

Securing a water resilient future for GPOP

Greater Parramatta and Olympic Peninsula Master Plan



Sydney
WATER





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Acknowledgement of Country

Sydney Water respectfully acknowledges the Traditional Custodians of the Greater Parramatta and Olympic Peninsula, the Dharug Nation.

Their lore, traditions and customs nurtured and continue to nurture the waters, both saltwater and sweetwater, in our operating area, creating wellbeing for all.

We pay our deepest respect to Elders, past and present. We acknowledge their deep connections to the land and waters. We are committed to reconciliation and partnering with our Traditional Custodians, to ensure ongoing collaboration on Caring for Country now and into the future, learning from traditional and contemporary approaches, while maintaining and respecting cultural and spiritual connections.



Foreword

I am pleased to present Sydney Water's Greater Parramatta and Olympic Peninsula (GPOP) Master Plan. The Master Plan outlines Sydney Water's aspirations to ensure our world-class water services can be enjoyed by GPOP residents, businesses and visitors for generations to come.

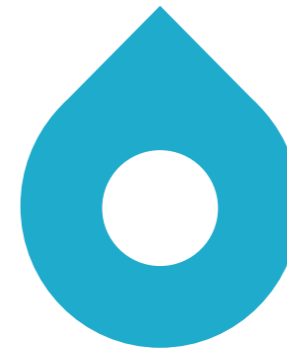
At the centre of the Central River City is the burgeoning Greater Parramatta and Olympic Peninsula (GPOP), home to Australia's largest health and education centre at Westmead; and the advanced-technology industries situated in Camellia, Rydalmere, Silverwater and Auburn.

Over the next 20 years, Central River City's population is forecast to increase by 400,000 people, with more than half of the population expected to reside in the GPOP area. To service this growth, we need to re-evaluate the traditional approach to water services and transition towards a holistic water management approach.

This Master Plan provides a framework for understanding the challenges and opportunities of an integrated water management approach in the GPOP area. It considers alternative water servicing pathways that support growth and deliver economic value to the region, with a focus on a centrally located resource recovery facility that can provide recycled water and, in the future, purified recycled water. These alternative water sources are drought-resilient and will help to maintain healthy waterways, which is critical to making Greater Parramatta a lifestyle destination.

We look forward to working closely with our partners, stakeholders and the community to deliver a resilient water supply to GPOP that will support liveable, productive and sustainable communities now, and well into the future.

Roch Cheroux
Managing Director





About the GPOP Master Plan

The GPOP Master Plan sets the long-term direction for water services in the area. It does this by considering an adaptable and holistic water cycle management approach that will support vibrant communities, achieve sustainability outcomes, and deliver economic value to the region. The Master Plan will guide Sydney Water's next steps in planning and delivery for GPOP.

The importance of GPOP

GPOP is central to the vision set by the Greater Cities Commission (GCC) to create a liveable, productive and sustainable Central River City. Sydney Water supports the GCC's aspirations for GPOP to become "Greater Sydney's true centre – the connected unifying heart."¹

The 6000-hectare GPOP corridor is expected to drive 60% of the population growth in the Central River City, and will see significant economic investment. Greater Parramatta will serve as a central hub that will bring together stakeholders across business, health, education, arts and heritage. Flowing through the area is the iconic Parramatta River, significant to First Nations history and culture, and key to making the Central River City a social destination.

Strategic Context

In 2019–20, Sydney Water participated in the NSW Government's Place-based Infrastructure Compact (PIC) for GPOP, a strategic planning model that aims to align infrastructure delivery with growth across 26 precincts in the GPOP corridor.

The GPOP PIC recommends the adoption of an integrated approach to urban water management that will deliver a more sustainable city outcome. This aligns with the direction set out in the Greater Sydney Water Strategy and the Greater Sydney Region Plan to ensure a sustainable and integrated delivery of water services for the next 20 to 40 years.

These strategies are incorporated in Sydney Water's Long Term Capital and Operational Plan (LTCOP) to address growth and supply resilience, and enhance the environment.

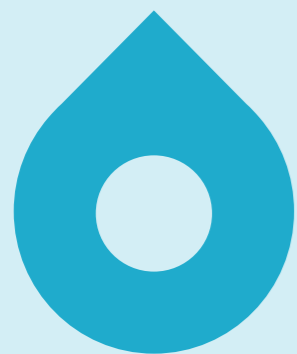
The strategic pathways in this Master Plan form part of Sydney Water's long term plans for delivering safe water to our customers while supporting a thriving, liveable and sustainable Greater Sydney.

¹Greater Sydney Commission – Greater Sydney Region Plan – *A Metropolis of Three Cities* (March 2018)

Opportunities and challenges in GPOP

Rethinking the ways in which water is valued, used and managed, and how water services are provided, will be vital to delivering the GCC's vision for the Central River City.

Along with servicing growth, the Master Plan takes an integrated approach to respond to multiple opportunities, challenges and complexities in the GPOP area, including: climate change, infrastructure development and asset capacity, growth and urban form and waterway health.



Climate change



Climate change is increasing the risk of prolonged periods of drought, which is one of the greatest threats to water supply in GPOP. The potential need for water restrictions may challenge the vision for a green and cool Central River City. Currently,

water supply is almost entirely dependent on rainfall within Warragamba Dam and the Upper Nepean River, posing significant risks to a reliable and resilient water supply.

Climate change may also lead to an increase in heavy rainfall and flooding events, adversely impacting liveability aspirations as well as the swimmability of Parramatta River.

Infrastructure development and asset capacity



The development of the GPOP area is being supported by a \$10 billion¹ investment in infrastructure by the NSW Government. Urban development will place increasing pressure on critical assets such as the Northern Suburbs Ocean Outfall

Sewer (NSOOS), which transfers wastewater to the North Head Water Resource Recovery Facility (WRRF), as well as the local pumping station. The system will require amplification over the next 10 years to cater for the projected population growth.

