that will need to be managed in order to not negatively impact waterways.

Climate change will:

- lead to less water flowing into waterways
- impact the health of soil and landscapes as a result of less rainfall and a drier, hotter climate
- change flow patterns and water quality affecting the health of platypus, fish, invertebrates and other aquatic animals, as well as the waterway's salinity.
- When less rainfall can soak into the ground, there is less moisture in the soil, and subsequently less water available for vegetation and seepage into rivers during dry conditions. This lack of moisture in the environment also leads to increased ambient temperatures which in turn impacts on community health and wellbeing.

The majority of the Sunbury growth area is flanked by Jacksons Creek to the west and Emu Creek to the east. Although flows in both creeks have been modified from natural conditions, any further modification due to urban growth and increased stormwater flows will lead to significant degradation.
Because the land around Sunbury's creeks has erodible soils, steep slopes and escarpments, increased stormwater runoff may also cause erosion and degrade soils.

To protect the value and health of these waterways, and not cause downstream impacts, significant flow reductions from the urban catchment are required.

Maintaining a 'business as usual approach' to water management in the Sunbury growth area does not address the full impact that increased stormwater and development will have on the health of the region's waterways. We need to consider a different approach.

How waterways are regulated

Waterways and groundwater are managed by the Crown (represented by the government) on behalf of all Victorians. This is enshrined in the Water Act 1989.

EPA's State Environment Protection Policy (Waters) (2018), also referred to as SEPP (Waters), provides a framework for the protection and management of water quality in Victoria, covering surface waters, estuarine and marine waters and groundwater across the States.

The Healthy Waterways Strategy provides a single framework for addressing community expectations and the obligations for waterway management, as outlined in relevant State, national and international legislation, policy and agreements. It builds on a long-term regional vision for waterway health.

Appendix E

More about our changing climate and urban growth

Climate change

Over the past 100 years, global surface air temperatures have risen by almost 1°C.[7] Both the atmosphere and the oceans are continuing to warm.

In Victoria, the climate has been following a drying and warming trend for several decades, and the Port Phillip and Westernport region, including Sunbury and nearby towns, is expecting an increase in average daily temperatures of 1.2°C to 2.3°C by the middle of this century.[8]

Research now tells us that human-induced climate change is likely to be a significant part of this trend due to the release of greenhouse gases from the burning of fossil fuels, land use change and agriculture. The severity of the Millennium Drought – a drought unprecedented in duration and intensity – has been linked to human-induced climate change.[9]

The Millennium Drought brought with it a seasonal shift in rainfall, with proportionally less rainfall in the cooler months. Figure E1 shows that this trend in rainfall reductions has continued in much of Victoria since the end of the drought.

Climate change and our local waterways and catchments

Climate change poses a serious threat to our catchments, rivers, creeks and other wetlands. The change to a drier climate is expected to significantly reduce inflows to our catchments.

Across the state, streamflows are projected to decrease by a greater proportion than rainfall, due to the interaction between rainfall and catchment hydrology. Figure E2 shows projected changes in runoff under a medium climate change scenario. It also highlights that average annual streamflow will possibly reduce by approximately 50 per cent in some catchments by 2065.[10]

Reductions in streamflows of this scale would in turn impact water quality, the health of waterways, and the ecosystems they support. For example, the species that live in and around our waterways rely on well-established flow patterns for successful feeding, breeding and movement throughout the landscape.

The hotter and drier conditions of climate change will also place pressure on maintaining healthy greenery and open spaces in our urban environments.

Unless water from suitable sources is found, the impacts of climate change will have serious consequences for water availability across Victoria.

Table E1 summarises these impacts and the risk to water supply and infrastructure.

[7] `Intergovernmental Panel on Climate Change 2007: Synthesis Report Summary for Policymakers', p2
[8] 'Healthy Waterways Strategy', p34
[9] 'Water for Victoria', p8
[10] 'Water for Victoria', p37

