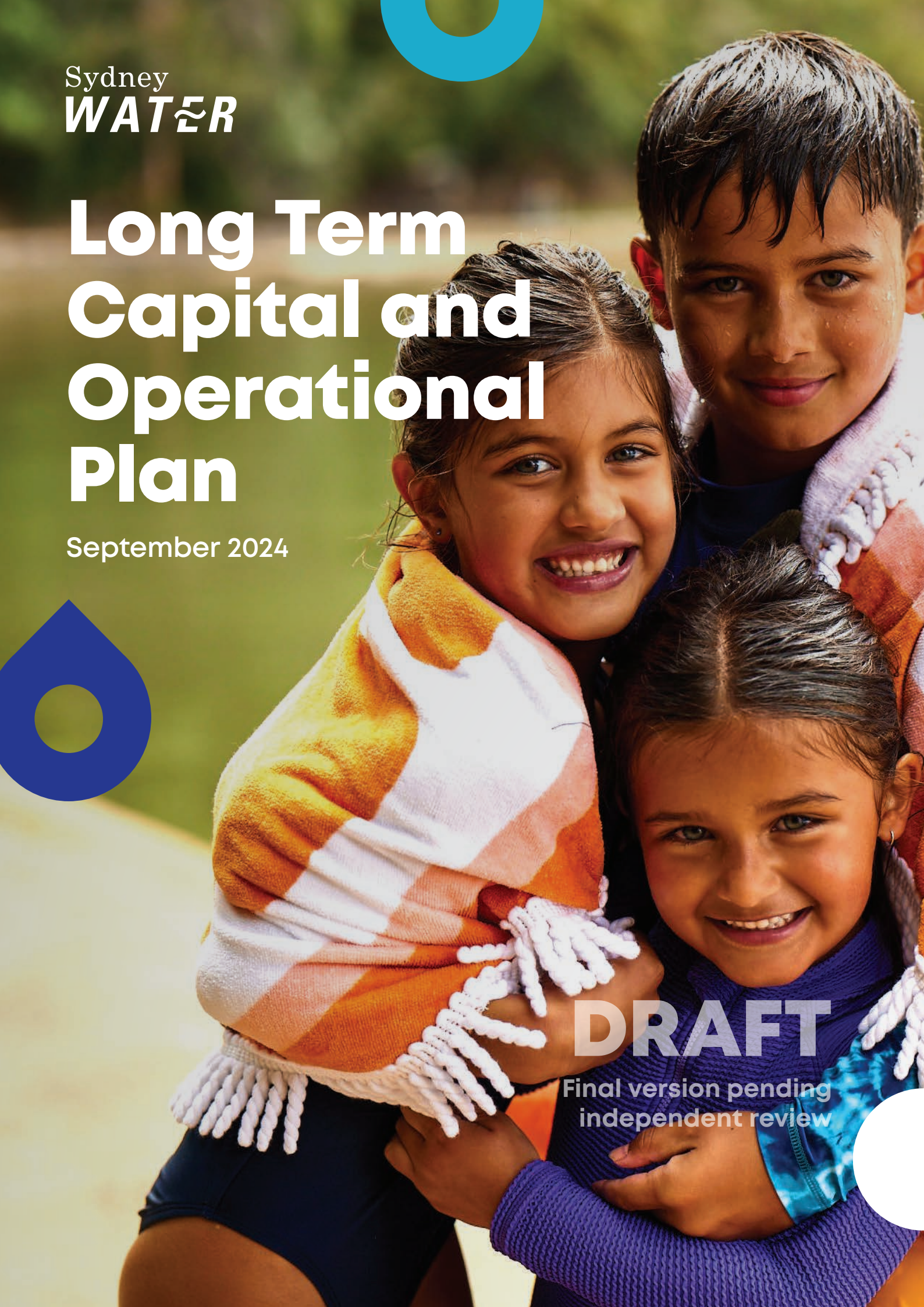
Sydney WATER

# Long Term Capital and Operational Plan

September 2024



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Final version pending independent review

# Acknowledgement of Country

Sydney Water respectfully acknowledges Aboriginal people as the traditional custodians of Sydney, Illawarra and the Blue Mountains where we work, live and learn.

Their lore, traditions and customs nurtured and continue to nurture the waters (bulingang or saltwater and muulii ngadyuung or sweetwater) in our operating area, creating well-being for all. We pay our deepest respect to Elders, past and present. We acknowledge their deep connections to land and waters. In the spirit of reconciliation, we remain committed to working in partnership with local Traditional Owners to ensure their ongoing contribution to the future of the water management landscape, learning from traditional and contemporary approaches, while maintaining and respecting their cultural and spiritual connections.

Our families, friends and future generations depend on us to protect their health and our environment. In doing so, we respect the traditional Caring for Country restorative approaches practiced over tens of thousands of years by Aboriginal people and play our part to improve the health of the landscape by recognising and nurturing the value of water in our environment and communities.

This artwork above was created by Dennis Golding for Sydney Water's Reconciliation Action Plan and depicts stories of both saltwater and freshwater people, land sustainability and culture. Dennis Golding is a descendant of the Kamilaroi/Gamilaraay people from north-west New South Wales.

Read more about our commitment to reconciliation at sydneywater.com.au.

# Contents

# Foreword

**Grant King**
Chair

**Roch Cheroux**
Managing Director

The Long Term Capital and Operational Plan is a major milestone in Sydney Water's 136-year history. A significant plan that captures our key infrastructure and operational decisions to 2050, it ensures services to our customers adapt to a changing world. Many of our existing systems have served us well in the past, but have now reached the end of their life, or their capacity to meet the needs of our growing cities.

The plan sets out our optimal investment pathway which balances the need to meet our obligations, customer and stakeholder expectations with the right cost and acceptable risk. It aligns with the Greater Sydney Water Strategy[1], and was developed in collaboration with WaterNSW to enable an integrated approach.

Investing now and in a new way ensures we serve our valued customers, and the communities in which they live, in the most meaningful way as we contribute to thriving, sustainable cities through the following objectives:

- Ensuring we have resilient and reliable services
- Integrated servicing of infrastructure to deliver long term value for customers
- Maximising community value through healthy waterways and parks
- Embedding circular economy principles across our planning, delivery and operations.

Sydney Water's investment plan extends nearly 30 years into the future, ensuring we retain and build on the service standards our customers have come to expect and value.

## Customers at the heart

Customers are at the heart of everything we do, and their expectations have evolved beyond traditional water and wastewater servicing. This plan is a response to their priorities, setting out our pathway to a resilient, reliable water supply flowing sustainably to the Greater Sydney of the future.

**Our Water, Our Voice**[2] (Sydney Water's customer engagement program) allows us to clearly identify our customers' priorities. Through this unique approach, our customers' voices have been clear and consistent - they support proactive measures to ensure the sustainability of Sydney's water supply. They have told us their top priorities for Sydney Water are maintaining safe and clean drinking water, ensuring bills remain affordable and maintaining clean, safe waterways and water recreation areas.

1 New South Wales Department of Planning and Environment (DPE) & WaterNSW, 2022, Greater Sydney Water Strategy
2 Sydney Water, 2023, Our Water, Our Voice



This plan responds to our customers recommendations on trade-offs that need to be considered to keep bills affordable and spread investment over the decades while delivering their priorities.

## Growing cities and climate volatility

Sydney Water will service nearly two million more people by 2050, according to Department of Planning, Housing and Infrastructure projections. As Greater Sydney continues to grow, our plan sets out a smooth transition to increased demand, serving more people across larger areas.

Much of this growth will be in Western Sydney where new cities are being built around the Western Sydney International Airport, while increased density in existing communities requires expanded network capacity. As our service areas grow, we will also digitise our operations to provide the enhanced water security our customers expect and deserve.

Economic activity is also growing across Greater Sydney, the Blue Mountains and the Illawarra region, contributing 25 per cent to Australia's economy. Water is key to this success, delivering essential services to households as well as supporting a growing number of industrial and commercial activities through smart, water-saving irrigation and innovative systems that cool warehouses and other industrial buildings more efficiently.

Unpredictable weather patterns require a new kind of planning. In response to prolonged drought and other extreme weather events, the Long Term Capital and Operational Plan seeks to safeguard our growing cities, as we build resilience into our water networks and minimise the impact of a changing climate.

Water is deeply entwined with First Nations culture and wellbeing, and Sydney Water embraces a Caring for Country approach to waterways health. We will continue to work together to provide safe, affordable and reliable water services for future generations and to align with First Nations practices to restore our connections with water, land and each other.

## Assets

For well over a century, Sydney Water has delivered safe and reliable water, wastewater, recycled water and some stormwater services to Sydney, the Illawarra and the Blue Mountains. This service has been delivered, in large part, due to the significant investments that took place around 1960. Apart from the Sydney Desalination Plant, no major investments have been completed since.

This plan sets out our investment response to our infrastructure network, much of which is at capacity or nearing end of life. Sustained investment is key to providing a reliable water supply to our customers, as well as Sydney Water's legislative compliance. This plan recognises the challenge in delivering new infrastructure and managing affordability issues in the post-covid recovery period.

The Long Term Capital and Operational Plan, the investment plan needed now and into the future, has been strongly tested and independently reviewed. It will support our growing cities and ensure a resilient water supply for Greater Sydney for 30 years or more.

We will continue to work with our customers and stakeholders to deliver the plan in a way which reflects our commitment to keeping our services affordable while delivering on our vision of *creating a better life with world-class water services.*

**Grant King**
Chair

**Roch Cheroux**
Managing Director

# Executive summary

## Our customers expect us to provide reliable and resilient services in the face of change

Water is an essential part of daily life. How we use water helps our city thrive and supports the productivity and prosperity of our economy. For 136 years, this has been Sydney Water's legacy – ensuring the people of Greater Sydney, the Blue Mountains and the Illawarra have a safe, reliable water supply.

Our city is changing, and how our water services are delivered needs to change to meet the needs and aspirations of our customers and communities. We face a unique combination of challenges from rapid population growth, climate change, changing customer expectations, new and emerging technologies, and geopolitical threats.

In 2020, the New South Wales (NSW) Government outlined the strategic approach to managing Greater Sydney's servicing systems to enable a thriving, sustainable and resilient city, recognising both challenges and opportunities. The *Greater Sydney Water Strategy (GSWS)*[1] sets a coordinated direction for our city, underpinned by priorities and requirements for service delivery.

The Long Term Capital and Operational Plan (LTCOP or the Plan) – this document – sets Sydney Water's long term servicing direction in alignment with the GSWS[1], and most importantly, outlines how we will meet the expectations of our customers and communities. It supports a vision of Sydney's servicing system that is much more resilient, integrated, and circular.

1 New South Wales Department of Planning and Environment (DPE) & WaterNSW, 2022, Greater Sydney Water Strategy

# Our services today and through time

First Nations people have been caring for Greater Sydney's land and waterways for thousands of years, with water deeply entwined in First Nations culture and wellbeing. Ensuring waterway health is integral to First Nations people maintaining a connection to Country. As we face a critical moment in planning Sydney's future water servicing systems, we acknowledge our own stewardship of a critical resource and the importance of responding to the changing and diverse needs of a growing city. Our strategy identifies where we need to collaborate and partner to improve waterway health and listen to the voices of First Nations and Aboriginal people.

Our servicing system has continued to evolve over the past 135 years. The core elements of Greater Sydney's water and wastewater systems were constructed in the late 1880s and have been built upon across several critical moments since. The largely centralised design has provided the most cost-effective and efficient method to service growing demand for water and wastewater services with the best technology available at the time. However, continuing to transfer water from dams in Western Sydney to coastal wastewater outfalls in the East will put increasing pressure on our systems, with this arrangement becoming less resilient to shocks and stresses over time.

Our investment in water conservation means that we have avoided the need to build new drinking water supplies since the end of the Millennium Drought. Figure 1 shows that the city uses around 12 per cent less drinking water than it did 20 years ago despite almost 1 million more people. On a per person basis, demand from drinking water sources is around 36 per cent less than it was in the early 2000s. Further, water conservation has also avoided investments in wastewater asset augmentation through reduced dry weather flows.

Customer bills have decreased over time (in real terms) and have been amongst the lowest in Australia for more than a decade.[3] Customers in Greater Sydney have benefitted from significant economies of scale, but this comes with an over reliance on Warragamba Dam and Prospect Water Filtration Plant (WFP), with both assets servicing over 80 per cent of Greater Sydney. Due to our reliance on these assets, Sydney currently has the lowest rainfall independent water sources of any major city in Australia, at up to only 15 per cent.

Recent modelling has highlighted that our drinking water supply, on average, is not adequate to meet Greater Sydney's current customer demand, let alone into the future or during prolonged drought conditions. Our large wastewater systems are aging, while growth and heavy rain make them difficult to operate and maintain. If capacity issues are left unresolved, we can expect to see detrimental impacts on our environment.

With most of our assets built before 1980, our servicing system is aging. Our services are heavily impacted by climate and weather, as evidenced by the two severe droughts experienced in the last 20 years, as well as frequent flooding and heavy rainfall events. These events, and feedback from our customers, has highlighted the need for more resilient water and wastewater systems.

Customers expect us not only to maintain the quality of our essential services, but to increase reuse and water conservation efforts and minimise the impact of service disruptions. At the same time, technology will continue to evolve, which brings great opportunities, but also risks that will need to be managed.