A long-term servicing solution that is both commercially viable and acceptable to the community will need to be in place by 2032, when the NSOOS is expected to reach its transfer capacity. Customer expectations lean more towards supporting recycling and building city resilience in the long term.

Growth and urban form



Population in the region is expected to increase by 400,000² people by 2036, with more than half of the population expected to reside in the GPOP area. Much of this growth is occurring in dense urban areas where there are lower levels of open space and tree canopy.

Moving to a whole water cycle approach could include:

- Harnessing wastewater resources to irrigate green spaces
- Achieving greater water conservation through smart water management systems
- Collaborating with planning authorities and developers to ensure stormwater planning is driven by the vision for a swimmable river, as set out in the Parramatta River Masterplan.



Waterway health



Urban growth will place more pressure on local waterways, such as the Parramatta and Duck Rivers. An important priority of the Central River City, identified in the Parramatta River Masterplan, is to make the

Parramatta River swimmable. Placing the river at the centre of planning for wastewater and stormwater is essential to protect the vision for swimming now and into the future.

Urban development presents the following opportunities and challenges for Sydney Water and local councils:

- Reusing of harvested stormwater for cooling and greening
- Improving how wastewater and stormwater impacts are managed to protect water quality
- Naturalising stormwater channels.

¹Greater Sydney Commission – Greater Sydney Region Plan – A Metropolis of Three Cities (March 2018)

²Greater Sydney Commission – GPOP Vision – Our true centre: the connected, unifying heart (October 2016)

The Master Plan approach

Issues and directions

- Investigate the servicing context for the region
- Propose strategic direction for an integrated approach across government agencies
- Establish the servicing narrative to deliver outcomes.

Concept development

- Develop and analyse several alternate servicing concepts and a base case
- Develop a water and resource balance for each concept
- Evaluate high-level investment costs and economic benefits.

Pathway development

- Combine concepts into four servicing pathways that reflect different levels of water integration
- Develop high-level investment costs for each pathway
- Evaluate economic benefits for each pathway.

Adaptive plan

- Ongoing monitoring of key pathway influences such as growth, customer and environmental approvals
- Reassess the application of the servicing pathways in response to the key pathway influences
- Roll out analysis into next steps of planning to realise the outcomes.

Setting the foundations

The GOPP PIC Strategic Business Case (SBC) identifies the need for an integrated approach to urban water management to deliver sustainable city outcomes. Issues and directions are set through the PIC process.

2018–2019

Develop servicing concepts

Identify the importance of a treatment and resource recovery facility within Camellia precinct, as part of Sydney Water's adaptive pathway for GOPP, to service growth in a sustainable manner.

2019–2020

Pathway development

Develop pathways further, in line with customer appetite for recycled water and services that are innovative and sustainable.

Pathway analysis

Review and test the servicing pathways with additional economic and financial analysis.

Identify events which may influence the pathways and the short-term response that would provide the greatest flexibility.

Develop the Strategic Business Case

Develop the SBC to provide a comprehensive analysis of long term development options for GOPP.

2020–2021

2021–2022

Rethinking the linear approach

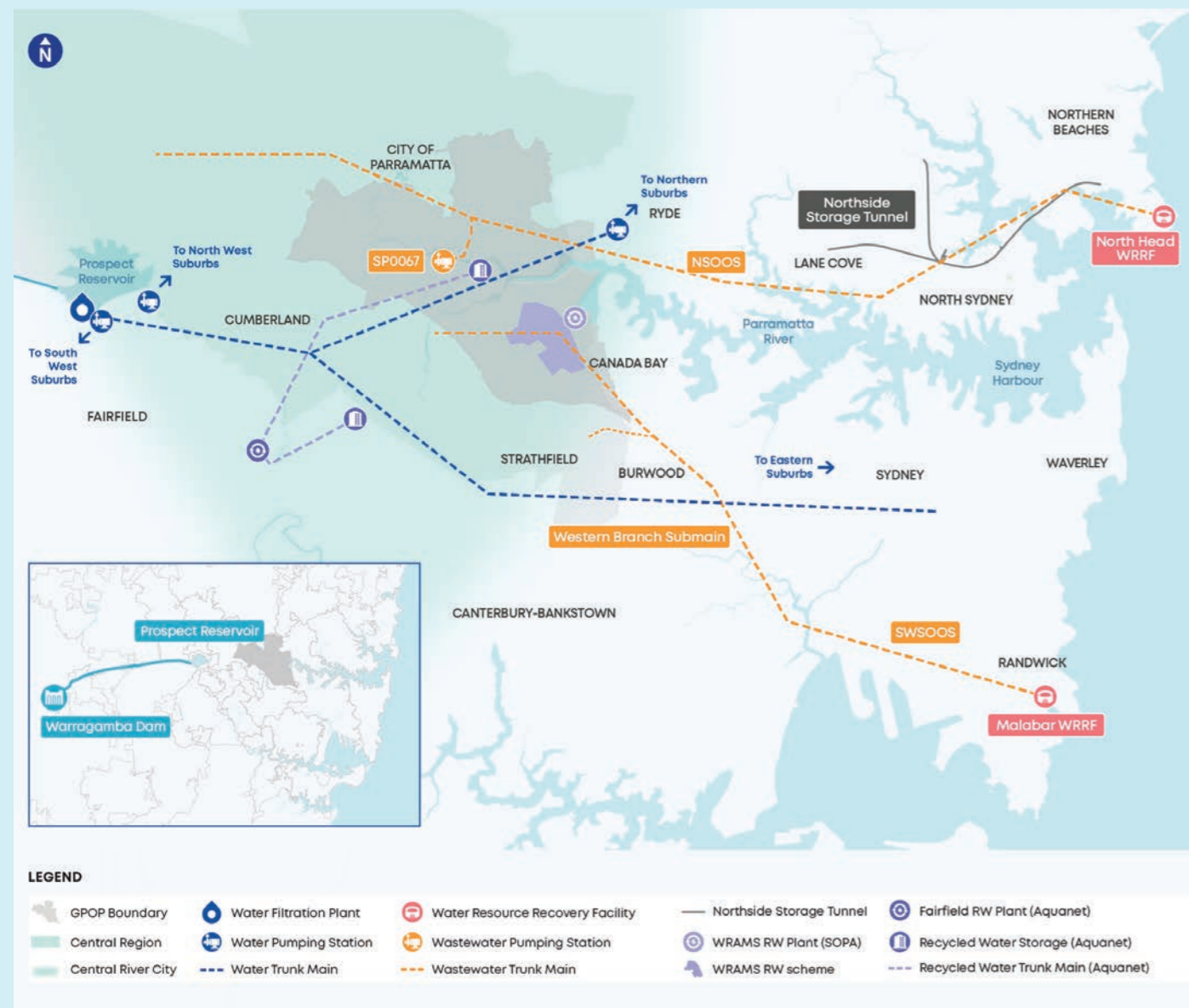
GPOP is currently serviced by rainfall dependent water supply from Warragamba Dam, and wastewater is transferred by the Northern Suburbs Ocean Outfall Sewer (NSOOS) to the North Head Wastewater Resource Recovery Facility (WRRF) for treatment and release to the ocean. The NSOOS and North Head WRRF do not have sufficient capacity to service the projected growth for the area.