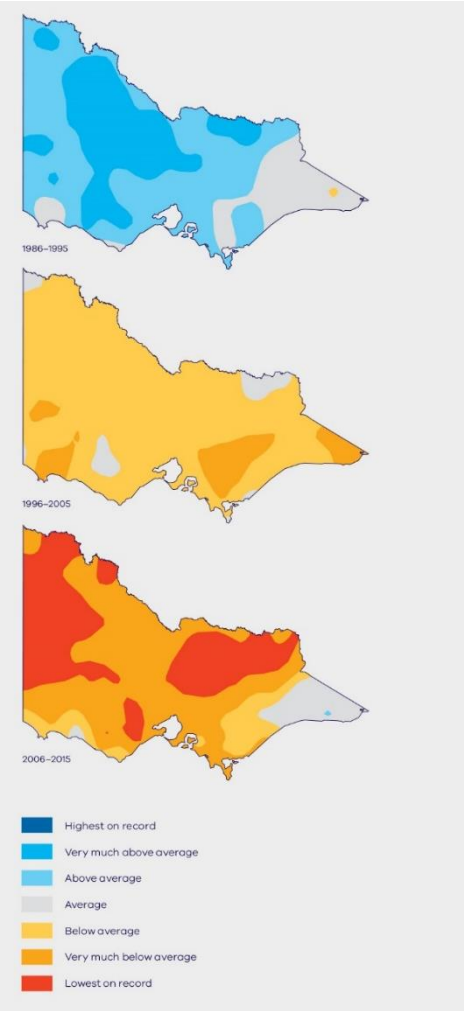


Figure E1: Rainfall received during the cooler months of the year (April–October) has declined across Victoria (Source: Water for Victoria)

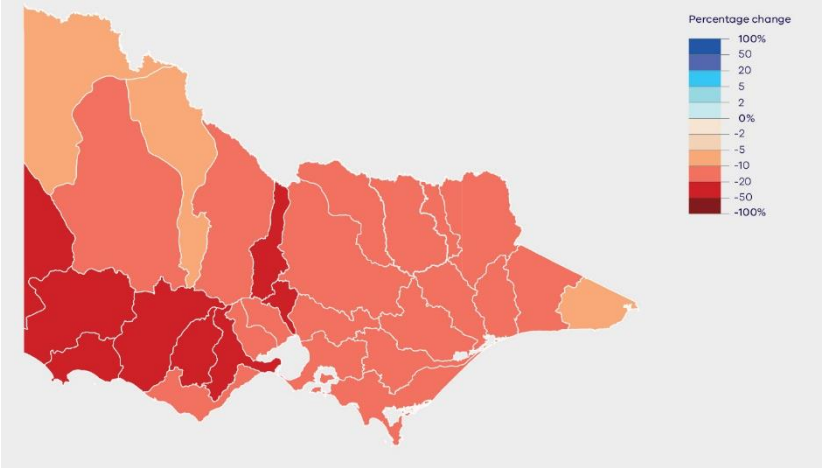


Figure E2: Projected changes in runoff for 2065 under medium climate change (Source: Water for Victoria)

Predicted climate change impacts	Potential climate change risks
• Reduced winter stream flows • Increasing average and minimum temperatures • More frequent and intense droughts • Sea level rise • Increased severity and intensity of storms and bushfires • More frequent and intense heatwaves • More intense rainfall events	• Insufficient water supply and reduced water quality • A major bushfire in critical water supply catchments • Frequent or extended disruption to electricity and telemetry systems • Decreased waterway and aquatic ecosystem health • Increased flash flooding • Impacts on the safety and wellbeing of community • Increased asset deterioration

Table E1: Impacts and risks to water supply and infrastructure

Urban growth

Population and urban growth pose real challenges for protecting the environmental, social, cultural and economic values of waterways. They also present challenges to an area's liveability and resilience.

Population growth will increase water demand; it will also generate higher volumes of sewage, recycled water and stormwater. This and the increased development that comes with urban growth will place pressure on Sunbury's unique landscape and waterway environments.

A trend towards smaller backyard size also places greater importance on the role of green open spaces, including waterways, for a growing population.

Stormwater and waterways

Urban growth increases discharges of stormwater to the environment through the connection of the stormwater system to our urban waterways.

Traditionally, stormwater has been managed with a focus on urban drainage and flood prevention, and by removing it from the landscape as quickly as possible. But we now know that this traditional management practice is not effective in protecting our waterways or addressing the issues that urban development and population growth presents. For example, if not managed properly, an increase in stormwater can result in erosion and pollution of our urban waterways.

In new residential developments, it is now a requirement to incorporate effective stormwater management into the overall design. This includes keeping stormwater in the landscape via constructed wetlands and managing stormwater discharges to waterways. A number of local councils have also implemented Water Sensitive Urban Design (WSUD) to improve the way we manage stormwater, help protect the environment, and enhance an area's liveability.

Urban growth and alternative water sources

Urban growth increases stormwater runoff and recycled water in quantities roughly the same as the amount of drinking water we use. (Water for Victoria, p. 86.)

This provides significant opportunities to diversify our water sources. These sources can be used to irrigate public gardens and sporting grounds, and to make sure that valuable parkland is not lost during drought.

Keeping water in the landscape and soils also provides cooler, greener urban places, which supports health and wellbeing. This will be even more important as we face increased and prolonged periods of heat.

Using alternative water sources has the added benefit of protecting our urban waterways and bays from stormwater and treated wastewater discharges.

Appendix F

DHHS communique on alternative water sources

This communiqué has been prepared by the Victorian Department of Health's Water Program to clarify its position on the role of public health in integrated water management activities.