3 Australian Bureau of Meteorology (BoM), 2021, Urban National performance report 2020–21: urban water utilities



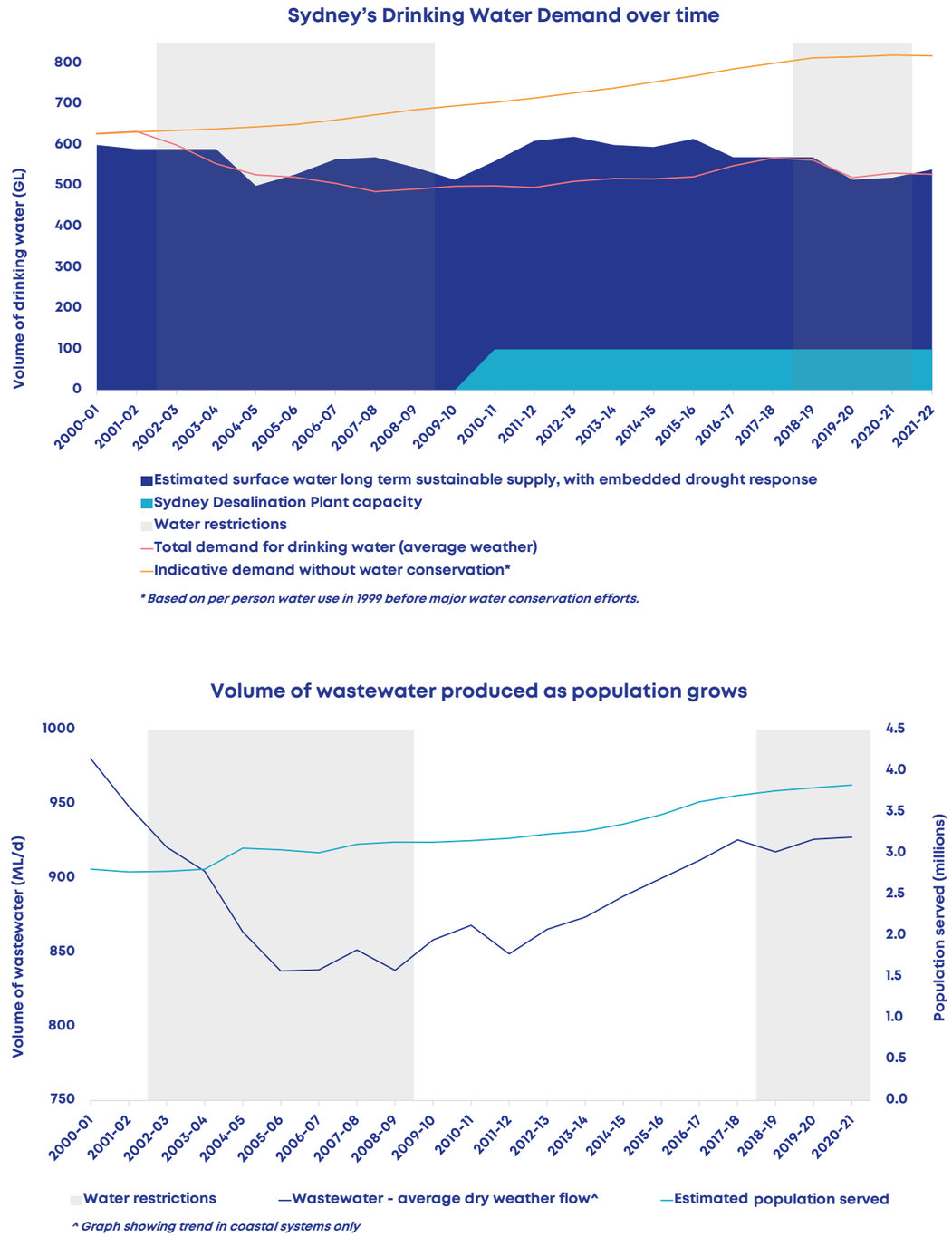



Figure 1: Changes to drinking water demand and wastewater flows over time

# We are facing unprecedented challenges

In 2050, Greater Sydney will be a very different place to what it is today. As such, we face five key trends and challenges to our future operations and service delivery:

**Continued growth across Greater Sydney**
The New South Wales Department of Planning, Housing and Infrastructure (DPHI) predicts Sydney's population will increase by 1.8 million people by 2050 (a 35 per cent increase), which is 50 per cent more growth than in the previous equivalent period. We are currently in the midst of a generational housing crisis and new policies are being implemented to increase affordable housing supply. At the same time, economic growth continues, with expanding industries such as data centres requiring significant volumes of water. This will require increased drinking water supply, new wastewater treatment facilities, and augmentation and expansion of existing water and wastewater systems. These Investments are aligned with the NSW Government's housing supply policy including the Transport Oriented Development (TOD) program.

**Increasing concerns regarding climate change and the impact of extreme weather**
Our climate is changing, with prolonged periods of heat and rain expected, and extreme weather events continuing to increase in frequency and severity. Variations in climate have a direct impact on our customers, our network and our services. These extremes also impact and challenge our existing assets and require a change of approach for the design of new assets.

**Evolving customer and community expectations**
Customers are at the heart of everything we do and their expectations around the services we provide have evolved beyond traditional water and wastewater servicing. Through the Our Water, Our Voice engagement program, we have received insights from our customers on the outcomes they expect Sydney Water to deliver over the longer term, preferences for how the outcomes will be delivered, and some insight into relative willingness to pay for those outcomes and service levels.

**Emerging digital capabilities**
There are and will continue to be advancements in the size, speed, intelligence, capabilities, and applications of digital technologies which provide new opportunities to plan, design, build, operate and maintain our assets and systems, but also increases our vulnerability to cyber risks. Advancements can also change the way we interact with customers and how they interact with us.

**Unpredictable events**
Evolving geopolitical volatility increases the risk of sophisticated, high impact cyber – and potentially, physical – attacks on critical infrastructure entities such as Sydney Water. There is also uncertainty as to the timing of other unpredictable events including pandemics, supply chain interruptions and drought.

All these challenges will have a profound effect on how we plan for future water services to enable a thriving, liveable and sustainable city. While many necessitate increased investment, they also create an enormous opportunity to future proof our service delivery to customers. We are at a tipping point, with a need to transform Greater Sydney's servicing systems now for the benefit of current and future generations while meeting our obligations, customer and stakeholder expectations and managing risk



# Co-designing Sydney Water's first LTCOP

This is our first LTCOP and we have worked closely with our key stakeholders throughout its development. We have collaborated with WaterNSW, DPHI, the Department of Climate Change, Energy, Environment and Water (DCCEEW), the NSW Environmental Protection Agency (EPA) and NSW Health to discuss and incorporate their needs and expectations for our services into the future.
Insights from our customers have also informed our key assumptions, decisions, and outcomes under the LTCOP.

The success of the LTCOP is critical to ensuring the safe, reliable and affordable delivery of water and wastewater services for the health and prosperity of Greater Sydney as it continues to evolve. The Plan's success will be determined by three key criteria as presented in Figure 2: affordability, deliverability and financeability.

In determining our investment profile, we have tested various scenarios against risk, levels of service and cost, and assessed our portfolio against our success criteria. Our proposed adaptive pathway is cognisant of key decisions and external factors, which although we have taken a view on, could alter the path of our investments into the future. To ensure the robustness of our approach and responsiveness to change, we have undertaken thorough sensitivity and stress testing as well as internal and external quality assurance.


Figure 2: LTCOP key success criteria

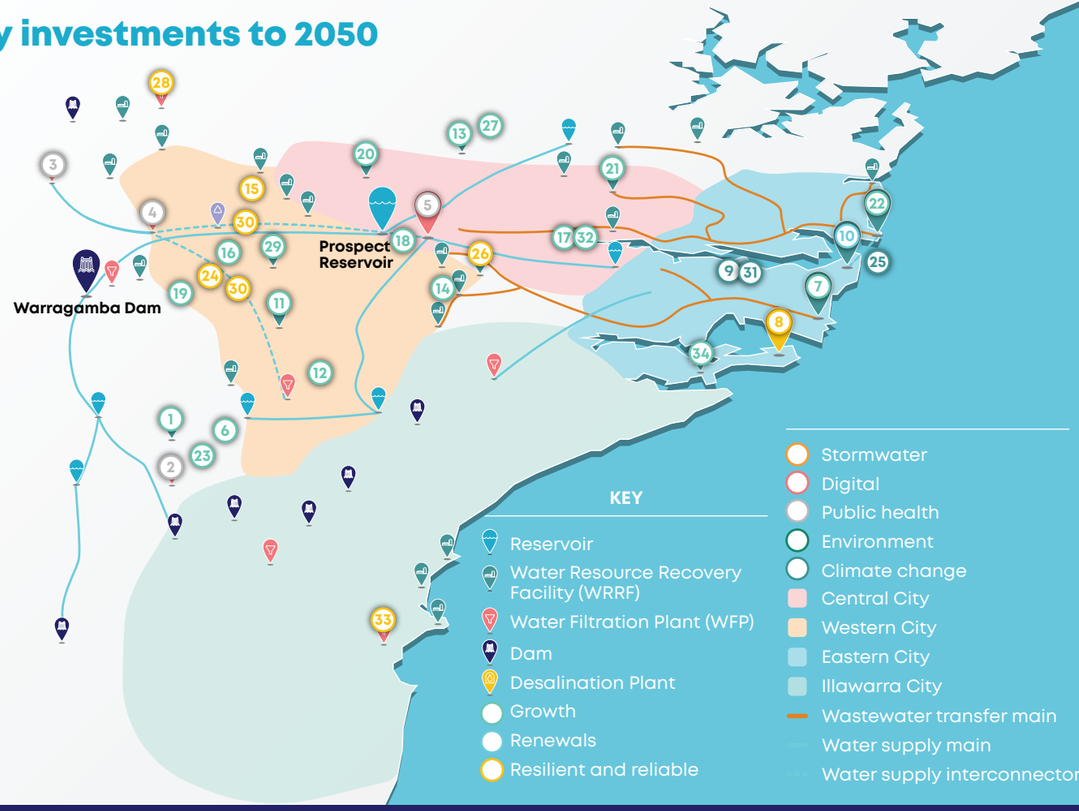
## We are transforming our service delivery systems whilst maintaining affordability for customers

We are now at a critical juncture, where transformative investment in our services is required to meet the city's future needs in a way that is integrated, resilient and sustainable. To 2050, Sydney Water will invest in the order of $83 billion to service our future city, with $32 billion of that investment needed in the next 10 years. This represents an annual average capital spend of around $3.2 billion over the next 10 years, while the annual average over the past 10 years was about $1.1 billion (real). This is nearly three times as much capital expenditure compared to recent past. While digital advancements will enable greater efficiency, our rapidly expanding asset base, increasing service expectations and climate volatility will see our operational investment increase by around 2.8 per cent per annum over the same period.

Our recommended plan provides a balanced approach, enabling management of the most significant public health, environmental and economic risks while maintaining the levels of service that customers expect. Our plan is optimised for both capital and operating costs to ensure we can provide services to customers in line with their expectations, meet our obligations to regulators and stakeholders, while also managing future risks at the lowest total cost. Our key investments are shown in Figure 3.



## Key investments to 2050




### FY2026-2035

1. Picton WRRF upgrades and renewals
2. Nepean WFP upgrades
3. Cascade WFP upgrade
4. Orchard Hills WFP upgrades
5. Prospect WFP upgrades
6. Greater Macarthur growth servicing
7. Malabar WRRF upgrade
8. Sydney Desalination Plant Stage 2 Expansion
9. Wet Weather Overflow Abatement Program (WWOA)
10. Bondi WRRF upgrades and renewals
11. New Upper Nepean WRRF with advanced treatment capacity and wastewater network
12. Macarthur WFP expansion and upgrade
13. North West Treatment Hub upgrades (Riverstone, Rouse Hill, Castle Hill)
14. Liverpool and Glenfield WRRF upgrades for purified recycled water treatment
15. Mamre Road and Aerotropolis Integrated Stormwater Scheme
16. Delivery of Upper South Creek WRRF
17. New Camelia WRRF
18. Prospect Pumping Station
19. South West Growth Area and Western Sydney Aerotropolis growth servicing
20. Quakers Hill WRRF upgrade for purified recycled water treatment

### FY2036-2050

19. South West Growth Area and Western Sydney Aerotropolis growth servicing
20. Quakers Hill WRRF upgrade for purified recycled water treatment
21. West Hornsby WRRF upgrades
22. North Head WRRF upgrade
23. Nepean WFP expansion
24. Prospect to Orchard Hills and Prospect to Macarthur Interconnectors
25. Bondi to Malabar Transfer Main
26. Fairfield WRRF upgrades for purified recycled water treatment
27. North West Treatment Hub upgrades (Riverstone, Rouse Hill, Castle Hill)
28. North Richmond WFP upgrade
29. Upper South Creek WRRF upgrades
30. Prospect to Orchard Hills and Orchard Hills to Macarthur Interconnectors
31. Wet Weather Overflow Abatement Program (WWOA)
32. Camellia WRRF upgrades for purified recycled water treatment
33. Illawarra Desalination Plant
34. New Arncliffe WRRF with purified recycled water treatment capacity

Figure 3: Key investments out to 2050

Table 1 demonstrates our investment profile in response to eight key drivers, each with consideration of future trends and uncertainties in our operating environment. Each of these drivers align with IPART's expectations and regulatory requirements as stipulated in their water regulation handbook using their newly developed framework which focuses on customers, costs and credibility. Although our investments have been linked to a single driver, they are not exclusively proposed in response to a single driver. Under a more integrated system and within our rapidly changing operating environment, we are seeking to ensure we invest to alleviate challenges felt in all areas of our systems. Namely, a large proportion of our investment is driven by growth, causing us to upgrade our water and wastewater treatment facilities. However, these upgrades and supporting investments consider how to best build resilience into our servicing system and water supply, environmental outcomes, and public health.

Further, investments in purified recycled water (PRW) are primarily driven by avoiding wastewater costs associated with growth. Therefore, these investments are included as a growth investment. However, PRW schemes also build resilience into our water supply, protect and enhance the environment, alleviate stress on our aging assets, and provide a public health benefit through diversification of water supply sources.