Although the North Head WRRF produces recycled water and renewable energy for on-site use, as well as biosolids for agricultural uses, there is limited water recycling within the GPOP area. The existing recycled water schemes in GPOP are the Rosehill Recycled Water Scheme, which services Rosehill-Camellia and is operated by Water Utilities Australia, and the Water Reclamation and Management Scheme, which services Sydney Olympic Park and is operated by Sydney Olympic Park Authority.

Stormwater in GPOP is largely managed by local councils, with Sydney Water providing trunk drainage services in some areas.



Current GPOP servicing

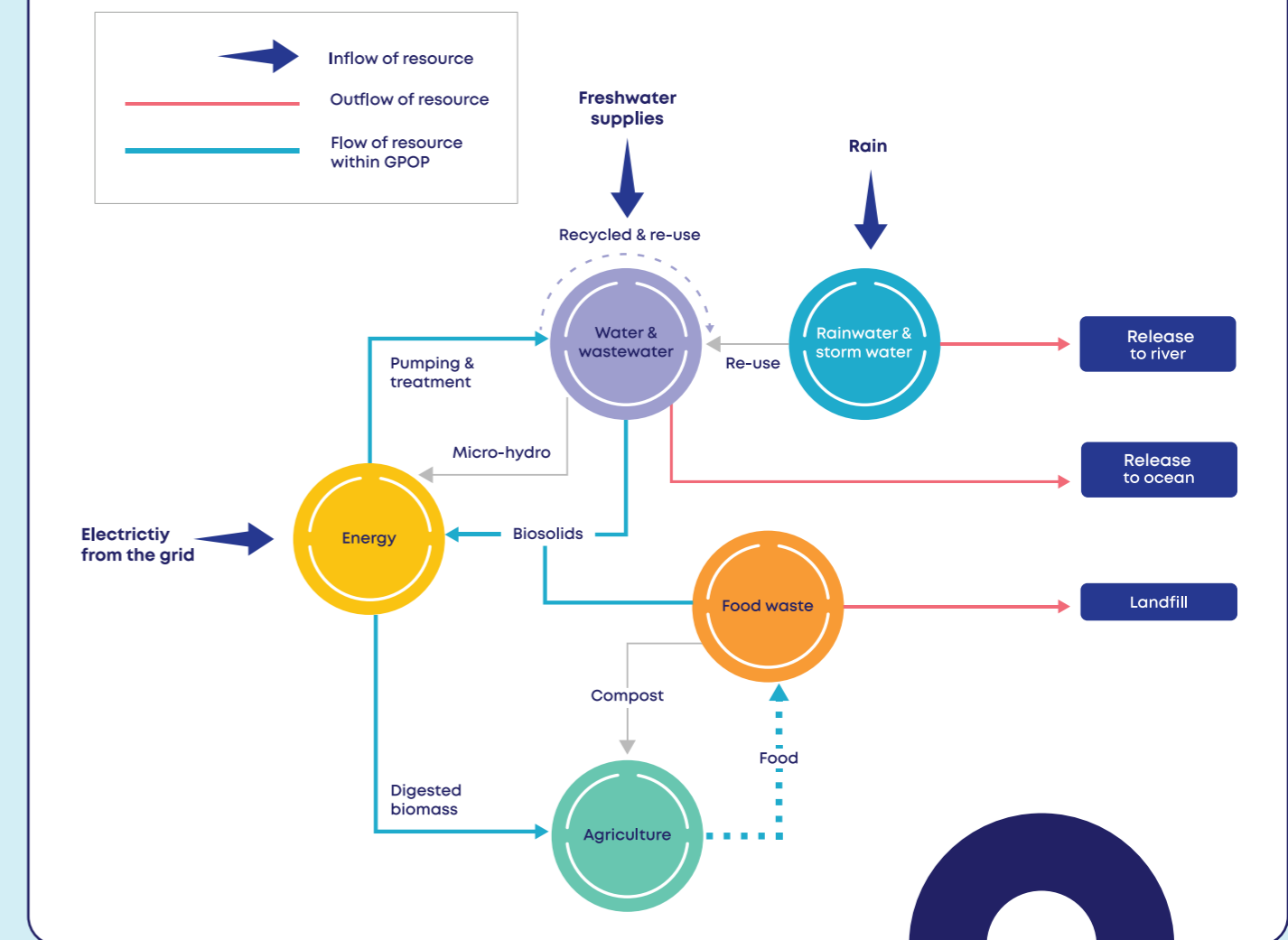


Towards a circular economy

Sydney Water sees an opportunity to embrace circular economy practices in GPOP that are aligned with government policy and customers' needs for sustainable, affordable and reliable services. By taking an integrated approach to the whole water cycle, we envisage a future where:

- Treated wastewater is reused as a climate resilient water supply for irrigating existing and future open spaces to support greening and cooling outcomes. This will also help to reduce wet weather overflows to Parramatta River, supporting the goals of the Parramatta River Catchment Group's Masterplan to improve swimmability in the river.
- The volume of stormwater runoff and pollutants entering the Parramatta River is reduced through increased stormwater reuse and retention of more water in the landscape for greening and cooling purposes.
- The amount of organic waste sent to landfill can be reduced through the co-digestion of food waste and biosolids to produce biogas for electricity.
- The net electricity imported from the grid can be reduced through the electricity generated from the co-digestion of food waste and biosolids.