This advice is provided in accordance with the core strategic direction of the department, which is to reduce the incidence of preventable and avoidable illness through health promotion and regulation.

The department supports the use of a range of alternative water supplies for non-drinking purposes. This strategy reduces the reliance on potable water supplies and allows for the use of alternative water supplies to underpin health and wellbeing, for example:

- providing accessible green spaces that support physical activity and mental health
- reducing localised urban heat island effects by using appropriate water sensitive urban design
- co-locating large alternative water sources with activities that provide economic benefit.

When planning for integrated water management the department promotes a risk management approach as described in the Australian Guidelines for Water Recycling. This approach is based on the principle that hazards in water need to be reduced to a level so that the water is acceptable for its intended end use (i.e. the greater the exposure, the greater the level of treatment required).

The department believes the best way to achieve this is to take the approach where water with high inherent risk is treated and used for low human exposure activities and the best available water be utilised for high exposure end uses.
Initiatives to build knowledge and capacity to better understand the role of alternative water sources are supported by the department. Areas requiring further research include:

- risk management
- treatment
- community perceptions and expectations
- maximising economic benefit.

Further information about the Department of Health Water program is available at website: www.health.vic.gov.au/water or by phone on 1300 761 874.

Appendix G

More info on the options

Options for Water Supply

A. New dam

B. Pipeline connection from areas where more water is available

C. Utilise alternative water sources to supplement for water supply

D. Use less: enforce water restrictions and water conservation programs

E. Develop groundwater sources

F. Use household rainwater tanks

A. New dam	
Pros	**Cons**
Dams are generally low-energy as a supply source	A dam requires regular and reliable rainfall and a large catchment area close to urban areas
Dams provide storage for high-rainfall events that can then supply water during low rainfall	There is a high environmental impact (for example on vegetation, soils, downstream waterway flows and ecology)
	Cost of infrastructure
	Lack of suitable land
An additional local dam would not be viable. *(If a suitable site were to be found elsewhere and rainfall was sufficient, the option may provide for the shortfall in the water supply but at a significant economic and environmental cost.)*	

B. Pipeline connections from areas where more water is available

Pros	Cons
Potential to source water through existing pipelines or new pipelines, with a water supply system that has a rainfall independent source (e.g. sourcing water from the Melbourne system connection and the Victorian Desalination Plant) for greater water security	The Melbourne system will also need to more water in the future (e.g. additional desalination capacity)
Water quality may be better than local sources	Cost of pipelines and pumping infrastructure and potentially higher cost in water transfer eg energy to pump
Potential access to a larger more secure supply system	There are additional costs associated with water purchasing agreements, including entitlement and volume of water required

This option provides the greatest opportunity to provide for the overall shortfall in water supply for the region but alone will not protect the waterways. Additional water would have to be purchased if it were to be used to provide for additional environmental flows. Would not provide the ecological protection of the waterway from the excess stormwater.

C. Use alternative water sources to supplement for water supply

Pros	Cons
Uses available local water sources to make up for shortfalls in the water supply	A lower water quality with higher risks depending on use.
Can save on purchasing more water	Cost of treatment for type of use can be expensive
Could treat to a high standard for high value uses creating greater benefit	Volumes not enough to provide for future overall shortfall for the region
Can deliver greater environmental benefits e.g. reduce recycled water/stormwater from entering the waterways	The health regulator only supports the use of treated alternative water for non-potable uses

This option would provide for some of the overall shortfall in water supply (depending on how much can be used and for what purpose). Use of the stormwater could provide the ecological protection of the waterway. Some of the alternative water can be used for green spaces. The health regulator supports the use of alternative water for non-potable uses only.

D. Use less: enforce water restrictions and water conservation programs

Pros	Cons
Conservation of a limited resource	Social and economic impact of less water available, especially if more severe restrictions were implemented
	Restrictions alone are not enough to provide for future shortfall

If a programme was successful it would only contribute a small amount to the water supply shortfall.

E. Develop groundwater sources

Pros	Cons
Potentially closer to where water demand is	Local aquifers cannot provide sufficient water at the required flowrate
	Potential impact on groundwater flow to waterway
	Treatment cost

This option cannot provide sufficient water.

F. Household rainwater tanks	
Pros	**Cons**
Conservation of limited traditional water resources	Rainfall dependent
Maximise use of on-site water	Rainwater from tanks is not permitted to be used for drinking, cooking and bathing without further treatment
Will reduce the amount of water that has to be purchased by the property owner	On-site treatment is potentially a high cost for property owner and is not practical for some
	High cost of rainwater tank installation, operation and replacement for property owner
	Multiple tanks or larger underground tanks required to provide for annual demand for a property
	Volumes not enough to provide for future shortfall
This option alone could not make up the shortfall in water supplies or protect the waterway. Any water used on site conserves water elsewhere and also reduces some of the flows to the waterways. There are higher costs for property owners with installing rainwater tanks and maintaining them than if water was purchased.	