Table 1: Our investment profile in response to eight key drivers

| | Key strategic driver | IPART driver | Forecast costs (billion) 2026-2035 | 2036-2050 |
|---|---|---|---|---|
| 1 | **Enable the government's growth ambitions** through expanding infrastructure capacity to support the delivery of Sydney's regional growth plan. | Growth | $14.3 | $15.3 |
| 2 | **Renew our assets** to meet customer service expectations today and in response to the external trends shaping our future. | Renewal of existing infrastructure | $8.6 | $24.9 |
| 3 | **Build a resilient and reliable water supply** through investing in rainfall independent sources, eliminating single points of failure across our assets, interconnecting our systems, and managing cyber security threats. | Growth | $2.6 | $6.6 |
| 4 | **Expand our stormwater services** to contribute to improved waterway health through more integrated servicing of recycled water across Western Sydney. | Growth | $3 | $0 |
| 5 | **Digital enhancements to our physical assets** to lay the foundations of our asset management system and support data driven decision making for improved customer outcomes. | Improvements | $0.6 | $1 |
| 6 | **Protect public health** to ensure the wellbeing of our customers and community through the products and services we offer. | Renewal of existing infrastructure | $1.6 | $0.4 |
| 7 | **Protect and enhance the environment** by improving the way we manage our wastewater and stormwater systems to prevent pollution and protect against failure. | Renewal of existing infrastructure | $1.3 | $2.2 |
| 8 | **Enhance our climate change response** through delivering against our environmental and social obligations and identifying new sources of value that deliver a positive benefit to the economy. | Improvements | $0.2 | $0.7 |
| | **Total** | | **$32** | **$51** |

The first 10 years of the investment profile aligns with our IPART submission and is therefore constrained for deliverability and affordability. For the 2036-2050 forecast, a set of assumptions have been made regarding future uncertainties in order to present an estimate of long term expenditure, and some optimisation of the long-term renewals and growth investments has been considered. However, long-term investment should be considered as a range based on potenital future scenarios.

Our adaptive plan (Figure 4) is centered around creating a future where the great decisions we make will substantially alter the future of our services for the better, improving value and reducing costs to customers. While our adaptive plan is centered around the pathway we have assessed to create the most value, we acknowledge that the future is uncertain, and we need to be able to adapt. Our plan therefore considers not only cost and benefits of key investment decisions and triggers to deliver investments at the optimum time, but also the consequences of those decisions taking an alternate path. The total range of investment for this adaptive pathway is $80 - $92 billion, depending on the pathway taken. There are decisions that may occur that could change the total investment envelope but would not change the direction of servicing, and as such have not been included in the adaptive plan illustrated in Figure 4. We have not costed these decisions in, as it would produce a conservative estimate of future costs.

The assets we build are the means through which we provide world class water services to our customers. To 2050, we are proposing significant investment across our servicing systems. A summary of some of our key investments are highlighted on the following page.

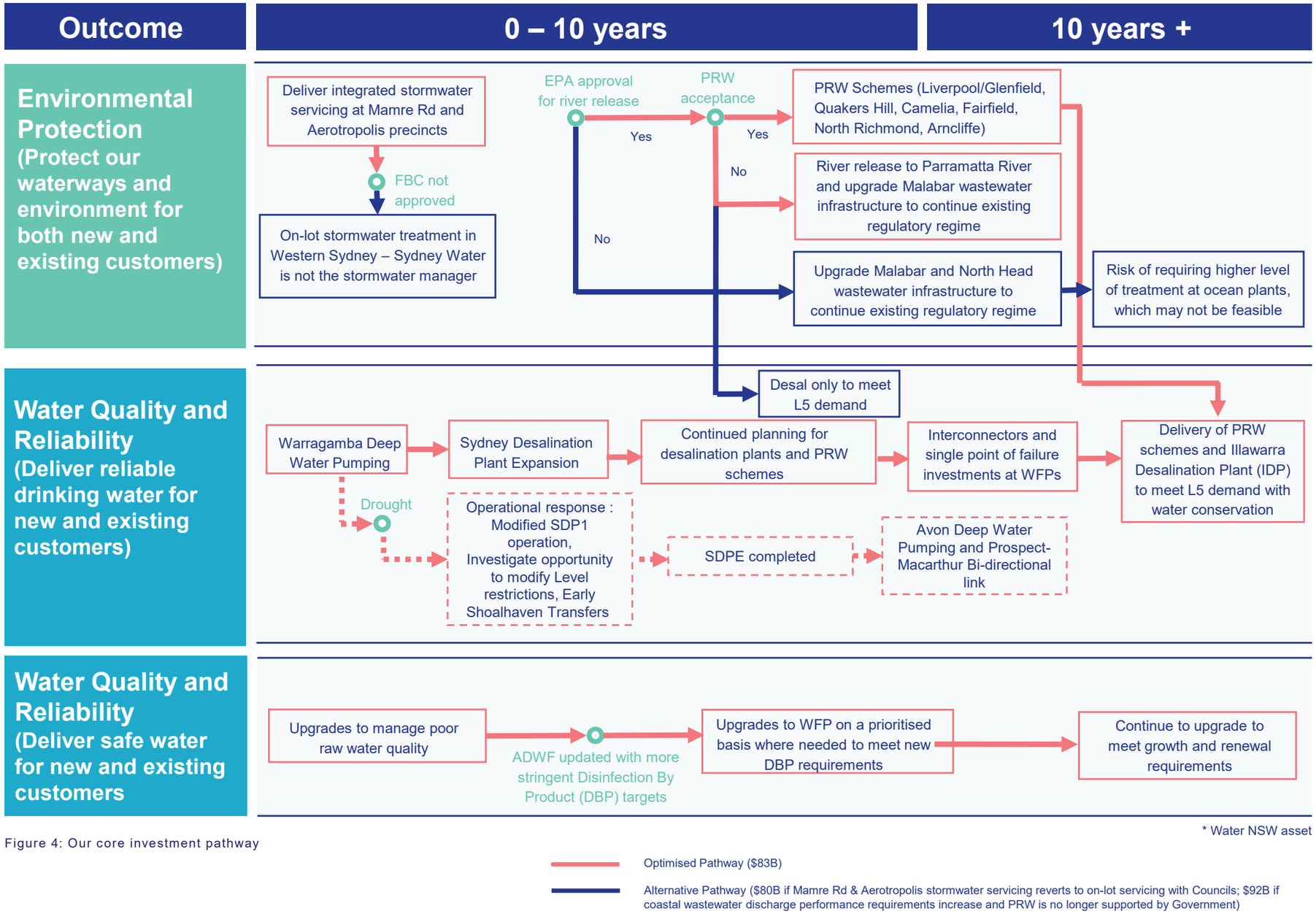



Figure 4: Our core investment pathway

Figure 5: LTCOP key investments and servicing outcomes


Our long term plan indicates a large step-change in investment as we are challenged to maintain and improve our customer service outcomes in an ever-changing operating environment, while also delivering on new responsibilities. Although our customers have received decreasing bills in real terms over recent decades, their bills are now among the lowest of any water utility in the country[4] and our long term planning indicates that increasing customer bills is now required to ensure reliable, safe, responsible, and resilient servicing into the future. Year on year, our bills are expected to increase from today to 2050. We will continue to work with our customers and key stakeholders to ensure our bills remain affordable for our customers – and that we maintain intergenerational equity – by considering different ways we can recover costs.

4 Australian Bureau of Meteorology (BoM), 2021, Urban National performance report 2020–21: urban water utilities



# Working together to deliver the Plan

To secure the future outlined in this Plan, there are several Enterprise Planning actions that Sydney Water will need to progress as a priority, as reflected in our price proposal. These are summarised below:

1. Scale-up the business to deliver the increased investment program through three key strategic interventions relating to industry intelligence, optimising delivery and supplier management
2. Continue our engagement with customers ensuring that our enterprise strategy and plans align with the latest customer preferences, values, expectations and willingness to pay
3. Increase community water literacy and work with stakeholders to maintain support for new water supply options, including PRW, as well as water conservation initiatives
4. Embed our 'Future Ready' organisational realignment to ensure ways of working are effective and that we are set up to deliver our customer priorities
5. Enhanced monitoring and control of infrastructure through the Internet of Things (IoT) program, uplifting existing automation capability and implementation of a digital twin
6. Reduce service and asset performance risk and sustain good asset management practices to support long-term planning and asset creation and improve service outcomes for our customers
7. Deliver Net Zero Carbon Program to reduce Sydney Water's carbon emissions ahead of government targets. Accelerating investment based on customers demonstrated willingness to pay
8. Implement Protective Security and Emergency Management uplift including the delivery of physical security services to ensure continued protection of critical assets in line with the Security of Critical Infrastructure Act

Sydney Water will also work proactively with its delivery partners, government and other stakeholders to support government policy and customer outcomes, while also ensuring the affordability, financeability and deliverability of the plan, including in the following key priority areas:

1. Support new housing policy, including prioritising investment to support Transport Oriented Development (TOD) sites and increasing infill capacity as required.
2. Contribute to development and implementation of Urban Development Plans that prioritise growth in areas that offer efficient, affordable and timely infrastructure servicing from a whole of Government perspective, and greater certainty over the location and timing of growth.
3. Improved feasibility of Integrated Water Cycle Management (IWCM) servicing solutions for greenfield development areas in Aerotropolis and Mamre Road Precincts through working with external stakeholders to provide greater guidance on how to achieve IWCM objectives.
4. Contribute to practical actions that lead to improved resilience of critical infrastructure where significant economic or security impacts (State and Federal) exist.
5. Ensure Infrastructure Contributions are implemented expeditiously and in way that ensures costs are shared appropriately between customers and developers and that contribution prices are phased in to ensure customers bear an appropriate share of development risk.
6. Support discussions on whether it is appropriate to recover higher or lower near-term costs from customers, creating a smoother increase in bills (more now, less later or vice versa) irrespective of the particular investment approach.
7. Secure support for potential interim river releases from recycled water facilities in the lead-up to proposed Purified Recycled Water scheme delivery, ensuring best value outcomes for customers and the environment.
8. Lead constructive discussions on PRW as a water supply augmentation option within government.
9. Support science-led and outcomes-based environmental performance requirements to ensure investment is focused on the highest impact areas.
10. Update water supply levels of service to reflect water system resilience objectives and ensure sufficient time to build new infrastructure during drought

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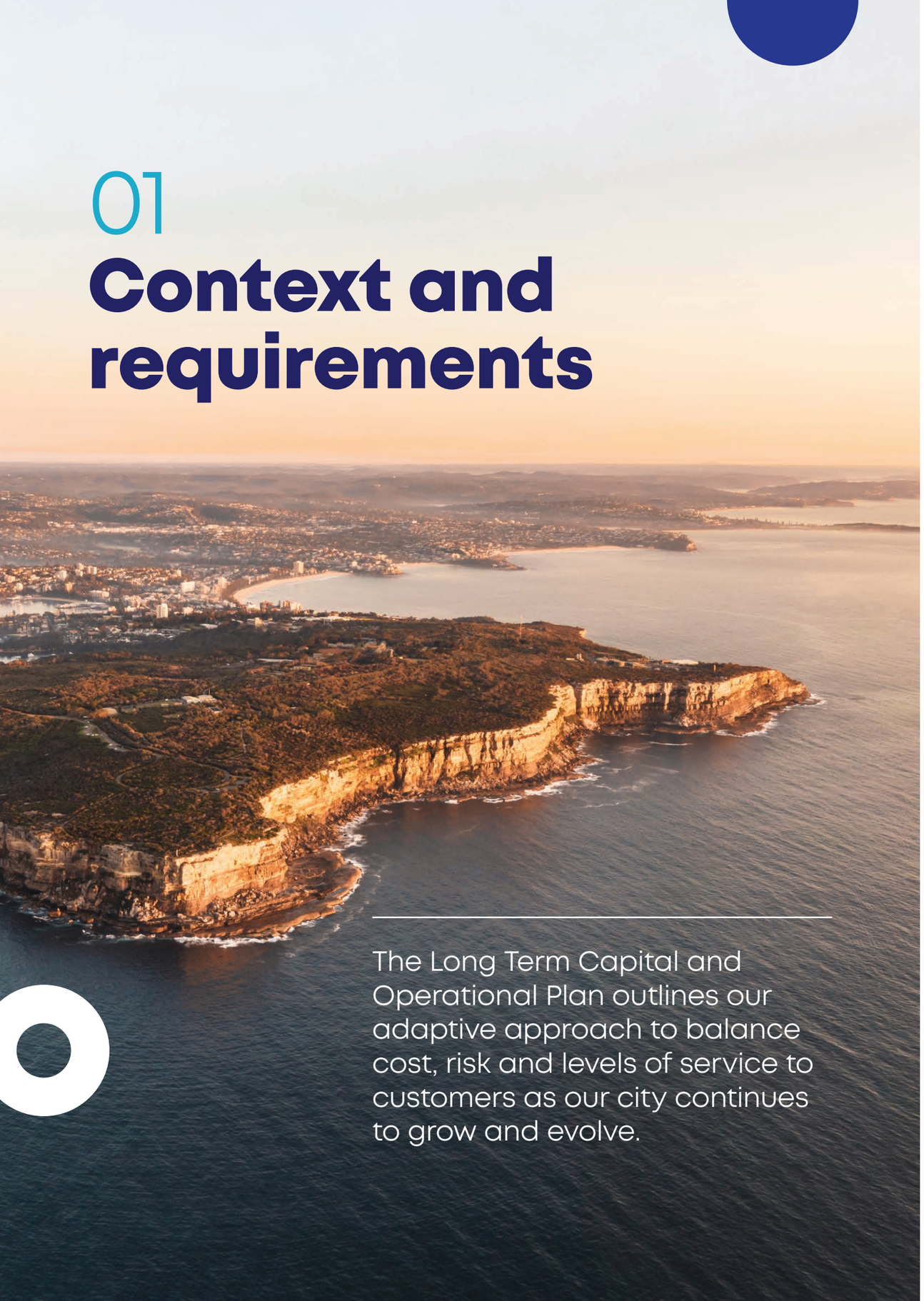
# Context and requirements



The Long Term Capital and Operational Plan outlines our adaptive approach to balance cost, risk and levels of service to customers as our city continues to grow and evolve.