Circular water economy in GPOP



Servicing pathways considered in the Master Plan

Pathway 1 Traditional City

Conventional servicing principles aligned with existing regulation, policy and governance.

Drinking water is supplied from Warragamba Dam and wastewater is collected, treated and released to the ocean. This represents the baseline servicing approach for GPOP.

Infrastructure

Significant wastewater infrastructure upgrades are required to support the projected growth, including duplication of the Northern Suburbs Ocean Outfall Sewer (NSOOS) tunnel.

Greening and cooling

Irrigation of open spaces is achieved through drinking water. As water supply is climate dependent, it will be impacted by drought and water restrictions, limiting greening and cooling benefits.

Waterway health

Sydney Water continues to collaborate with other partners to deliver on the Parramatta River Masterplan.

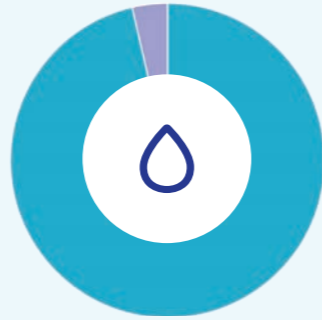
Circular economy

Sydney Water continues to produce recycled water and renewable energy for on-site use at North Head WRRF.

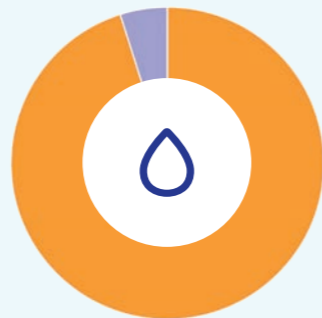
Water resilience

Limited recycled water in GPOP from the Rosehill Recycled Water Scheme and the Water Reclamation and Management Scheme.

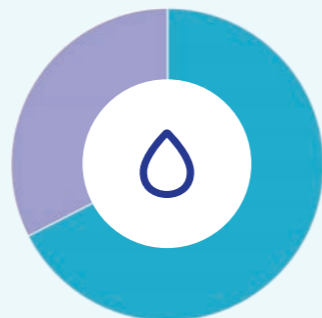
Traditional City
Water



Traditional City
Wastewater



Traditional City
Greening demand



Legend

Water

- Drinking water
- Recycled water
- Purified recycled water

Wastewater

- Riverflow
- Purified recycled water
- Recycled water
- Released to ocean

Greening demand

- Drinking water
- Recycled water
- Purified recycled water

Pathway 2 Water Reuse City

Recycled water is supplied for non-drinking purposes, reducing the demands on existing water and wastewater systems.

A new water resource recovery facility (WRRF) produces recycled water for GPOP, and the remaining wastewater is collected, treated and released to the ocean. Recycling defers the need to upgrade and duplicate Northern Suburbs Ocean Outfall Sewer (NSOOS) for a few years.

Infrastructure

While the NSOOS duplication would be deferred, it will need to be duplicated at some stage and there will be minimal benefits for additional water recycling.

Greening and cooling

Irrigation of open spaces is achieved through recycled water, within the recycled water scheme boundary. The remainder of GPOP uses drinking water for irrigation when water restrictions are not in place. This is a better outcome compared to the Traditional City, as more customers will experience greater greening and cooling benefits from having climate resilient water supply for irrigation.

Waterway health

Sydney Water continues to collaborate with other partners to deliver on the Parramatta River Masterplan. The health of the Parramatta River is improved because wastewater is extracted from the system to produce recycled water, which helps to reduce wet weather overflows.

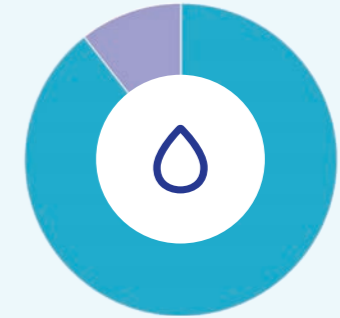
Circular economy

Sydney Water continues to produce recycled water and renewable energy for on-site use at North Head WRRF. In addition to recycled water, there is potential for renewable energy generation at the new WRRF.

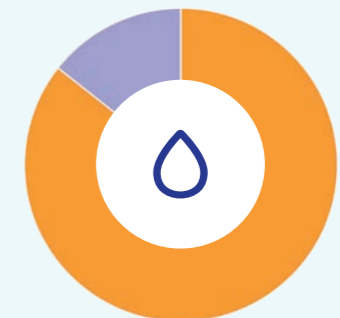
Water resilience

Increased climate resilient water supply in GPOP from the recycled water scheme supplied by the new WRRF.

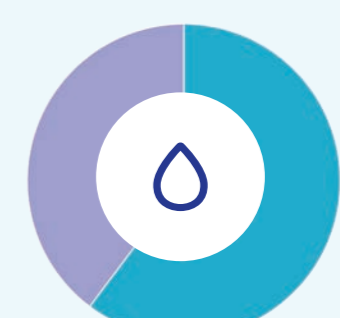
Water Reuse City
Water



Water Reuse City
Wastewater



Water Reuse City
Greening demand



Pathway 3 Waterways City

Wastewater is further treated to a higher standard and released to local waterways, reducing wastewater overflows and ensuring waterway health is maintained.

Drinking water is supplied from Warragamba Dam and a new WRRF produces recycled water for GPOP. At a later stage, more wastewater can be collected from GPOP, treated to an advanced standard and released to the nearby waterway (Parramatta River) in line with regulated environmental standards (river release)*.