Options for Wastewater/Recycled Water

A. Collect & treat at estate for local reuse (open spaces)
Collect & treat (at treatment plant) to Class B (current) or higher quality to:

B. Release to waterway

C. Irrigate open spaces and recreation areas

Irrigate suitable farm crops on:

D. Existing farms

E. Find/create new farms

F. Help create new industries

G. Install dual pipe to new dwellings for garden, toilet or laundry

H. Store and release to waterway when environmental flows are needed

A. **Collect & treat at estate for local reuse (open spaces)**	
Pros	**Cons**
Facilitates greener spaces, visual amenity and urban cooling	Requires storage distributed within neighbourhoods
Local sustainability	Will require local treatment plants within neighbourhoods
	No clarity about who is responsible for managing treatment and risk
This option alone could not reuse the additional volume of recycled water generated unless there was a high demand for recycled water in local open spaces. Any recycled water used locally would reduce the total volume that would be released to the waterway.	

B. Collect & treat centrally (at treatment plant) to Class B (current) or higher quality to: *Release to waterway*

Pros	Cons
Will provide some environmental benefit at certain times when the creek needs the flow	Requires a higher level of treatment
Local uses of local resources	Limited opportunity to release to waterways with Class B and under current EPA Licence

This option is not permitted at the current quality. At a higher quality it would have potential to release more to the waterway however it would need to be stored and released at the right times to benefit the waterway.

C. Collect & treat centrally (at treatment plant) to Class B (current) or higher quality to: *Irrigate open spaces and recreation areas*

Pros	Cons
Broader and greater use of local water	Requires large storage and a pipe to transfer to where it is used
Facilitates greener spaces, visual amenity and urban cooling	Based on forecast demand for recycled water within the local Regional area it is expected that demand for additional recycled water is limited

This option alone could not reuse the additional volume of recycled water generated unless there was additional industrial/agricultural demand for this class of water. However, any recycled water used locally would reduce the total volume that would be released to the waterway and provide the benefit of maintaining green spaces.

D. Collect & treat centrally (at treatment plant) to Class B (current) or higher quality to: *Irrigate suitable farm crops on existing local farms*

Pros	Cons
Beneficial reuse of existing local resource	Requires large storage and a pipe to transfer to where it is used
Productive reuse of alternative water source	Based on forecast demand for recycled water within the local regional area, it is expected that demand for additional recycled water is limited
	Western Water may need to buy land and operate at their cost - not consistent with core business

This option alone could not reuse the additional volume of recycled water generated. However any recycled water used locally would reduce the total volume that would be released to the waterway and provide the benefit of maintaining green spaces.

E. Collect & treat centrally (at treatment plant) to Class B (current) or higher quality to: *Find/create new farms/areas*

Pros	Cons
Potential for higher value beneficial use	Requires large storage and a pipeline to transfer
Greater demand and revenue potential beyond local area	Higher cost to transfer to areas further away
	Availability of suitable land

This option may have potential to beneficially reuse the additional volume of recycled water generated with a larger farming area and demand for water.

F. Collect & treat centrally (at treatment plant) to Class B (current) or higher quality to: *Help create new industries to use excess recycled water*

Pros	Cons
Potential for higher value beneficial use	Requires large storage with possibly higher treatment
Productive reuse of alternative water resources	Cost to transfer to areas further away
	These types of industries are not evident in current planning

This option does not appear to be currently feasible but may be an opportunity in the future to utilise some of the additional recycled water.

G. Collect & treat centrally (at treatment plant) to a higher quality (Class A) to supply to dual pipe to new dwellings for garden, toilet or laundry

Pros	Cons
Conserves drinking water	Requires storage and treatment to meet non-potable water use regulations
Local use of local resources	Requires a separate pipe and plumbing system from the treatment plant into households
	Cost of upgrading treatment plant to produce Class A
	Cost benefit issues - Small blocks have limited demand for recycled water uses on gardens therefore reducing the overall demand

This option alone could not reuse the additional volume of recycled water generated unless there was additional industrial/agricultural demand for this class of water. However any recycled water used locally would reduce the total volume that would be released to the waterway.

H. Collect & treat centrally (at treatment plant) to a higher quality to store and release to waterway when environmental flows are needed

Pros	Cons
Greatest opportunity to provide flows at the right times to benefit Jacksons Creek	Requires storage
Beneficial reuse of local resources	Cost of higher level of treatment
	Currently not allowed – need changes to quality and EPA licence conditions

This option could utilise all of the additional recycled water and potentially provide an overall benefit to the environment if it can be stored and released at the right times. Some of the stored volume could also provide the benefit of maintaining green spaces.