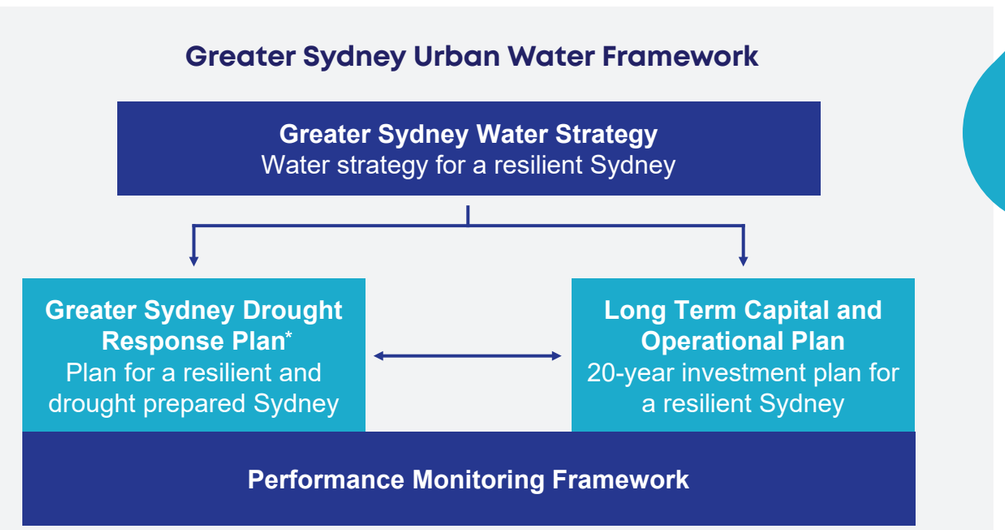
## A long term adaptive plan to support resilient systems and value services to customers

Sydney Water's Long Term Capital and Operational Plan is an adaptive plan to 2050, capturing Sydney Water's key infrastructure and operational decisions. It identifies immediate infrastructure needs and guiding principles for resilient long term water servicing. Without seeking expenditure approval, it specifies the guiding parameters under which all short-term plans and investment cases should be developed.

Importantly, the LTCOP sets out the requirements for Sydney Water to effectively balance cost, risk and levels of service to customers in the context of our changing city. It identifies supporting operational requirements, policies, and actions to best enable the plan, including to ensure ongoing affordability for customers and intergenerational equity.

## Our long term planning is aligned with the NSW Government's vision for Greater Sydney

The New South Wales Government has outlined the strategic and long term approach to managing Greater Sydney's water services to enable a thriving, sustainable and resilient city. The *Greater Sydney Urban Water Framework* and *Greater Sydney Water Strategy (GSWS)*[1] set a coordinated direction for our city, underpinned by priorities and requirements for service delivery (Figure 6). The direction follows an integrated water management approach, with emphasis on ensuring the resilience of our water supply as our city grows, and protection of our natural environment. The LTCOP is aligned with and supports achieving the objectives of the GSWS[1] and meets the needs of our operating licence requirements[5].




* Joint plan developed with Water NSW

Figure 6: Greater Sydney Urban Water Framework[1,6]

5 Sydney Water, 2019, Operating Licence 2019-2023

6 New South Wales Department of Planning and Environment (DPE), WaterNSW and Sydney Water, 2022, Greater Sydney Drought Response Plan Overview

We recognise that sustainable water and wastewater services are essential in supporting growth, jobs and building a strong economy. In driving these outcomes, the LTCOP is aligned with and supports the NSW Government's vision, as outlined in the NSW State Infrastructure Strategy as well as the government's priority for Transport Oriented Development, diverse and well located homes and urban greening of the city.

We have worked closely with WaterNSW and other stakeholders to develop and finalise our LTCOP, ensuring a holistic and consistent view of Greater Sydney's water services. Our LTCOP is supported by WaterNSW, Infrastructure NSW, DCCEEW, the EPA and NSW Health. Independent Pricing and Regulatory Tribunal (IPART), DPHI, NSW Treasury, the Premier's Department and Cabinet Office have also been consulted.

The LTCOP is one part of our Enterprise Planning approach (Figure 7). It has been developed in conjunction with our Statement of Corporate Intent and aligned to our IPART price review (2025-2030), and the customer engagement that is paramount to informing the submission. While this plan sets a strategic direction, our Statement of Corporate Intent (SCI) is our business plan. Investments identified within the plan are still required to adhere to the usual business case assurance processes, with justification and approval of the need, options, costs, etc required prior to investment being made.


Figure 7: Key Sydney Water planning documents



# How we have included the voice of our customers in our long term plan

Customers are already at the heart of everything we do at Sydney Water. Delivering outcomes in line with customer and community expectations is a fundamental pillar of Sydney Water's business. Sydney Water continuously engages with customers to understand and respond to their experiences, through research studies that track customer sentiment and satisfaction with the products and services they receive. In addition, we review customer interactions through our website and customer contact centre. Sydney Water is committed to continual customer engagement as it forms an integral part of our enterprise planning process.

Building on previous engagements, through the Our Water, Our Voice customer engagement program[2], we have gained insights to help shape Sydney Water's strategic planning for the future, including our LTCOP. This two year program of customer engagement commenced in September 2022 and covered a wide range of topic areas over six phases to give customers a direct line to tell Sydney Water what their priorities, values and trade-offs are. Many customers displayed future focused views, albeit through a lens of affordability. They wanted Sydney Water to be acting now to address challenges, such as population growth and climate change, rather than taking a wait and see approach. Most customers argued strongly in favour of focusing on the collective benefit to achieve environmental outcomes. The insights we gained from customers have been used to confirm many of our long term assumptions to determine the appropriate balance between levels of service, risk and cost. More detail on how customers are shaping our Plan can be found later in this document, when we explore the key trends and challenges shaping our future servicing needs.

# Our key assumptions in developing the plan

We completed a thorough assessment to determine the core and minimum assumptions that would shape the LTCOP, as summarised in Table 2. Changes to these assumptions could significantly change our Plan and would prompt its review. Further information regarding how we formulated our assumptions is available in Appendix 1.1.

Table 2: Key assumptions for the LTCOP

| Assumption | Description |
|---|---|
| **Warragamba Dam Operating Level** | The Full Service Level (FSL) of the dam will not be increased for water supply or decreased for flood mitigation. Due to the significant uncertainty surrounding future Government policy in this space, and the large impact on the Plan, we have not included the potential permutations of investment in the adaptive plan (refer to further detail in our adaptive plan section of this document). |
| **Workplace exposure standards** | Workplace exposure standards for airborne contaminants (e.g. hydrogen sulphide) will not change. |
| **Major System Decentralisation** | System configuration remains broadly centralised. For example, broad scale use of in-home water supply systems is not considered. |
| **Changes to the bulk water supply model** | Ownership of assets remains consistent with current arrangements. |
| **Business Model** | Sydney Water's Business Model will remain consistent with current, with potential to explore opportunities in tangential markets such as resource recovery and energy generation. |
| **Population** | Reflect DPHI's 2022 Population Projection. This review was checked with the latest 2023 (released in 2024) forecast and targets, which includes the NSW Government Transport Oriented Development precincts. |
| **Demand Projection** | Aligned to above population projection, water conservation aligned to Greater Sydney Water Strategy[1]. Refer to Appendix 1.1 for further detail. |
| **Climate change** | Representative Concentration Pathway (RCP) 4.5 scenario, NSW and Australian Regional Climate Modelling (NARCliM) 1.0 & 1.5. |
| **Model Drought** | 1:100,000 drought. Note that the sensitivity stress testing for drought was not updated for V1.1 of the LTCOP. |
| **Water Quality Standards** | Achieve Australian Drinking Water Guidelines - date of change assumed 2025 for disinfection by-products (DBP) and PFAS and related forever chemicals. |
| **Wastewater Quality Standards** | Achieve Hawkesbury Nepean Framework requirements from 2026 and existing coastal plant licence conditions as a minimum |
| **Dry Weather Network Discharge** | Zero dry weather discharge |
| **Wet Weather Overflows** | Achieve current Environmental Protection Licences for wet weather as a minimum |
| **Recycled Water** | Service provision under existing cost recovery model |
| **Property tax** | Required to pay tax on land |
| **Land acquisition** | We pay for land that supports our assets. |
| **Social licence for Purified Recycled Water** | Support for PRW through indirect means obtained in 2025, direct source integration obtained in 2040 |
| **Pass through costs** | Assume current cost structures apply for WaterNSW, Sydney Desalination Plant (SDP), BOO Plants. Full pass through for SDP, and pass through based on rate for WaterNSW and BOO's (SWC demand risk). |
| **WACC** | Post tax WACC of 3.6% for FY26-30, 4.4% for FY31-35, 4.6% onwards |
| **Infrastructure Contributions** | Levied from July 2024 with staged implementation. First year with 75 per cent discount, second year 50 per cent discount and third year zero discount. |
| **SDP Operation** | Will run full-time under flexible operation rules |



# How to read our Plan

The LTCOP is structured under the following sections and is supported by further information in several appendices.

1. **Context and requirements**
   The key objectives of the LTCOP, alignment with the NSW Government's vision, the role our customers play and core assumptions that have informed its development.
2. **The delivery of our services today and through time**
   A brief history of Sydney Water's services, how services are delivered today, and the key characteristics of our current servicing system and how they deliver outcomes for customers.
3. **The trends and challenges that are shaping our future servicing needs**
   The external opportunities and challenges causing us to re-think the way that we deliver our services as our city continues to change.
4. **How we developed our Long Term Capital and Operational Plan**
   A summary of the modelling and decision making undertaken to develop the expenditure profile under the plan, including how differing assumptions, sensitivities, risks and customer outcomes have been considered.
5. **The adaptive plan to support Sydney's servicing needs**
   Our vision for Greater Sydney's water servicing, including the investments we will adaptively deliver out to 2050, the associated bill impact, and how they will achieve our customer outcomes.
6. **Delivering value for our customers**
   The mechanisms by which we will collaborate and the actions required of our customers, delivery partners, government and other stakeholders to ensure we can deliver on our adaptive plan.
7. **Next steps for the Long Term Capital and Operational Plan**
   How we will monitor and improve our long term planning to ensure it remains responsive to the needs of our customers, stakeholders, and the changing world around us.

# How we will update our Plan

We will work with our customers and stakeholders to review the LTCOP at least every five years. Annually, a rapid review will be undertaken of costs and to discern if there have been any significant changes that would prompt a major review. This review process will ensure the Plan always reflects what our customers and stakeholders expect of us, as well as the latest changes in our operating environment.

02

# The delivery of our services today and through time

We have been providing water and wastewater services to Greater Sydney for over 135 years. The prosperity and evolution of our city has depended and will continue to depend on our services. The scale and volume of change in our operating context is both a challenge, and an opportunity, which has prompted us to re-think the way we deliver our services for a thriving, liveable and sustainable Greater Sydney.

# Our water services through time

First Nations people have been caring for Greater Sydney's land and waterways for thousands of years, with water deeply entwined in First Nations culture and wellbeing. Ensuring waterway health is integral to First Nations people maintaining a connection to Country. Our strategy identifies where we need to collaborate and partner to incorporate voices and perspectives of First Nations and Aboriginal people in our long term planning.

The water source, which became known as the Tank Stream in 1788, quickly highlighted the need to protect and plan water services, as early European settlement led to unsustainable impacts on the availability of safe drinking water. This led to a series of enhanced servicing and protective measures and infrastructure from the 1790s. The foundational elements of Greater Sydney's servicing system were constructed in the late 1880s and have been built upon across several critical moments since (Figure 8). Our wastewater system's inception was through the introduction of the Bondi Ocean Outfall Sewer (BOOS) in 1889, followed by the Northern Suburbs Ocean Outfall Sewer (NSOOS) in 1920s and the Southern and Western Suburbs Ocean Outfall Sewer (SWSOOS) in the 1940s. Deepwater Ocean Outfalls were then constructed at Malabar, North Head and Bondi in the late 1990s. For our water system, the Upper Nepean Dams and Prospect Reservoir set the foundation in 1888, followed by Warragamba Dam in the 1950s and the Prospect Water Filtration Plant (WFP) in the 1990s.

These assets, systems and ways of operating have provided Greater Sydney with a safe, reliable, cost-effective and efficient method to service growing demand for water and wastewater services using the technology available at the time.

**1788:** Water was sourced from a creek called the Tank Stream after European settlement.

**1827:** Busby's Bore commissioned to serve water from Lachlan Swamps (modern day Centennial Park) replaces the Tank Stream as the city's main water supply.

**1857:** The Bennelong Point Sewerage System become Sydney's first planned system to dispose of the city's sewage.

**1859:** Sydney's sewerage system consisted of five outfall sewers which drained to Sydney Harbour.

**1859:** Botany Swamps Water Supply Scheme began, with the pumping station taking water from a convict built dam through Crown St Reservoir (today's oldest water supply reservoir still in service).

**1888:** Board of Water Supply and Sewerage (BWS&S) created.

**1888:** The Upper Nepean Scheme successfully linked the Nepean, Cataract, Cordeaux and Avon Rivers to deliver water to Sydney through the Upper and Lower Canals.