Infrastructure

A new WRRF and recycled water network distributes recycled water to customers in GPOP. The WRRF will be upgraded to produce high quality treated water for river release*, with advanced treatment and disinfection to maintain swimmability objectives for the Parramatta River. Once river release* is in place, there is minimal additional benefit in expanding the recycled water scheme.

Greening and cooling

Irrigation of open spaces is achieved through recycled water, within the recycled water scheme boundary. The remainder of GPOP uses drinking water for irrigation when water restrictions are not in place. This is a better outcome compared to the Traditional City, as more customers will experience greater greening and cooling benefits from having climate resilient water supply for irrigation.

Waterway health

Sydney Water continues to collaborate with other partners to deliver on the Parramatta River Masterplan. Sydney Water investigates river release* in collaboration with key stakeholders, including environmental regulators and members of the Parramatta River Catchment Group, to ensure waterway health is maintained.

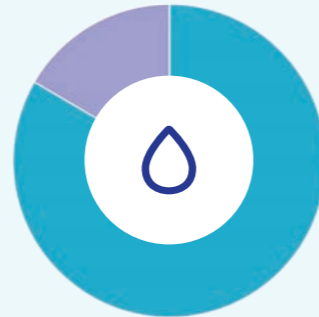
Circular economy

Sydney Water continues to produce recycled water and renewable energy for on-site use at North Head WRRF. The new WRRF is a resource recovery centre, producing recycled water, renewable energy and biosolids.

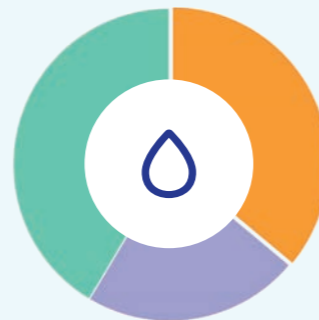
Water resilience

Increased climate resilient water supply in GPOP from the recycled water scheme supplied by the new WRRF.

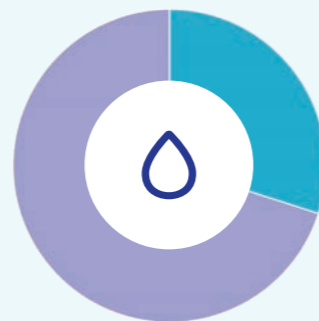
Waterways City
Water



Waterways City
Wastewater



Waterways City
Greening demand



*subject to further investigation and approvals

Legend

Water

- Drinking water (light blue)
- Recycled water (purple)
- Purified recycled water (dark blue)

Wastewater

- Riverflow (green)
- Purified recycled water (dark blue)
- Recycled water (purple)
- Released to ocean (orange)

Greening demand

- Drinking water (light blue)
- Recycled water (purple)
- Purified recycled water (dark blue)

Pathway 4 Resilient City

Transition to recycled water, river release and, ultimately, purified recycled water supply.

Drinking water is supplied from Warragamba Dam and a new WRRF produces recycled water for GPOP. At a later stage, more wastewater can be collected from GPOP and treated to drinking water standard (Purified Recycled Water or PRW) to be released to the environment to increase water supply resilience for Greater Sydney*. River release can be considered as an interim approach before regulatory approvals for PRW are obtained.

Infrastructure

A new WRRF and recycled water network distributes recycled water to customers in GPOP. The WRRF will be upgraded to produce PRW*. Like other pathways, there is minimal additional benefit in expanding the recycled water scheme once PRW is delivered.

Greening and cooling

Irrigation of open spaces is achieved through a mix of recycled water, PRW and drinking water. This pathway provides the best greening and cooling outcomes from diverse climate resilient water sources.

Waterway health

Sydney Water continues to collaborate with other partners to deliver on the Parramatta River Masterplan. Extracting wastewater flows for recycled water scheme and PRW helps in reducing wet weather overflows to Parramatta River.

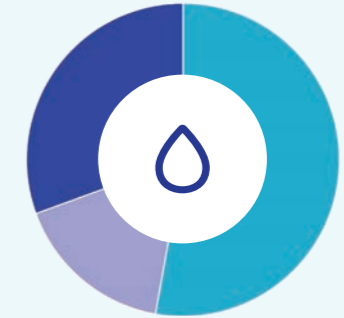
Circular economy

Sydney Water continues to produce recycled water and renewable energy for on-site use at North Head WRRF. The new WRRF is a resource recovery centre, producing recycled water, renewable energy and biosolids.

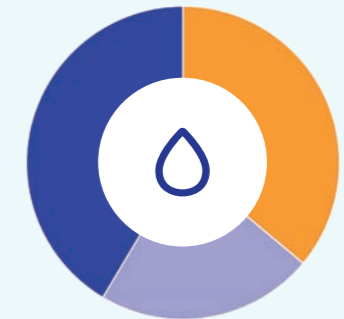
Water resilience

This pathway provides the best water resilience outcome for the Greater Sydney community through PRW, in addition to recycled water supply in GPOP.

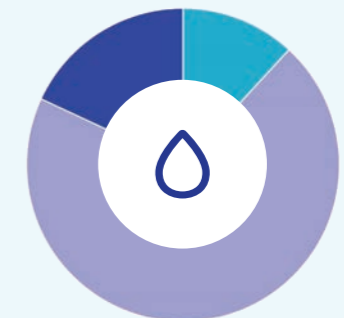
Resilient City
Water



Resilient City
Wastewater



Resilient City
Greening demand



*subject to approvals and community acceptance

Improved water services bring value to GPOP



The three servicing pathways: Water Reuse City, Waterways City and Resilient City were evaluated against the Traditional City pathway through a Cost Benefit Analysis (CBA) to determine the value that each pathway would bring to GPOP.