Options for Stormwater

A. Collect at dwelling (tanks) for garden, toilet, laundry
B. Collect in new estates for open spaces or evapotranspiration

C. Store and release to waterway at the right times when environmental flows are needed

Collect and treat centrally to:

D. Irrigate open green space/recreation areas

Irrigate suitable farm crops:

E. On existing farms

F. Find/create new farms/areas/industries

G. Install dual pipe to new dwellings for garden, toilet and laundry

H. Supply into drinking water system

A. Collect at dwelling (tanks) for garden, toilet, laundry	
Pros	**Cons**
As for rainwater tanks above	High cost for property owner
Water collected and used reduces volume and nutrients that would otherwise enter the waterway	Rainwater tanks are not a compulsory requirement (is discretionary for property owners)
Some reduction in flows to drainage system	Rainwater tanks alone are not sufficient to protect the waterway from stormwater flows
	High cost of rainwater tank installation, operation and replacement for property owner
Any water used on site conserves water elsewhere and also reduces some of the flows to the waterways. This option alone would not protect the waterway from the additional stormwater flows.	

B. Collect in new urban areas for open spaces or evapotranspiration

Pros	Cons
Facilitates greener spaces, visual amenity and urban cooling	Requires storage distributed within neighbourhoods
	Requires suitable soils and land set aside for evapotranspiration
	Alone are not sufficient to protect the waterway from stormwater flows

This option alone could not reuse the additional volume of stormwater generated. Any stormwater used locally would reduce the total volume that would be released to the waterway and provide the benefit of maintaining green spaces.

C. Store and release to waterway at the right times when environmental flows are needed

Pros	Cons
Could utilise available water supply storage capacity	Use of existing water supply storage will require higher level of treatment (as outlined in above points) otherwise larger separate storage required at high cost.
Storage and volume would help provide flows at the right times in Jacksons Creek	Some additional treatment
Greatest potential to utilise sufficient volume of stormwater to protect the waterway	

This option could reuse the additional volume of stormwater to benefit the waterway if it was of suitable quality, stored and released at the right time and location.

D. Collect and treat centrally to: *Irrigate open green space/recreation areas*

Pros	Cons
Broader and greater use of local water	Requires large storage and potentially higher treatment a pipe system to transfer to where it is used
Facilitates greener spaces, visual amenity and urban cooling	Volume for irrigation alone is not sufficient to protect the waterway from stormwater flows
As for recycled water use to irrigate open green space/recreation areas.	

E. Collect and treat centrally to: *Irrigate suitable farm crops – on existing local farms*

Pros	Cons
Beneficial reuse of existing local resource	Requires large storage and a pipe to transfer to where it is used
	Based on forecast demand for recycled water within the local regional area it is expected that demand for additional stormwater is limited
	Western Water may need to buy land and operate at their cost - not consistent with core business
As for recycled water use to irrigate local farms.	

F. Collect and treat centrally to: *Irrigate suitable farm crops – find/create new farms/areas/industries*

Pros	Cons
Potential for higher value beneficial use	Requires large storage and a pipe to transfer to where it is used
Greater demand and revenue potential beyond local area	Cost to transfer to areas further away
	These types of industries are not evident in current planning

As for recycled water use option.

G. Collect and treat centrally to: *Dual pipe to new dwellings for garden, toilet and laundry*

Pros	Cons
Higher value use	Requires storage and treatment to meet non-potable water use regulations
Conserves drinking water	Requires a separate pipe and plumbing system from the treatment plant into households
	Cost/benefit issues - small blocks have limited non-potable water demand hence volume is not sufficient to protect the waterway from stormwater flows

As for recycled water use option.

H. Collect and treat centrally to: *Supply into drinking water systems*

Pros	Cons
Could utilise available water supply storage capacity	Water from urban runoff will have higher level of pollutants than catchment water hence requires higher level of treatment to use for drinking water
Could use existing water treatment plant and upgrade it to treat the stormwater to meet health regulations	Higher cost to collect and treat.
Greatest potential to utilise sufficient volume of stormwater to protect the waterways	Not consistent with Health regulator position - to use alternative water sources for non-potable use

This has potential to reuse most of the additional stormwater volume generated and provide the ecological protection of the waterway whilst providing for some of the shortfall in water supply. It would require a high level of treatment and the health regulator supports the use of alternative water for non-potable uses only.

Options for Healthy Waterways, Soils and Landscapes

A. Build stormwater basins, wetlands and infrastructure to improve stormwater quality and control erosion (this is the current approach in new housing developments)

B. Collect, treat, store and release additional **stormwater** to the waterway at the right times when environmental flows are needed.

C. Collect, treat store and release additional **recycled water** to the waterway at the right times when environmental flows are needed.