**1892:** BWS&S renamed to Metropolitan Board of Water Supply and Sewerage (MBSW&S).

**1902:** Sewerage network expanded to a network of 20 sewage pumping stations, ending discharges to Sydney Harbour.

**1903:** Wollongong water supply connected.

**1915:** Construction of Cataract Dam completed.

**1916:** Southern and Western Suburbs Ocean Outfall Sewer (SWSOOS) No. 1 completed.

**1926:** Construction of Cordeaux Dam completed.

Construction of Avon Dam completed.

**1930:** Northern Suburbs Ocean Outfall Sewer (NSOOS) completed.

**1941:** SWSOOS No. 2 completed, increasing capacity in Sydney's biggest wastewater system to service Sydney's growing population.

**1953:** Bondi Wastewater Treatment Plant completed.

**1960:** Construction of Warragamba Dam completed.

**1975:** Construction was completed on Sydney's largest Wastewater Treatment Plant at Malabar.

**1977:** The Shoalhaven Scheme is constructed (Tallowa Dam, Fitzroy Falls Reservoir, Wingecarribee Dam).

**1980:** Blue Mountains water supply scheme was taken over by the Metropolitan Board of Water Supply & Sewerage.

**1984:** Construction of North Head Wastewater Treatment Plant was completed.

**1990:** Deep ocean outfalls at Bondi, North Head and Malabar were completed.

**1996:** Prospect Water Filtration Plant, which supplies up to 80% of Sydney Water's customers, is completed.

**2000:** Construction completed on the Northside Storage Tunnel, designed to protect Sydney Harbour from pollution from wet weather sewer overflows.

**2002:** Recycled water for non-drinking uses supplied to residents for the first time via the Rouse Hill Recycled Water Scheme.

**2008:** Peak in water conservation spend with program delivering 86GL of savings in drinking water use

**2010:** Introduction of rainfall independent water supply sources with the commissioning of Sydney Desalination Plant and St Marys Advanced Water Recycling Plant, reducing demand on Warragamba Dam.

**2023:** Purified Recycled Water Discovery Centre commissioned to support our customers' understanding of how purified recycled water is produced.

1788 – 1888 **Our city's beginnings**

1888 – 1910 **Metropolitan Board of Water Supply & Sewerage**

1910 – 1940 **Metropolitan Board of Water Supply & Sewerage**

1940 – 1994 **Metropolitan Board of Water Supply & Sewerage**

1994 – Today **Sydney Water**

Figure 8: Sydney Water investment timeline

As outlined in Figure 9, we still have a primarily centralised water and wastewater system. The majority of the City's water is collected in dams in the West and transferred to coastal wastewater outfalls in the East. Its unique and important characteristics set the foundation for the way we plan for the long term.

# Key features of Sydney's Water and Wastewater System

**80% of Sydney's drinking water is supplied by the Warragamba Dam**

Constructed through the 1950s, the capacity within Warragamba Dam has facilitated Sydney's growth into a global city.

**4.3 million customers receive drinking water filtered via Prospect**

The Prospect Water Filtration Plant treats drinking water that is then distributed across Sydney.

**Two main networks carry Sydney's wastewater to our coastal facilities**

The majority of the Eastern and Central Cities wastewater flows through the SWSOOS and NSOOS, a series of bulk capacity sewer mains and pipelines.

**62% of Sydney's wastewater is processed by three coastal Water Resource Recovery Facilities**

The Eastern and Western Cities are processed via three large coastal wastewater systems at Bondi, North Head and Malabar.

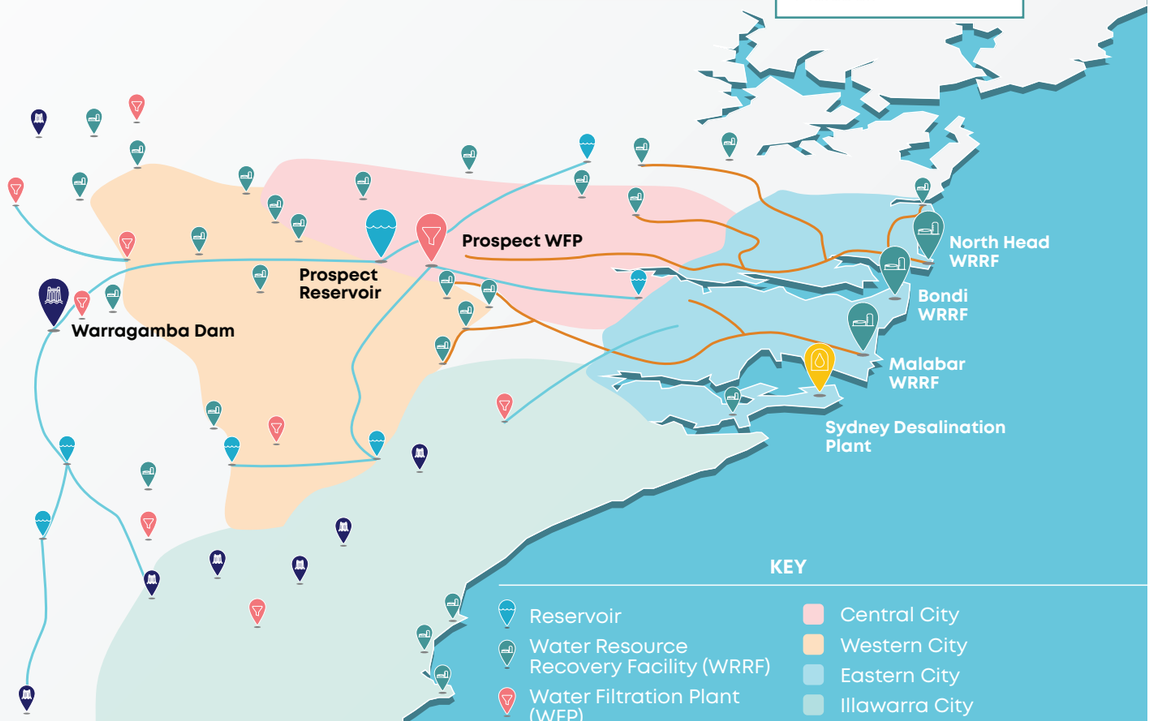



Figure 9: Key features of Sydney's Water and Wastewater System

## Creating a servicing system today, for tomorrow

Sydney Water provides safe, affordable and reliable water, wastewater and stormwater services to over five million customers across the Greater Sydney Region, including Illawarra and the Blue Mountains. We do this in ways that align with the traditional custodians of the land and waterways in which we live, work, play and connect. We embrace the Caring for Country approach practiced by First Nations people, and we embrace efforts to restore our connections with water, land and each other.

To deliver our services, we manage a network of 251 drinking water reservoirs, approximately 50,000 km of water and sewer pipes, over 850 pumping stations, 30 water resource recovery facilities (WRRFs) that treat wastewater, and nine WFPs. The Sydney Desalination Plant (SDP) provides our only rainfall independent source of water, delivering up to 15 per cent of demand from drinking water sources.

We work closely with WaterNSW, who collect, store and transport bulk raw water via dams, rivers, pipes and canals to our water filtration plants which produce drinking water for distribution to our customers via pipes. Figure 10 provides a snapshot of our key water, wastewater and stormwater service features, and our area of operations is shown in Figure 11. Further information can be found on our services at Appendix 2.1.

Importantly, in January 2021, accountability for water supply augmentation was transferred from WaterNSW to Sydney Water by Ministerial Direction and this accountability is now embedded in our Operating License. Sydney Water is therefore responsible for developing new water supply solutions in line with the recommendations of the *GSWS*.[7] In March 2022, the NSW Government announced the appointment of Sydney Water as the trunk drainage authority for stormwater in the Western Sydney Aerotropolis, including the Mamre Road Precinct (pending Final Business Case approval). These new obligations are included and addressed in our long term plan.

7 New South Wales Department of Planning and Environment (DPE) & WaterNSW, 2022, Greater Sydney Water Strategy

# **Our** services

We love water – it's in our name – but we do lots more.

## We supply:

**water**, **wastewater** and **recycled water** services

supply

to **5.3 million customers**

**Western Sydney** | **Central Sydney** | **Eastern Sydney** | **Illawarra Shoalhaven**

Our area of operations covers **12,870 sq km**

**22,745 km** of water mains

**40 acoustic sensors** are deployed across 5 discrete pressure zones to monitor and detect leaks and breaks

Your water comes from:

- **21** dams
- **1** desalination plant
- **251** reservoirs
- **153** water pumping stations

We produce **508, 478 million litres** every 12 months

We supply water to **2,105,709 properties**

**80%** of your drinking water comes from **Warragamba Dam/ Lake Burragorang**

**Your drinking water** comes from lakes, rivers and bushland including World Heritage national parks and is used not only for drinking, but also other indoor andoutdoor uses such as showering, toilet flushing and irrigation.

## We test

**the drinking water at:**

- inlet and outlet of water filtration plants
- homes
- catchments
- reservoirs

**We test for:** colour, taste, odour, micro-organisms, chemical content

We have installed **10,000 IoT devices** to detect blockages in wastewater pipes helping us **avoid 15-20 overflows each month**

We **filter 100%** of your water

We analyse data from **2,000+ sewer blockages** to create an AI model that predicts which tree species are most at risk of intruding into wastewater pipes

**Water recycling**

**11** Recycled water pumping stations

**9** Recycled water reservoirs

**14** Recycling plants

We recycle **129 megalitres a day**

We recycle **37,693 million litres** of wastewater through **793km** of **recycled water mains** **every year**

**Wastewater**

We **remove** **698,215 million litres** of wastewater from **2,055,860 properties**

through **26,693 km of wastewater pipes** and **30 water resource recovery facilities**

**454 km** of stormwater channels and pipes, draining **640,168** properties

Figure 10: Our key water, wastewater, stormwater, and recycled water service features

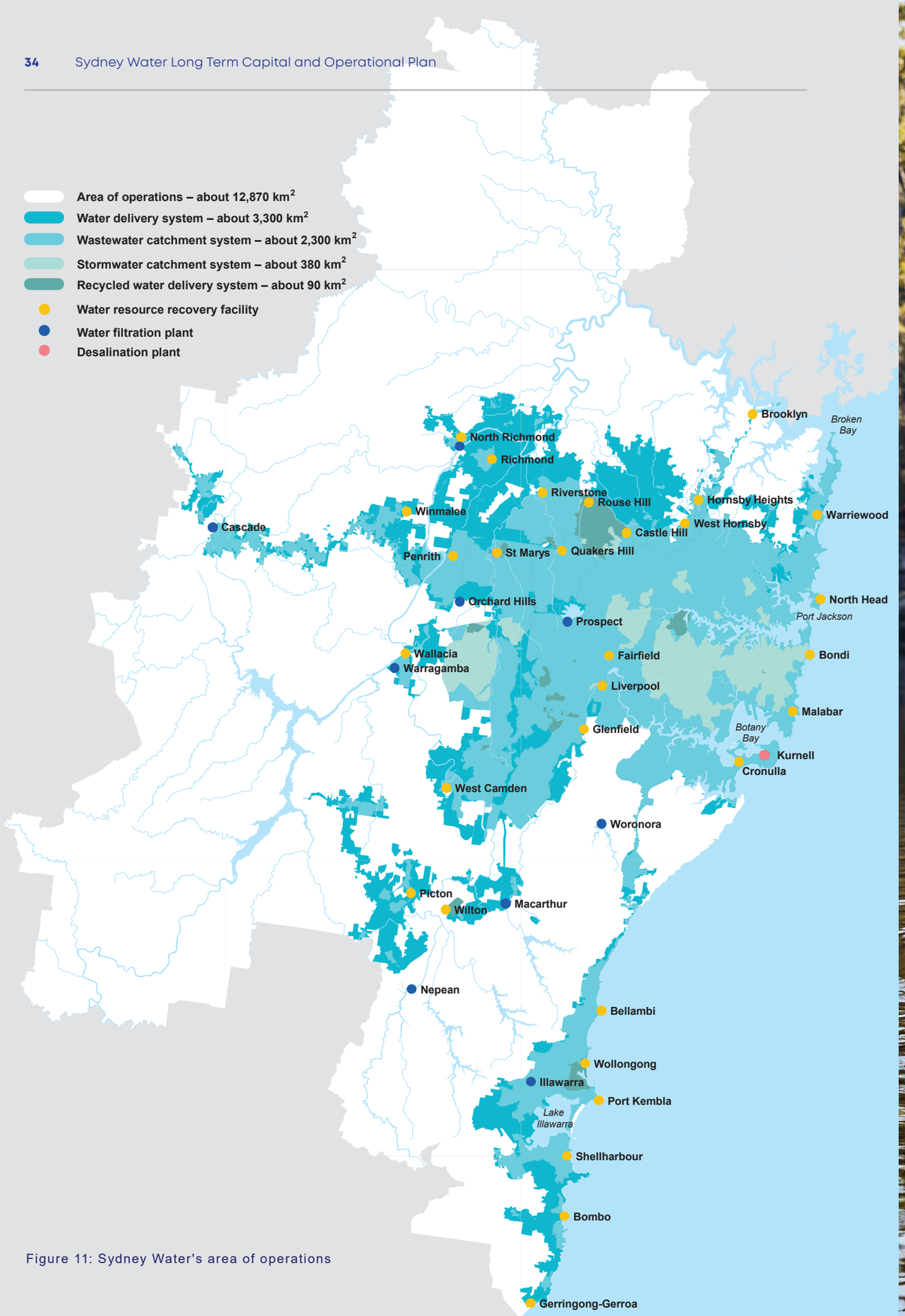



Figure 11: Sydney Water's area of operations

Our systems have served us well for over 135 years with assets being designed appropriately to provide sufficient capacity. However, many assets are now close to reaching the end of their 'design life' and the value they provide far exceeds the costs customers are currently paying to maintain these services. Approximately 15 per cent of our in-use regulated assets are fully depreciated and about 26 per cent are past their theoretical end-of-life. Many of these assets are also now undersized for the current service need. Sydney's population has more than tripled since Warragamba Dam was built in 1950, but this dam still provides 80 per cent of our drinking water. Currently on average 88 per cent of Sydney's water is supplied by surface water sources including Warragamba. We are now at a tipping point with forecast annual drinking water demand exceeding our estimate of the current sustainable supply available from all our dams (otherwise known as surface water yield) and the Sydney Desalination Plant combined.