The impacts assessed in the CBA include:

- **Direct infrastructure cost impacts** of additional water, wastewater and/or recycled water infrastructure required to service GPOP.
- **Environmental impacts** in relation to the health of the ocean and Parramatta River, including swimmability-related impacts, and greenhouse gas emissions.
- **Avoidable cost impacts** resulting from avoided or deferred expenditure in the downstream wastewater system and upstream drinking water system.
- **Social and liveability impacts** in relation to health and amenity value from drought-proofing open spaces.

In addition to these items, non-quantifiable impacts were also considered, including avoided drought management infrastructure cost, waterway biodiversity, amenity value from enhanced river recreation opportunities, and urban cooling.

The costs and benefits of the pathways are strongly influenced by the constraints on the wastewater system and the approach to wastewater recycling. This informs the type and timing of infrastructure to be built in each pathway, as well as the volume of wastewater that can be recycled.

The cost benefit analysis highlights:

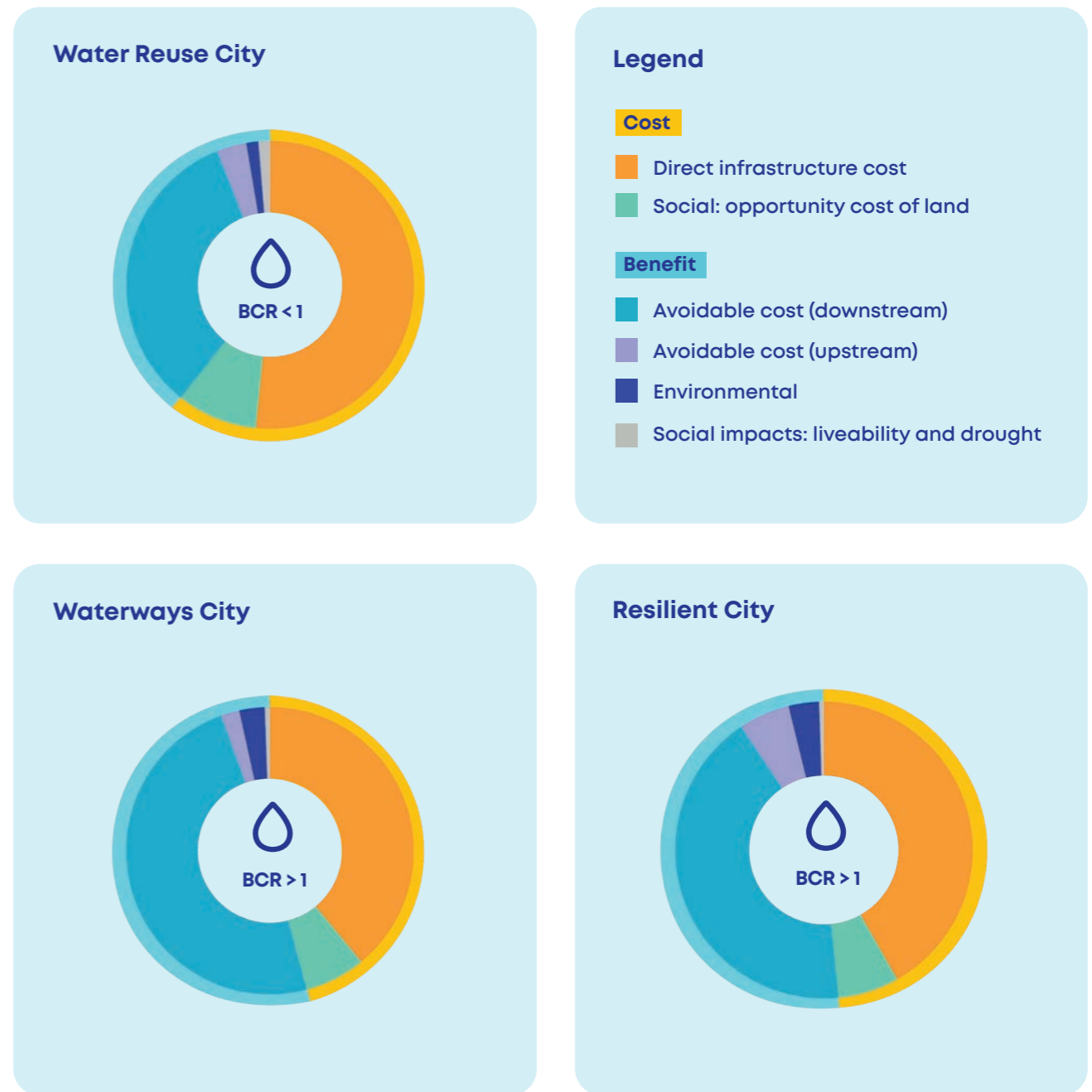
- Downstream wastewater avoidable costs are the dominant benefits, through recycling of wastewater that would otherwise be transported by NSOOS to North Head WRRF. Compared to the Traditional City pathway, the Waterways City and Resilient City pathways significantly reduce the volumes of wastewater released to the ocean, deferring the required North Head upgrades until after 2032.
- Since the benefits for downstream wastewater avoidable costs are almost identical across the pathways, direct GPOP infrastructure servicing cost and benefit become the key factor for determining overall value outcomes for the community. The Water Reuse City pathway incurs a higher cost, relative to its benefit, in providing a recycled water network for homes and businesses. The cost of the recycled water network would need to be funded through alternative sources, such as infrastructure contributions by future developers.

It is important to note that the analysis assumes all pathways are viable and does not account for implementation risks. Further investigations, particularly on river release and PRW, would need to be carried out to confirm implementation costs, timeframes and viability.

Note: A benefit cost ratio (BCR) greater than 1 is considered to maximise society's wellbeing, whereas a BCR less than 1 does not maximise society's wellbeing.



Comparative Cost Benefit Analysis (CBA) of servicing pathways



How we are supporting GPOP

The Master Plan aspirations for water in GPOP go beyond delivering clean, safe, reliable and efficient water and wastewater services that meet our customers' needs. Our analysis highlights that an integrated water cycle approach, with a focus on a water resource recovery facility, is critical to achieving sustainable outcomes that will support liveable communities.