D. Release more water from Rosslynne reservoir for the environment

E. Collect, store & treat recycled water centrally (at treatment plant) to irrigate open spaces and recreation areas

F. Collect, store and treat stormwater centrally to irrigate open green space/recreation areas

A. Stormwater basins, wetlands and infrastructure to improve stormwater quality and control erosion

Pros	Cons
Provides some removal of sediments and nutrients and protects escarpments from erosion	Not sufficient on its own to protect the waterway ecology

The current practice is for developers to build wetlands within new urban developments which remove some of the sediment and nutrients in the stormwater from entering the waterway. These wetlands alone are not enough to protect the ecology in the waterway from higher stormwater volumes and flows.

B. Collect, treat, store and release additional stormwater to the waterway at the right times when environmental flows are needed

Pros	Cons
Could utilise available water supply storage capacity	Use of existing water supply storage will require higher level of treatment (as outlined in above points) otherwise larger separate storage required at high cost
Storage and volume would help provide flows at the right times and where it's needed in Jacksons Creek	
Greatest potential to utilise sufficient volume of stormwater to protect the waterway	
As for stormwater option.	

C. Collect, treat store and release additional recycled water to the waterway at the right times when environmental flows are needed

Pros	Cons
Storage and volume would help provide flows at the right times and where it's needed in Jacksons Creek	Requires storage
	Cost of higher level of treatment
As for recycled water option.	

D. Release more water from Rosslynne Reservoir for the environment

Pros	Cons
Would maximise environmental flow benefit by releasing water at the right times when the waterway needs it and at the best location	Insufficient inflow to existing reservoir and would need to purchase more water or develop alternate water sources to provide the volume required

This option could provide the required volume if more water was available to release from Rosslynne Reservoir. Any increase would increase the water supply deficit and require additional water sources .

E. Collect, store & treat recycled water centrally (at treatment plant) to irrigate open spaces and recreation areas

Pros	Cons
Uses available water in the region	Requires large storage and potentially higher treatment
Facilitates greener spaces, visual amenity and urban cooling	Requires a pipe system to transfer to where it used

As for recycled water option.

F. Collect, store and treat stormwater centrally to Irrigate open green space/recreation areas

Pros	Cons
Uses available water in the region	Requires large storage and maybe further treatment
Facilitates greener spaces, visual amenity and urban cooling	Requires a pipe system to transfer to where it is used
As for stormwater option.	

Glossary

Alternative water sources: Water from alternative sources, such as recycled water or stormwater, that's treated to suit specific uses. (See also 'fit-for-purpose water'.)

Attractive solution: An option that rates highly against strategic objectives and has the greatest potential to deliver the best outcomes.

Biodiversity: A measure of the number and variety of plants, animals and other living things (including microorganisms) across our land, waterways and seas.

Catchment: An area where rain is collected by the landscape, eventually flowing to a body of water such as a creek, river, dam, lake or ocean; or into a groundwater system. The Maribyrnong River catchment is relevant to the Sunbury region.

Catchment management authorities (CMAs): The Catchment and Land Protection Act 1994 established 10 catchment and land protection regions, each with a catchment management authority responsible for the integrated planning and coordination of land, water and biodiversity management.

Class A recycled water: The highest quality of recycled water, supplied to residential customers for non-drinking purposes such as toilet flushing, garden watering and car washing. It's also available for commercial and industrial uses, firefighting and public open space irrigation.[i] Western Water produces Class A recycled water from the Melton Recycled Water Plant. It's not currently available in the Sunbury region.

Climate change: A long-term change of the earth's temperature and weather patterns, generally attributed to human activities such as fossil fuel combustion and vegetation clearing and burning.

Community: Includes individuals, public and private landholders, community groups and business owners.

Department of Environment, Land, Water and Planning (DELWP): Supports Victoria's natural and built environment to ensure economic growth and liveable, sustainable and inclusive communities. The department assists the minister, develops and implements state policies and programs, and oversees the administration of organisations including catchment management authorities.

Drinking water: Water safe to drink or use for food preparation. (See also 'potable water'.)

Dual pipe scheme: An urban water recycling scheme where Class A recycled water is provided to dwellings for specific uses via a pipeline system separated from the drinking water supply.

Economically viable options: Those that can deliver the greatest benefit at the lowest cost. In some cases the benefits cannot be expressed as a monetary value ($) because there is no market price or established value. For example, the ecology of waterways is known to have environmental and social value but cannot easily be assigned a monetary value. In these cases the value could be established by asking those who would be paying for protecting the ecology of a waterway how much they would be willing to pay for that.

Ecosystem/Ecological system: The living components such as animals and plants, non-living components like air and water and the interactions that occur between these components.

Environmental flow/regimes: The timing, frequency, duration and magnitude of flows for the waterway environment. (See also flow regimes; hydrological regime.)