Our existing systems were designed at a point in time using the best technology available. Technology has and continues to provide, greater opportunities to optimisation of how we operate our assets, reducing manual operation and enabling more sophisticated configuration of the systems. It is not only our systems that have evolved, but also how we operate them. This improves our ability to harness capacity in our systems to defer investment and avoid expensive energy costs.

Our customers have benefited over time from significant economies of scale through the way we manage our services. Our approach to asset management and past investment in water conversation[9] has meant that we have avoided the need to build new drinking water supplies since the end of the Millennium Drought. On a per person basis, demand from drinking water sources is around 36 per cent less than it was in the early 2000s (Figure 12).

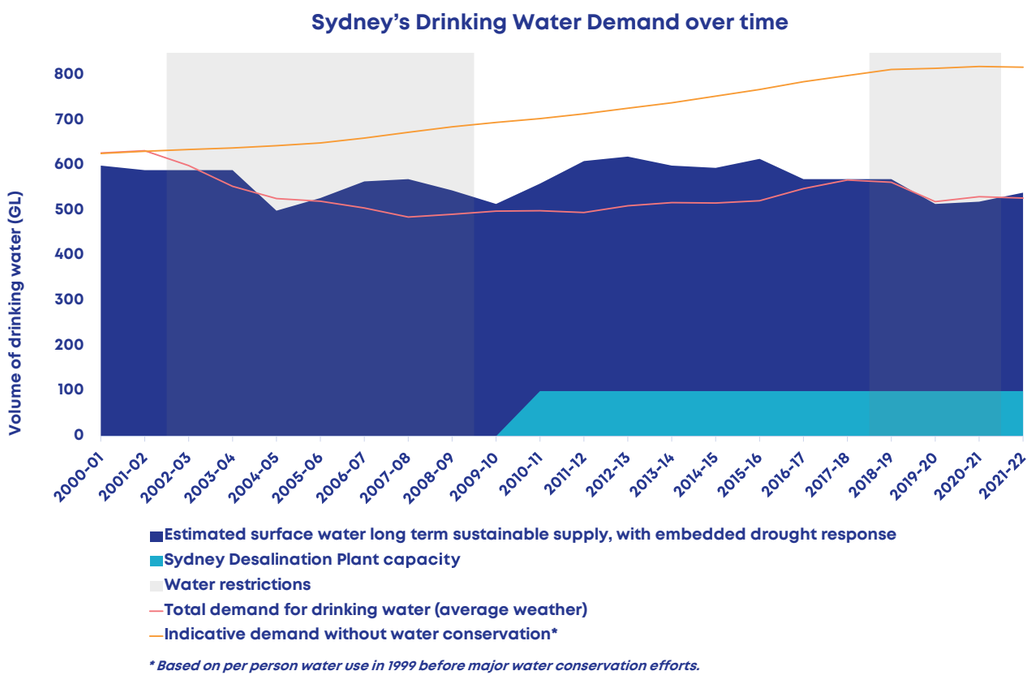



Figure 12: Sydney's drinking water demand and sustainable supply through time

9 Sydney Water, 2023, Water use and conservation



Water conservation has also generated benefits for the wastewater system, with reduced volumes of wastewater being generated (as shown in Figure 13).

As demonstrated in Figure 14, our service delivery outcomes have clearly resulted in decreased customer bills over the last decade in real terms and have been amongst the lowest in Australia for more than a decade.[10]

Our current system design, and the capacity and operating constraints of this design given emerging needs, poses increased risk to our ability to maintain the standards of service that our customers expect and value. We need to invest now to transform and integrate Greater Sydney's water, wastewater, stormwater, and recycled water systems to create a step change to ensure the continued reliability and improved resilience of our systems.

Further information on the trends shaping our future investment is provided in the next section.

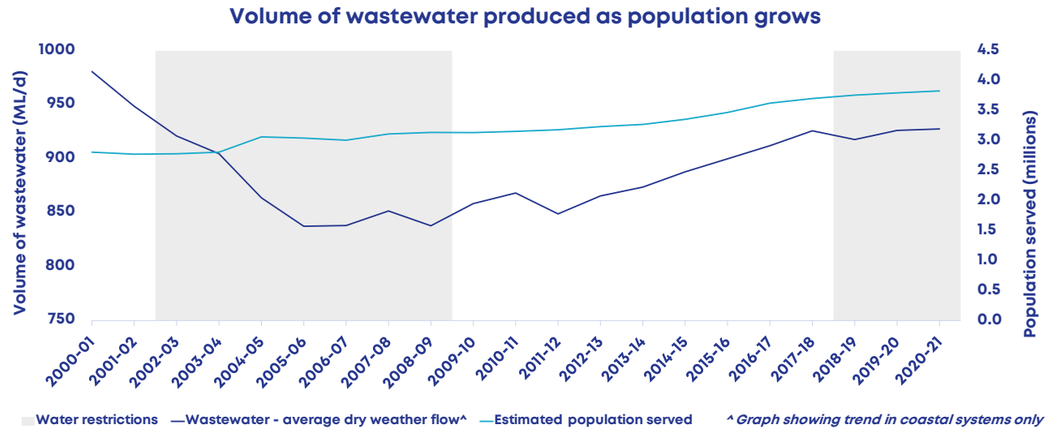



Figure 13: Impact of water restrictions on wastewater average dry weather flows

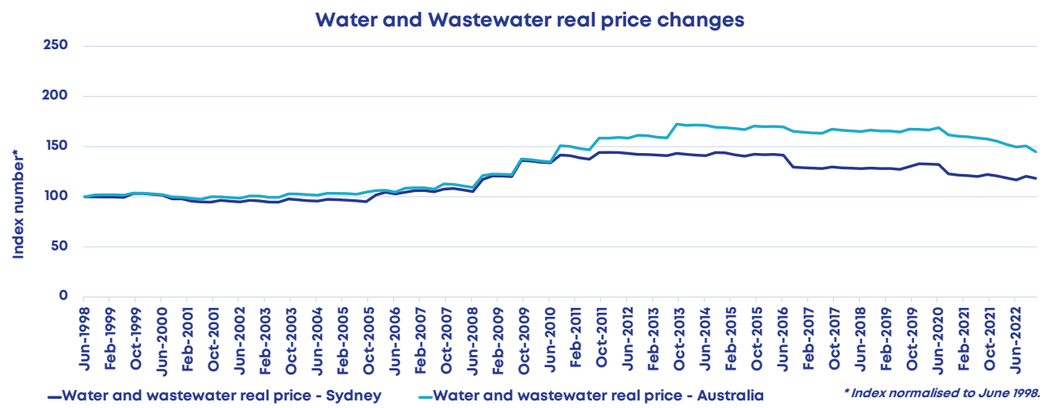



Figure 14: Sydney Water customer bills since 1998 – water and wastewater

10 Australian Bureau of Statistics (ABS), 2023, Consumer Price Index, Australia (reference period December Quarter 2022)

# 03
# The trends and challenges that are shaping our future servicing needs

In 2050, Greater Sydney will be a very different place to what it is today. As our city evolves, our service delivery approach needs to as well. We have identified five key trends and challenges that will affect our operating context into the future, and what it means for delivery of our services.

Our city continues to change and evolve. This includes in response to the impacts of the COVID-19 pandemic. By 2050 we will have expanded from 5.4 million customers to 7.5 million.[11]

This growth is in the order of 40 per cent, leading to greater urban densification within existing communities and expansion of the urban footprint to greenfield locations. These growing communities will be seeking more urban greenspace that better connects our suburbs and cities with our natural environment. Climatic extremes are becoming the new normal, and our geopolitical context is shifting. More sophisticated technology will prompt us to think about how we deliver and operate infrastructure, communicate with our customers and ensure cyber safety. These changes will fundamentally impact what is necessary for water services to enable a thriving, liveable and sustainable city.

We have identified five key trends and challenges that will affect our operating context into the future, and what it means for delivery of our services.

- **Continued growth across Greater Sydney**
  Urban expansion and increasing population density in developed parts of the city will require increased drinking water supply, new wastewater treatment facilities, as well as augmentation and expansion of existing servicing system for up to an additional two million people by 2050. The staging and location of this growth has a large impact on the cost to deliver services.
- **Increasing concerns regarding climate change and the impact of extreme weather**
  Our climate is changing, with prolonged periods of heat and rain expected, and extreme weather events continuing to increase in frequency and severity. We will see a range of new extremes and likely overlaps of impacts that will continue to challenge our existing assets, and which will require a change of approach for design of new assets.
- **Evolving customer and community expectations**
  Expectations around the services we provide beyond traditional water and wastewater servicing are changing - an increasing focus on environmental protection, improving the health of our waterways for recreation, greater access to information to support customers manage their water use, providing water for green spaces to maintain amenity and recycling larger volumes of stormwater and wastewater to reduce water lost to the ocean.
- **Emerging technology and digital capabilities**
  There will be advancements in the size, speed, intelligence, capabilities, and applications of digital technologies – this will open opportunities in how we plan, design, build, operate and maintain our assets and servicing system. It will also change the way we interact with customers and how they interact with the services we provide. We will need to keep pace with our customers' demand for more digital interfaces, capitalise on the efficiencies and improved decisions that technology can enable, while taking steps to mitigate our vulnerability to malicious cyber and technology-based risks.
- **Unpredictable events will add further complexity and risk to a challenging future**
  Evolving geopolitical volatility increases the risk of sophisticated, high impact cyber and potentially physical attacks on critical infrastructure entities such as Sydney Water. There is also uncertainty as to the timing of other unpredictable events including pandemics, supply chain interruptions and drought.

While we expect each of these trends to occur, their speed, volatility and relative importance for customers and our servicing system is uncertain, complex and ambiguous. In response, our planning will need to adapt over time. In this section we provide an overview and evidence for these challenges.

11 New South Wales Department of Planning and Environment (DPE), 2022 [accessed 11 May 2023], Population projections

# Continued growth across Greater Sydney

The NSW Government's vision for growth is to increase the supply of diverse and well-located homes to support a nationwide and generational housing crisis. The NSW Government has signed up to the National Housing Accord, which sets an ambitious target of 1.2 million homes across Australia by June 2029. NSW's share of this target is 377,000 new well-located homes.

To support this, the NSW Government has introduced the TOD program, which aims to deliver sustainable and connected cities via more housing around 45 transport hubs, most of which are in Greater Sydney. In addition, the NSW Government has overhauled planning rules to fast track low and mid-rise housing, which is expected to result in an increase in infill development.

There are eight Accelerated TOD Precincts as well as another 24 TODs to be implemented through an amendment to the State Environment Planning Policy (Housing) (Housing SEPP) within our Area of Operations.

The accelerated TODs are:

- Bankstown
- Bays West
- Bella Vista
- Crows Nest
- Homebush
- Hornsby
- Kellyville
- Macquarie Park

The Housing SEPP TODs are:

- Ashfield Station
- Banksia Station
- Berala Station
- Canterbury Metro Station
- Corrimal Station
- Croydon Station
- Dapto Station
- Dulwich Hill Metro Station
- Gordon Station
- Killara Station
- Kogarah Station
- Lidcombe Station
- Lindfield Station
- Marrickville Metro Station
- North Strathfield Metro Station
- North Wollongong Station
- Rockdale Station
- Roseville Station
- St Marys Metro Station
- Turrella Station
- Wiley Park Metro Station
- Belmore Station (new)
- Lakemba Station (new)
- Punchbowl Station (new)

There are 11 key growth areas across Greater Sydney:

- South West Growth Area (SWGA)
- Western Sydney Aerotropolis Growth Area (WSAGA)
- Greater Macarthur Growth Area (GMAC)
- Eastern Sydney Growth Area (ESGA)
- Greater Parramatta to Olympic Peninsula Growth Area (GPOP)
- Greater Penrith and Eastern Creek Growth Area (GPEC)
- North West Growth Area (NWGA)
- Metro North West Growth Area (MNW)
- Epping to St Leonards Growth Area (E2SL)
- Sydenham to Bankstown Growth Area (S2B)
- West Dapto Urban Release Area (WDURA)

Figure 15 provides an indication as to the proportion of investment planned for the different growth regions around Sydney.




Figure 15: Proportion of growth investment across key Greater Sydney growth areas

As plans for delivery of these growth areas progresses, the population of Greater Sydney is anticipated to grow by around 68,000 people on average each year up to 2050.[12] By this time our population will be over seven million people, a 40 per cent increase overall and doubling in the city's West, with the Western City covering 100,000 hectares. This is the equivalent of another Adelaide and Canberra within our area of operations. Growth at this scale and geographic spread is unprecedented for our city and will challenge how we deliver our services. By comparison, this is 50 per cent more growth than has been experienced over the past equivalent period. In conjunction, the geographic spread of growth, particularly into unserviced greenfield growth areas, has increased dramatically, with the coverage of growth areas forecast to increase by 40 per cent between 2012 and 2023 (Figure 16). For a comprehensive view of our detailed growth assumptions, refer to Appendix 3.1.

Servicing population growth requires us to respond in five key ways, depending on where and when the growth occurs:

1. Additional drinking water supply supplies to ensure our customers have access to a sustainable, resilient, and safe water supply
2. New wastewater recycling facilities to service major new growth areas
3. New and extended service networks to connect and serve new urban developments and communities
4. Upgrades and augmentation to increase the capacity of the existing drinking water and wastewater systems to maintain reliability of our services
5. New stormwater services to minimise the impacts of urbanisation.