Recycled water and purified recycled water support the Greater Sydney Water Strategy's direction to sustainably manage resources and provide a drought-resilient water supply. The water resource recovery facility can be staged to produce treated water at qualities required for both non-drinking and drinking purposes. The scale of benefits will depend on the volume of wastewater that is recovered and recycled.

Additionally, recycled water can alleviate constraints in the wastewater system, including deferring significant upgrades to the NSOOS, with its associated economic benefits. This will also reduce wastewater overflows and improve waterway health, which will help to achieve a swimmable Parramatta River, as outlined in the Parramatta River Masterplan. Sydney Water is the lead coordinating agency for the Parramatta River Masterplan and will continue to work with the Parramatta River Catchment Group to achieve the vision for a swimmable river.

Stormwater harvesting and passive irrigation can be implemented to help deliver greener and cooler places, reduce stormwater runoff and pollution, and provide waterway benefits. Sydney Water is collaborating with the City of Parramatta to identify opportunities to improve stormwater management, including flood mitigation.

Moving from the Traditional City to the Resilient City for GPOP means:

- More rainfall-independent water sources for drinking purposes.
- More recycled water for non-drinking purposes, including greening and cooling, reducing reliance on climate-dependent water sources.
- The flexibility to transition to river release and/or purified recycled water in the future.
- The opportunity for local collaboration on co-generation, including from food waste.
- The opportunity for further collaboration with councils and other partners to improve waterway health outcomes through better management of stormwater.



A flexible, adaptive plan

Adaptive planning enables flexibility to respond to changing conditions and new information such as future growth, climate patterns, technological advances, catchment system responses to climate changes and socio-political developments. This also helps accelerate decisions to respond to certain triggers.

Sydney Water has developed an adaptive plan for GOP that transitions water services from the current Traditional City pathway to an integrated water approach that supports growth and place-based aspirations.



The key component of the adaptive plan is a treatment and resource recovery facility located within GOP that produces:

- Recycled water for non-drinking purposes in the **short-term**, to service growth and irrigate open spaces to support greening and cooling initiatives.
- Advanced treated water in the **medium-term** for river release with potential waterway health benefits.
- Purified recycled water in the **long-term** to reduce reliance on climate-dependent water sources.*
- Electricity through the treatment of wastewater by-products.

*subject to approvals and community acceptance

This staged approach, starting with the delivery of recycled water for non-drinking use, will provide flexibility to move to another pathway in the future by not ruling out any alternative pathways early on. A servicing pathway which considers recycled water for non-drinking use on its own, however, comes with a funding gap that would need to be recovered. Sydney Water is currently exploring this funding mechanism to enable the initial staging of recycled water and progress an adaptive pathway for GOP.

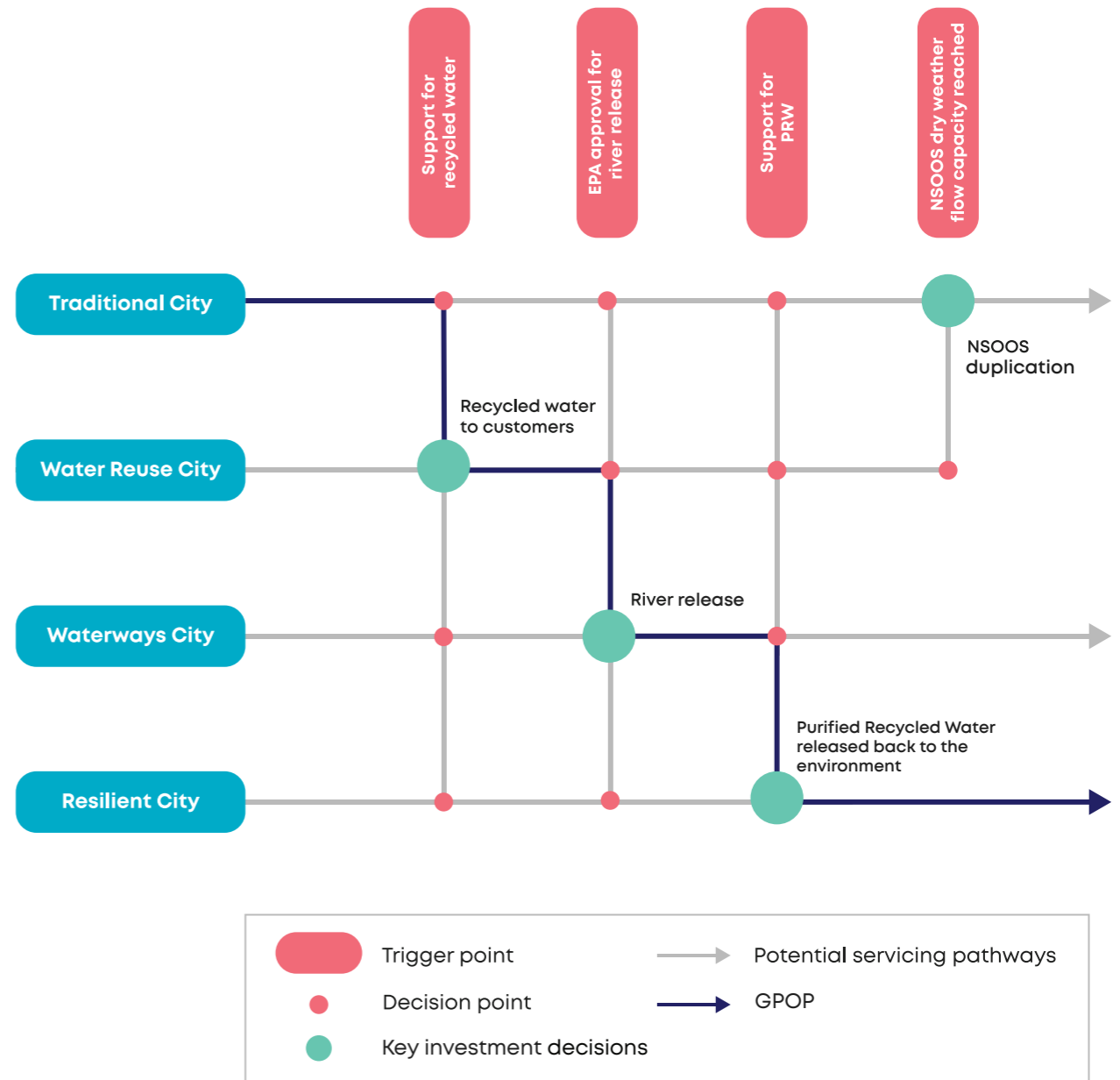
The adaptive servicing plan diagram on the right outlines the possible interconnectivity between the servicing pathways. The diagram also depicts the key decision points for each pathway. At key points in the future, decisions will be required to adopt and/or discontinue the pursuit of alternate servicing pathways. These decisions will be made by considering the latest information available at the time.