Environmental flow studies: The study of the

flow requirements of river and wetland systems used to inform policy decisions on water resources.

Environmental water/reserve: A certain amount of water set aside by law to meet environmental needs called the environmental water reserve.

Evapotranspiration: The part of the water cycle that removes liquid water from an area with vegetation and into the atmosphere by the processes of both transpiration and evaporation. Evaporation occurs when liquid water is converted to water vapour and hence removed from a surface, such as a lake, soil or wet vegetation, into the air.

Evapotranspiration field: treat wastewater by using evapotranspiration — the loss of water from the soil by evaporation and by transpiration from plants growing there. ET beds are used where the soil cannot treat wastewater before it percolates to groundwater, such as in rocky soils, or where the soil prevents wastewater from percolating from the application field, such as in heavy clay soils.

External sources of water supply: Water supplied to a town or region that's sourced from outside the region (as opposed to local water sources).

Fit-for-purpose water: Water of a quality appropriate for its intended use.

Floodplain: Low-lying land adjacent to a river or stream with unique ecosystems dependent on inundation from flood events.

Floods: The overflow of a large amount of water beyond normal limits or a specific rainfall depth distributed in time. (See also 'significant rainfall events'.)

Green spaces: The shared vegetated areas in a community including parks, gardens and sporting fields. Provision of green spaces is linked to recreation enjoyment, health benefits and cultural services, including the preservation of ecosystems and species.

Greywater: Household water from baths, showers, hand basins and washing machines that does not include toilet discharge. Although grey water has a lower level of contamination risk, it can cause health issues if it is not treated to an adequate level if you want to reuse it for toilet flushing, clothes washing or watering the garden. (See also 'wastewater'.)

Groundwater: Water that is located below the earth's surface. Over time, water from rain and rivers migrates through the ground and is stored in porous soils and rocks. The study of groundwater is known as hydrogeology. Groundwater is found in vast quantities filling the spaces between grains of soil or rock; it slowly flows through aquifers; it connects with rivers, streams, lakes and wetlands; it feeds trees and vegetation. Australia is a very old continent, and much of its groundwater is tens of thousands, even hundreds of thousands of years old. Groundwater is a finite resource, and aquifers can become depleted when extraction rates exceed replenishment, or 'recharge', rates. Like surface water, groundwater can become polluted or contaminated.

Growth area: Area on the fringe of metropolitan Melbourne around major regional transport corridors that are designated for large-scale change, over many years from rural to urban use. Melbourne has seven growth areas: Cardinia, Casey, Hume, Melton, Mitchell, Whittlesea and Wyndham.

Habitat: The natural home or environment of an animal, plant or other organism.

Healthy waterways: The overall state of key features and processes that underpin functioning

waterway. (See also 'waterway health')

Integrated catchment management (ICM): The coordinated management of land, water and biodiversity resources based on catchment areas. It incorporates environmental, social, cultural and economic considerations. This approach seeks to ensure the long-term viability of natural resource systems and human needs across current and future generations.

Integrated water management (IWM): A collaborative planning approach that brings together all elements of the water cycle including sewage management, water supply, stormwater management and water treatment, considering environmental, economic and social benefits.
For Sunbury, this includes a long term commitment to a process of collaboration between stakeholders, customers and the community. It recognises there may be better alternative solutions to water cycle management.

Integrated water management opportunity: A servicing need that has the potential to leverage broader benefits when undertaken collaboratively, using an integrated water management approach.

Integrated water management plan: A documented analysis of an integrated water management opportunity using a collaborative integrated water management approach.

Liveability: Liveability reflects the wellbeing of a community, and the many characteristics that make a place where people want to live, now and in the future. A liveable city or region meets the basic social, environmental and economic needs of its people. It also addresses community values and preferences for amenity, wellbeing and a sense of place.

Local governments: Local government organisations (councils) provide a wide variety of services to their municipalities and enforce various federal, state and local laws for their communities. These include a range of urban water management services.

Millennium Drought: By Australian definition, a drought occurs when rainfall over a three-month period is the lowest recorded for that region in the past. The Millennium Drought ran from 1995 until late 2009, and is the worst drought recorded since the settlement of Australia.

Multiple benefits: The term 'multiple benefits' is used to describe a project that offers benefits beyond the solution to the initial problem. These may be financial savings, long term resilience or adaptability, liveability, amenity and/or environmental benefits.

Megalitre (ML): One million (1,000,000) litres

Natural water cycle: As water moves between the land, ocean, rivers and atmosphere it changes from solid to liquid to gas. Essential for life on Earth, this is our planet's way of recycling water.

Nutrients: Promotes wanted and unwanted plant and algae growth.

Potable water: water that is safe to drink. (See also 'drinking water')

Precinct structure plan (PSP): Detailed master plan for future growth corridor developments, informed by growth corridor plans. They identify alignments of transport routes, town centres, open space networks, densities of residential areas, and areas for industry and employment.