Location and staging of growth can have a significant impact on the nature of the servicing solution and the cost to implement services. By way of example, the cost to service new properties in the Greater Macarthur Growth Area, which requires significant investment to facilitate any new growth, is in the order of 400 per cent higher than average cost to service new properties. Growth is occurring across many fronts, while the timing and location of growth is subject to a lot of change. The spread of growth in this manner creates challenges in delivering timely services while also providing the more efficient servicing solution.

12 New South Wales Department of Planning and Environment (DPE), 2022 [accessed 11 May 2023], Population projections




Figure 16: Geographic spread of growth – comparison of 2012 to 2023

# Our climate is changing

Greater Sydney's climate has significantly changed since our water and wastewater systems were developed over the 20th century. Weather patterns and events are becoming more volatile, unpredictable, and extreme. In the last five years, drought, bushfires, floods and storms have impacted the delivery of services and highlighted current capacity constraints within our systems and some of our assets reaching the end of their 'design life'. Meanwhile, inflows into our dams have nearly halved since the early 1990s (Figure 17).

We have historically managed our operations by building infrastructure that catered to the climatic conditions of the time. Now, we are planning for a very different future climate which will be characterised by more extreme periods of high and low rainfall. We will need to manage future climate and weather risks despite difficulties in knowing their exact nature (frequency, severity and timing). It is therefore prudent that we invest in building an enduring supply of water in preparation for the potential impacts of such events and therefore protect the continuity of our services.

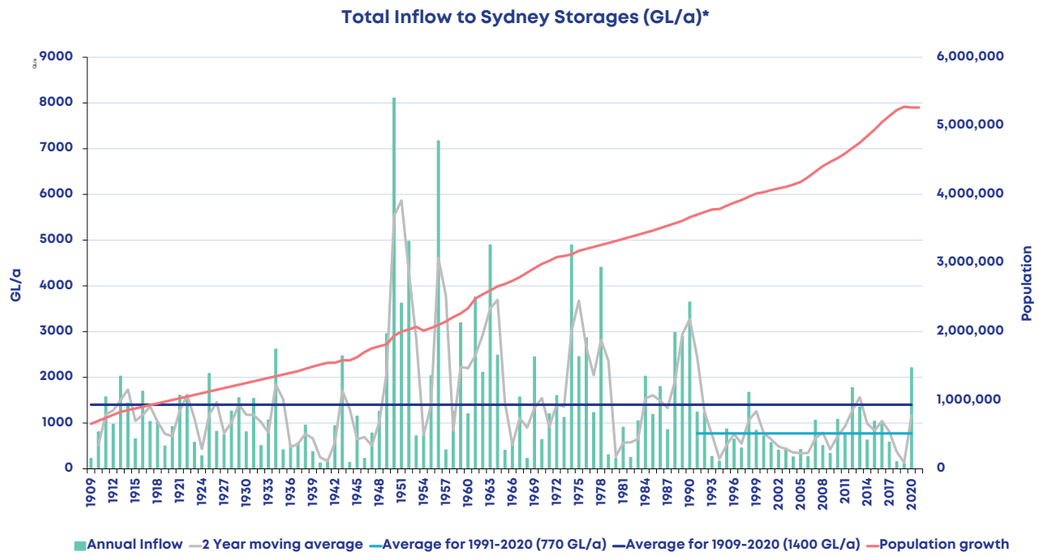



Figure 17: Annual average inflows to Sydney's water storages since 1909 (graph provided by WaterNSW)



## Level 3 Water Restrictions

- Triggered at 35-40% dam level
- Demand reduction of 19%
- Achieved via
  - Watering can or bucket for outdoor use (watering garden and car washing) – no sprinklers
  - No filling or top up of household pools
  - High household and business water users must reduce use by 20%
  - Watering sports fields and parks limited to 30 mins/ week
  - Car washes and nurseries must limit use

## Level 5 Water Restrictions

- Triggered at 15-20% dam level
- Demand reduction of 39%
- The use of level 4 and 5 restrictions has not been endorsed by the NSW Government
- COVID scale economic impacts would be experienced for the duration of implementation
- Water use prioritised to drinking, toilet flushing, firefighting, medical, police and other frontline services
- Limit showering time/ frequency
- Non-essential water-using businesses temporarily close (e.g. cafes, nurseries, car washes)
- High water use industries temporarily close (construction, manufacturing)
- Options to reduce or cease environmental flows
- Potential to turn off water supply systems at selected locations.
- Very high level of uncertainty regarding ability to achieve target demand reductions

## Enduring Supply

- GSWS defined enduring supply as something to "build over the longer term, capable of meeting the communities' minimum needs during periods of prolonged and extreme drought, irrespective of how long the drought lasts and the impact of climate change"
- For LTCOP we (Sydney Water in agreement with DPE) are targeting a L5 restricted demand for enduring supply
- With L5 equivalent of Rainfall Independent Water Supply (RFIS) in place, L5 restrictions would never be required, as there is always sufficient time to build additional supply before severe restrictions are implemented
- Targeting L5 RFIS for enduring supply does not mean not building more than this if needed in a drought. It is a target for long term planning

Figure 18: Water restrictions and levels of service

Our long term planning is adaptive to a range of climate change scenarios. Sydney Water's policy requires that planning be undertaken considering Representative Concentration Pathways (RCPs). RCPs are climate change scenarios defined by the Intergovernmental Panel for Climate Change (IPCC). They describe different greenhouse gas concentration (not emissions) trajectories out to 2100 and the associated predicted temperature change. We have adopted the RCP 4.5 climate scenario, but with sensitivity assessment considered at RCP 8.5 to ensure risks are well understood and managed. RCP 4.5 is considered a balanced approach, as it is an intermediate scenario.

Considering the RCP 4.5 climate scenario, we are planning for the following climate change impacts as identified in Table 3. For further analysis, refer to Appendix 3.2

Table 3: Key climate change impacts considered under the LTCOP

| | |
|---|---|
| **Reduced sustainable inflows** | Inflows to Greater Sydney's dams have almost halved since the early 1990s.[13] In the last 10 years we have witnessed record low inflows (2017-19) and record high inflows (2021-22). Modelling indicates considerable uncertainty and variability in rainfall and inflow volumes under the most likely climate future. However, a median loss of around 30GL per annum (7 per cent) is expected from our surface water supplies over the 2020-2059 period, with a maximum potential loss under a drier weather scenario of around 65GL per annum (15 per cent)[14] (for full modelling see Appendix 3.2). With surface water supplies and inflows decreasing, and rainfall variability and evaporation increasing, we can no longer rely solely on our current rainfall dependent supply sources to service our future city. |
| **Increased severity of droughts** | We face an increased severity of a 1:100,000 drought event, with more variable raw water quality impacts as droughts (and floods) increase in magnitude and frequency.<br><br>The severe 2017-2020 drought saw Greater Sydney's water storage levels deplete by 50 per cent in just two and a half years. Inflows during this period were significantly lower than any previous droughts on record (e.g., the Millennium Drought). If the drought had persisted, it is likely that we would have been unable to avoid water restrictions more severe than ever previously experienced in Sydney, while the next water supply was built. |
| **More intense heatwaves** | By 2030, NSW is expected to experience 10 more days in heatwave each year, with heatwaves becoming even hotter. As such, the demand for water will increase in support of greenspace, environmental health, and public health. In parallel, our assets will be subject to perform under deteriorating conditions, with the probability of asset failure increasing. |
| **Increased bushfire risk** | Bushfire is one of the main natural hazard impacts on Sydney Water staff, its operations and services. They are a natural part of the Australian environment, with NSW one of the most bushfire-prone regions of our country.<br><br>In the summer of 2019-2020, the capacity of our WFPs was challenged in a dual bushfire and flooding event, that resulted in unprecedentedly poor dam water quality. Ash and debris washed into our water sources and WFPs were pushed to operate beyond their design capacity. Bushfires can also impact our above-ground assets, causing damage and accessibility issues for our operational staff.<br><br>Historical information on bushfire events indicates increased occurrence in the last few decades. Research based on the understanding we have about how extreme bushfires develop suggests that there is potential for increases in frequency into the future (Sharples et al 2016). |
| **More severe storms and floods** | Since February 2020, Greater Sydney has experienced four major flood events. For example, throughout March and April 2022, a once-in-50-year weather event brought heavy rains throughout March and April 2022, turning our streets and footpaths into rivers and creating flooding in parts of Greater Sydney. More than 1,520 billion litres of rainwater flowed into dams – more than enough water to fill Sydney Harbour three times.<br><br>This persistent heavy rain and flooding caused significant deterioration in the raw water quality across all sources which was outside the design envelope of most WFPs. In two instances, customers were asked to reduce their water use as our WFPs were not able to filter the raw water at a sufficient rate to maintain our usual supply volumes. Further, more intense rainfall requires increased use of technology and investment in minimising stormwater ingress into wastewater systems, as overflows in our wastewater system can present risks to the environment and public health. |

Note that the climate change modelling has not been updated for V1.1 of the LTCOP.

13 New South Wales Department of Planning (DPE) & WaterNSW, August 2022, Greater Sydney Water Strategy

14 New South Wales Government AdaptNSW, 2020, Climate projections used on AdaptNSW

# Evolving customer and community expectations

Customers' views on water use and services has changed in recent times and will continue to evolve over the next decade. Customer expectations are being influenced by climatic events, a society wide push for a more circular and sustainable use of our valuable and finite resources and a growing understanding that healthy waterways and recreation areas add to quality of life. Customers will be empowered by more personalised and transparent services which have been shaped by experiences outside of the water sector (e.g., banking, electricity, telecommunications, web and mobile services).

Both our customers and the government have an expectation that Sydney Water contributes to waterway health, pollution prevention and safe and clean accessibility to swimming and water-based recreation sites across all of Greater Sydney. We have also listened to our First Nations customers who identified use of safe and clean local waterways for recreation and availability of water for essential household activities as key expectations. Importantly, First Nations customers also requested that their cultural knowledge and land practices should be a focus of any water management planning and decisions.

As Sydney grows, customer expectations are for water services that support an urban lifestyle with green spaces and waterways for recreation and city cooling. We anticipate purified recycled water (PRW) and desalination will be required to supplement our rainfall dependant water source. PRW will require wider social acceptance and be further tested via community education and engagement.

Through the Our Water, Our Voice[2] customer engagement program, we have gained customer insights on the outcomes they expect Sydney Water to deliver during the 2025-30 price period and over the longer term. We have insight into customer preferences for how the outcomes should be delivered, and some insight into relative willingness to pay for those outcomes and service levels.

Phase 1 of the Our Water, Our Voice customer engagement[2] program by Kantar Public outlines the 15 customer identified priorities for Sydney Water. The key priorities for customers are detailed in Figure 20 and the full report can be found at Appendix 3.3. We have responded to these priorities through the identification of three customer outcomes to ensure maximum customer value.

Our LTCOP ensures that we have a plan to deliver each outcome and associated objectives. Also identified in the phase 1 findings report by Kantar Public is that there have been marked shifts in the expectations and priorities of customers in recent years. Water's perceived value, use and impact has changed.

Whilst water is often still transactional in nature (i.e., focused on how water is used, its taste/smell, when it is used, what it is used for and ways in which it may be wasted or not used properly), customers are displaying considerably more future focused and preventative thinking when considering the value of water and how it is used. An example is the value being placed by customers on Sydney Water providing mitigation strategies against floods and fires – two customer identified risks.

In Phase 4 of the Our Water, Our Voice customer engagement program, over 4,000 customers (including owners and renters) informed us of the

### Our customer outcomes

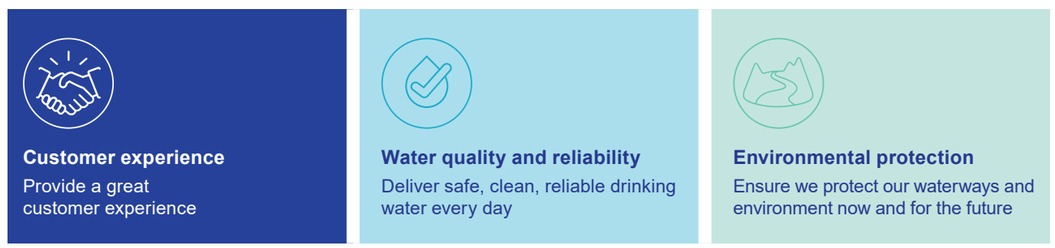



Figure 19: Our customer outcomes



value they placed towards Sydney Water improving or reducing service levels over the next 10 years, through an online Willingness to Pay survey. This was on top of already estimated increases to their bills to maintain current levels of service for new and existing customers. Of greatest importance to our LTCOP, the average customer who was a homeowner placed a value of:

- $15 on their quarterly bill for Sydney Water to maintain the current estimated time until severe water restrictions are enforced that is planned for at five and a half years, rather than it being reduced to four years, and an additional $13 to lengthen the time until severe water restrictions are enforced from five and a half years to eight years
- $15 on their quarterly bill for Sydney Water to maintain the current number of waterway sites which Sydney Water could improve that is planned for at 40, rather than it being reduced to zero, and an additional $12.50 to expand the number of waterway sites which Sydney Water could improve from 40 to 120
- $10 on their quarterly bill for Sydney Water to maintain the current production of recycled water that is planned for at four billion litres, rather than it being reduced to one billion litres, and an additional $6 to increase the production of recycled water from four billion litres to 6.5 billion litres per year (to irrigate 1,300 hectares of open space)
- $2.80 on their quarterly bill for Sydney Water to achieve net zero carbon emissions by 2040 and an additional $6.70 (total of $9.50) for Sydney Water to achieve net zero carbon emissions by 2030, rather than aligning to Government target by 2050.