Continued stakeholder collaboration and monitoring of actual growth, climate, environmental responses to development, and community attitudes to water recycling will be necessary to inform decisions at key times over GOP's evolution. Planned infrastructure will be scalable to be responsive to changing needs and circumstances.

An adaptive plan with appropriate robust monitoring, comprehensive trigger identification, and planned response protocol can help realise opportunities as they arise.



Adaptive plan for GOP



Next steps



Productivity

Outcome

Water services that support economic growth in GPOP.

Action plan

- Plan for water services to be delivered in line with projected growth.
- Ensure water is available for cooling purposes to support public health.
- Collaborate with councils on stormwater services to improve flood resilience.



Liveability

Outcome

A cooler and greener Central River City.

Action plan

- Plan for recycled water services in collaboration with planning authorities and developers.
- Initiate detailed investigation and funding options for recycled water services.
- Collaborate with councils on stormwater harvesting and passive irrigation schemes to improve waterway health outcomes.



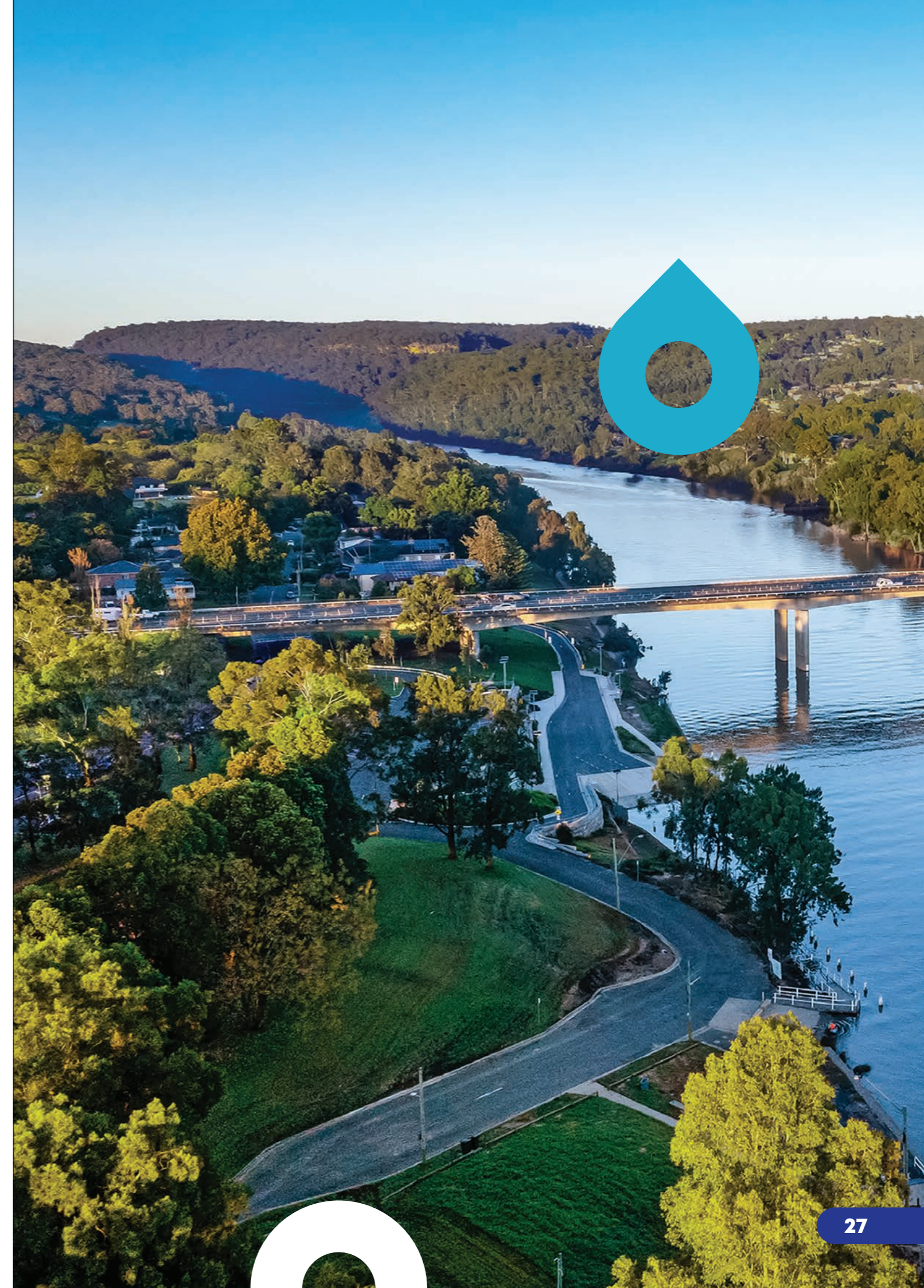
Sustainability

Outcome

Sustainable use of resources.

Action plan

- Plan for Camellia WRRF as a centre for recovery of water and energy with a staging approach to support the adaptive plan.
- Investigate the feasibility of river flows and initiate environmental impact assessment.
- Initiate investigation for the feasibility of implementing purified recycled water.
- Investigate the potential for collaboration on transfer of food waste for energy generation.





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