Preferred option: Selected following technical feasibility, stakeholder and community engagement processes and which on balance represents the best overall outcome.

Recycled water: water produced through the wastewater treatment process and can be reused

for other purposes. (See also 'treated wastewater'.)

Recycled water discharge: The controlled release of treated recycled water to waterways or land, in accordance with limits set by the EPA.

Recycled water plant: A wastewater treatment plant producing Class A, B or C recycled water available for reuse or discharge in accordance with EPA guidelines.

Regulated rivers/flows/systems: Systems where the flow of the river is regulated through the operation of large dams or weirs.

Riparian: A **riparian** zone or area is the place between land and a river or stream. Plant habitats and communities along the river margins and banks are called **riparian** vegetation.

Sediments: Generated from the erosion of waterway beds and banks, together with runoff from roads, urban, agricultural and forested lands.

Stormwater: Runoff from urban areas. The increase in runoff and decrease in groundwater recharge results from the introduction of hard surfaces such as roofs and roads within urban development. Stormwater runs off roofs, roads and other surfaces into gutters, drains, creeks and rivers, and eventually into the sea. This can carry contaminants such as sediments, litter, oils, detergents, heavy metals and other toxic substances.

Stormwater harvesting: Collecting, treating, storing and using stormwater runoff from urban areas. It differs from rainwater-roof water harvesting as the runoff is collected from drains, basins or wetlands rather than roofs.

Sunbury IWM plan: An output from the collaborative planning process that includes a program of initiatives that have been assessed against a criteria that includes a representation of stakeholder and community values. The plan will continue to evolve and adapt throughout the engagement phase of the project and beyond into implementation.

Sunbury IWM project: The collaborative planning process which includes a commitment to engage with stakeholders, customers and the community. It recognises there may be better alternative solutions to business as usual or traditional/conventional, approaches to water cycle management for the Sunbury region.

Technically feasible options: Those that are considered possible based on current technology and knowledge and regardless of cost.

Urban water cycle: The cycle of water through urban environments. This differs to the natural urban water cycle because water is transferred through built infrastructure and the high runoff rates generated by hard surfaces.

Urban water strategies: All urban water corporations in Victoria are required to develop strategies that detail how water supplies and water demands will be balanced over the long term. These are the next iteration of Water Supply Demand Strategies prepared in 2002 and 2007.

Wastewater: There are two types of wastewater - greywater and blackwater. Greywater is household water from baths, showers, hand basins and washing machines that does not include toilet discharge. Blackwater is from toilets. Wastewater from your kitchen sink is also treated as blackwater in onsite wastewater systems, because it can be highly contaminated with food particles, cooking oil and grease. Although greywater has a lower level of contamination risk, it can cause health issues if it is not treated to an adequate level if you want to reuse it for toilet flushing, clothes

washing or watering the garden.

Water affordability: A central element to water access. When water costs make water unaffordable, it can pose a health and safety issue as well as administrative and political issues. Water affordability is typically measured by the annual cost of water bills as a percentage of median household income.

Water corporations: Victorian Government organisations charged with supplying water to urban and rural water users. They administer the diversion of water from waterways and the extraction of groundwater. Formerly known as water authorities.

Water retailer/utility: Water corporations in Victoria are established under the Water Act 1989 and provide a range of water services to customers within their service areas. Within the metropolitan region –there are four water retailers South East Water, Yarra Valley Water, City West Water and Western Water. Melbourne Water provides bulk water and bulk sewerage services in the Melbourne metropolitan area in addition to waterway management.

Water sector: Organisations involved in water management, including water corporations, local government and catchment management authorities.

Water systems: All sources of water supply including centralised and decentralised sources and structural or non-structural options, including planning, regulatory or pricing measures.

Water treatment /infiltration plant: Transforms water from catchment sources into drinking quality water for supply.

Waterways: Rivers and streams, their associated estuaries and floodplains (including floodplain wetlands) and non-riverine wetlands. In Sunbury, these include Emu and Jacksons Creeks and the Maribyrnong River downstream.

Waterway condition/waterway health: Waterway condition (or waterway health) is an umbrella term for the overall state of key features and processes that underpin functioning waterway ecosystems (such as species and communities, habitat, connectivity, water quality, riparian vegetation, physical form, and ecosystem processes such as nutrient cycling and carbon storage). (See also 'healthy waterways'.)

Wellbeing: Includes health and wellness, better living conditions, improved quality of life and community connectedness.

Wetlands: Areas, whether natural, modified or constructed, subject to permanent or temporary inundation, that hold static or very slow moving water and develop, or have the potential to develop, biota adapted to inundation and the aquatic environment. Wetlands may be fresh or saline.