In Phase 5 of the program, 60 customers participated in a deliberative panel over multiple days to consider a trade-off between performance, cost and risk to shape Sydney Water's investment plan for the next five year period. They informed us that they saw value in Sydney Water prioritising investment to reduce the risk of Sydney running out of water due to drought. They were prepared to pay another $15-$20 on top of their current bills over the next five years, in addition to maintaining current levels of water conservation to see this achieved. They also saw value in Sydney Water improving the state of waterways through preventing more pollution and protecting the wastewater system against failure. They were prepared to pay another $15-$20 on top of their current bills over the next five years for this to be achieved.

### The top customer priorities for Sydney Water are


Figure 20: 15 customer identified priorities for Sydney Water

## Emerging digital capabilities

As society progresses through the digital age, there will be significant advancements in the size, speed, intelligence, capabilities, and applications of digital technologies, such as new digital platforms, cloud technology, Artificial Intelligence and Quantum Computing. These technologies will change the way people live, work and interact, and will influence how Sydney Water delivers its services. These advancements will help to improve our operational efficiency and provide a significant opportunity to deliver enhanced water services across a more integrated and smarter network, and the ability for Sydney Water to make better and more timely decisions. It will change the way that customers interact with us and the services we provide them. However, increased digitalisation introduces heightened vulnerability to malicious cyber and technology-based risks.

Table 4 outlines what these opportunities and challenges might mean for us when developing our services and how our customers interact with us and our services.

Table 4: Opportunities and challenges for digitising our systems and operations

| | Developing our services | Interacting with our customers |
|---|---|---|
| **Opportunities for improved service, cost and risk outcomes** | To become a more resilient, responsive and efficient water utility will require us to respond proactively to societal changes in the use of digital technology.<br><br>Working together, our physical and digital assets will unlock improvements across water conservation, leakage reduction, operational efficiencies, and recycling. Significant upgrades are also required across our systems to enable this automation, which will see a positive shift in our workforce capabilities and skills.<br><br>This will not be without challenge, as we adapt to an increased digital environment while still using, and keeping our workforce trained in, 'manual' operation mode in times of emergency. | We expect that our ways of working and customer interactions will transform and become increasingly automated.<br><br>Our focus on customer outcomes must endure and driving business efficiencies will be critical to achieving this goal. To assist in this, further implementation and investment in enhanced automation, monitoring and control technologies and smart metering will be important. |
| **Heightened cybersecurity risk** | A greater reliance on and use of technology increases exposure to cyber-attacks, particularly for social infrastructure. As the technology matures and becomes more sophisticated, we will need to adapt to become more digitally resilient. | Like all utilities, and under recent changes through the *Security of Critical Infrastructure Act (2018)*, we will need to enhance our online systems and implement redundancy measures to protect the integrity of the network and customers' data. |

## Unpredictable events

Our ability to respond to the previous challenges is even further constrained by unforeseeable and unavoidable 'black swan' events occurring, such as pandemics and material price escalation due to global supply chain constraints and geopolitical tensions. The COVID-19 pandemic, for instance, has led to reduced resource availability and increased cost to deliver new infrastructure. While these costs appear to be levelling, they are unlikely to decrease and will continue to pose affordability challenges into the immediate future.

Our world has become more complex, with a greater deal of uncertainty around the rise of geopolitical forces across the Asia-Pacific region. Evolving geopolitical volatility increases the risk of sophisticated, high impact cyber and potentially physical attacks on critical infrastructure entities such as Sydney Water.

Sydney Water is classified as a 'critical water asset' under the amended Security of Critical Infrastructure (SOCI) Act 2018 (the Act) and has a responsibility under the Act to protect our systems. The Act imposes numerous protective security and all hazard management obligations upon Sydney Water, including the requirement to maintain a documented risk management program that must be approved annually by the Sydney Water Board.

As technology matures and becomes more sophisticated, we will need to continue to adapt and remain digitally resilient. Like all utilities, we will need to enhance our technology and implement redundancy measures to protect the integrity of the network and customer data. Sydney Water will also continue to leverage a range of advanced and emerging technologies to address the convergence between cyber, personnel and physical security.

04

# How we developed our Long Term Capital and Operational Plan

Due to inherent uncertainties in our operating environment, the LTCOP has been developed as an adaptive plan. We have considered the features that would deem our Plan successful, and tested various servicing scenarios against cost, levels of service and risk. Our adaptive approach is inclusive of sensitivity and stress testing, and quality assurance over the long term.

## Shaping the success of the LTCOP

The success of the LTCOP is critical to ensuring the safe, reliable and affordable delivery of water and wastewater services for the health and prosperity of Greater Sydney as it continues to evolve, including recovering from the COVID-19 pandemic. In developing the Plan, we have considered the following:

The LTCOP:

- Provides a basis to meet outcomes for both **near term regulatory requirements and critical stakeholder expectations**, and positions for foreseeable emerging directions (such as with regards to water quality, sustainability).
- Sydney Water's Infrastructure Investment Program is aligned with the NSW Government's housing supply policy, including the Transport Oriented Development (TOD) program, and will support implementing this.
- Reflects sensitivity to needs of **First Nations people**
- Appropriately **balances cost and service risks** which reflects rising **customer expectations and priorities** including acknowledging post-covid affordability challenges
- **Identifies, manages, and mitigates key risks from key decisions**
- Ensures **significant investments and decisions** are scheduled to **balance prudency, risk, and the ability to exploit new technologies or servicing strategies at any given time**
- Is informed by a confident understanding of when **critical decisions** will be required for **future servicing directions**
- Allows **confident near-term investment** and delivery in the context of **long term servicing strategies** for service delivery across the network
- **Monitors sensitivities and triggers** to drive **adaptive responses**
- **Encourages intergenerational equity** through both financing and delivery.

In addition to these considerations, we have developed success criteria to ensure the Plan's success as shown in Figure 21.


Figure 21: LTCOP success criteria

## Our plan has been shaped by our customers and key stakeholders

We have engaged with our key stakeholders across the development of the Plan, considering their requirements and expectations for our services into the future. In line with our LTCOP stakeholder engagement plan, we have consulted with our stakeholders across two phases, to inform key assumptions, decisions, and outcomes for the LTCOP. Our phased approach to engagement has ensured that each stakeholder receives the same opportunity to ask questions, share expectations and test ideas. Across the first two phases, we have been engaging with our stakeholders across deep dive sessions, one on one meetings, a range of working groups (such as the GSWS[1] and Water Sector Leadership groups) and briefings. Phase three, the final phase of our engagement, will see us close the loop with stakeholders through providing the final LTCOP, a consultation summary demonstrating all engagement completed, and an overview of the next steps.

Our LTCOP stakeholder engagement plan and the outcomes of our conversations with our key stakeholders can be found in Appendix 4.1 and 4.2 respectively. In consideration of our customers longer term priorities and immediate needs, we have shaped our Plan and key investment decisions around their preferred risk, cost and levels of service. In doing so we have weighed up the benefits and risk to customers of each long term decision to ensure we balance the needs of the economy, public health and the environment, and costs to service. For each investment decision, appropriate trade-offs have been applied that are consistent with our customers recommendations and advice.

## We are planning adaptively

In consideration of our key planning principles, we have developed the LTCOP using adaptive planning principles and methods. As such, we have considered a range of investment options and have stress tested the plan against several change scenarios. We have modelled various investment scenarios in consideration of different levels of service we can provide, the decisions we make, and outcomes realised as our operating environment evolves. Through time, we will monitor, investigate, and make appropriate decisions at the right time to shape our future servicing path. Each investment decision will depend on our customer priorities, the available solutions, the ability to address multiple outcomes, and the key design trade-offs and opportunities at that time.

Several key choices were identified that could significantly influence levels of service to customers, risk or benefits to the economy, public health and the environment, and costs to service. The key decisions framing our investment pathway across our investment drivers as well as their alignment with customer's priorities and preferences are detailed in Table 5. Our regulators and key stakeholders (NSW Health, EPA, DCCEEW and DPHI) have been engaged and support these decisions.

Table 5: Key planning choices considered under the LTCOP

| Choice | Customer priority | Recommended option and action | Risks/benefits to customers | How this aligns with customers risk/ cost/performance preference |
|---|---|---|---|---|
| **Enable the government's growth ambitions (~28 per cent of CAPEX to 2050)** | | | | |
| **1. How we enable and respond to growth (water and wastewater)** | This is not a customer priority however customers expect Sydney Water to consider the future needs of Sydney, to ensure existing benefits continue to be enjoyed with continuing population growth. | Work with DPHI and other key stakeholders to improve growth sequencing, ensuring best outcomes for potential home buyers with respect to both cost and availability of services. Implement Infrastructure Contributions that reflect the true cost to service growth. | With improved coordination, planning and sequencing of growth, Sydney Water could service more dwellings than the current developer led program, for nearly half the water and wastewater servicing cost. While this is a water servicing lens, there are examples of growth areas that also do not have transport, education and health services available. | Customers expect us to act in their best interests when investing for the future and build infrastructure efficiently.<br><br>They want us to ensure that we provide the same service standards for both new and existing customers. This means extending services to new customers in a timely manner in conjunction with expanding or upgrading the capacity of existing serviced areas. |
| **Water Quality and Reliability**<br>Deliver safe water for new and existing customers to protect public health (~15 per cent of CAPEX to 2050) | | | | |
| **2. Timing of upgrade to manage very poor raw water quality** | Maintaining safe and clean drinking water (1)<br><br>Reducing the chances of your drinking water occasionally smelling or tasting different (9) | All WFP's resilient to poor raw water quality by 2030 on a prioritised basis.<br><br>Upgrade WFPs to service new customers reliably | Mitigation of public health and water continuity risks during flood, drought and bushfire.<br><br>Provides a staged approach with Choice 2 as it also reduces risk of disinfection by-product (DBP) formation. | Customers expect Sydney Water to consistently provide access to safe, clean, water.<br><br>Ensuring that current standards do not slip, was a high priority for customers.<br><br>Customers want Sydney Water to prioritise areas that were urgent and business critical |
| **3. Timing to meet future Australian Drinking Water Guideline (ADWG) requirements** | | Address new DBP requirements when required to do so.<br><br>Assume implementation program of at least 5 years will be agreed with NSW Health. | Nature and timing of changes to ADWG requirements is uncertain. Allows performance of Choice 1 upgrades to be monitored and optimised ahead of further upgrade, which may avoid or reduce upgrade cost. | Customers were supportive of Sydney Water prioritising maintenance to maintain service levels around aesthetics |
| Deliver new water supply for new and existing customers to provide reliable drinking water every day (~3 per cent of CAPEX to 2050) | | | | |
| **4. Triggers to build water supply** | Enhancing the water network's resilience to drought (4)<br><br>Reducing water loss by minimising leaks and breaks (5)<br><br>Increasing water savings and reducing usage (6) | Build new supplies that enable supply resilience though diversification, while also ensuring we have time to progressively augment with new supplies to minimise likelihood of severe restrictions. This includes immediate investment in about 250 ML/d of desalination capacity and progressing planning for other projects. PRW projects would be implemented within a 10 year timeframe to realise avoided costs. | Investing in new supply now will address the current shortfall in sustainable supply to meet average demand and will also reduce the risk of restrictions and water supply failure in drought. The additional supply will slow depletion of the dam storage during a drought, providing some additional time to construct new supplies.<br><br>Further investment is warranted to further mitigate risks. At the very least, being delivery ready with additional projects to be built during drought would be the minimum level of readiness. Only building on drought triggers retains a level of risk of restrictions, supply failure and project deliverability risk that can be mitigated through investment prior to drought conditions. | Customers were supportive of a medium low risk profile which required Sydney Water would invest in new water supply options. Customers would also continue to conserve water at current levels however would be open to enhanced water conservation efforts if supported by Sydney Water to reduce the risk profile further.<br><br>Customers argued it was better to pay for new water infrastructure now than to wait till things get catastrophic.<br><br>Customers want Sydney Water to improve the resilience of Greater Sydney's water supply and reduce the frequency and duration of severe water restrictions. |

| Choice | Customer priority | Recommended option and action | Risks/benefits to customers | How this aligns with customers risk/ cost/performance preference |
|---|---|---|---|---|
| **5. Water supply available during deep drought ("enduring supply")** | | Deliver enduring supply to satisfy minimum restricted demand over time (approximately 60 per cent of normal total demand), through planned supply augmentations and drought triggered investment. | Intended to manage risk of unprecedented drought and the economic impacts this would have. Full implementation of this target represents a very high cost. Pre-investment and then a climate triggered approach provides substantive risk mitigation and opportunity for moderation of the investment profile to 2050.<br><br>Achievement of this level of supply with rainfall independent sources (enduring supply) will significantly reduce the risk of water supply failure during drought and will provide enough time to build another supply if needed. This target does not mean we would not continue to build more supply during severe or prolonged droughts. | Customers want Sydney Water to seek out improvements where possible, but to not 'go overboard' and chase higher levels of service.<br><br>Customers said that Sydney Water should increase its efforts to educate the public on how to reduce their water usage.<br><br>Customers perceived the minimum bill increase to be realistic, particularly when considering the current economic climate and rising living expenses. |
| **6. Approach to water system nodal resilience** | | Combination of investments to minimise single points of failure, additional rainfall independent supply, interconnect systems, digital investment and enhance emergency response. | Provides an optimised mix of investment to minimise economic and social impacts if key assets were to fail. Addresses highest asset reliability risks. Ensures key nodes have a form of additional supply or alternative pathway in case of failure.<br><br>Aligns with raw water quality related upgrades. Balances new supply across prioritised systems. Reduces cyber security threat, though no civil infrastructure solution resolves this fully. | Customers identified their preferred risk settings over the longer term to ensure that we adopt a medium-low risk profile in the delivery of water and wastewater services. |

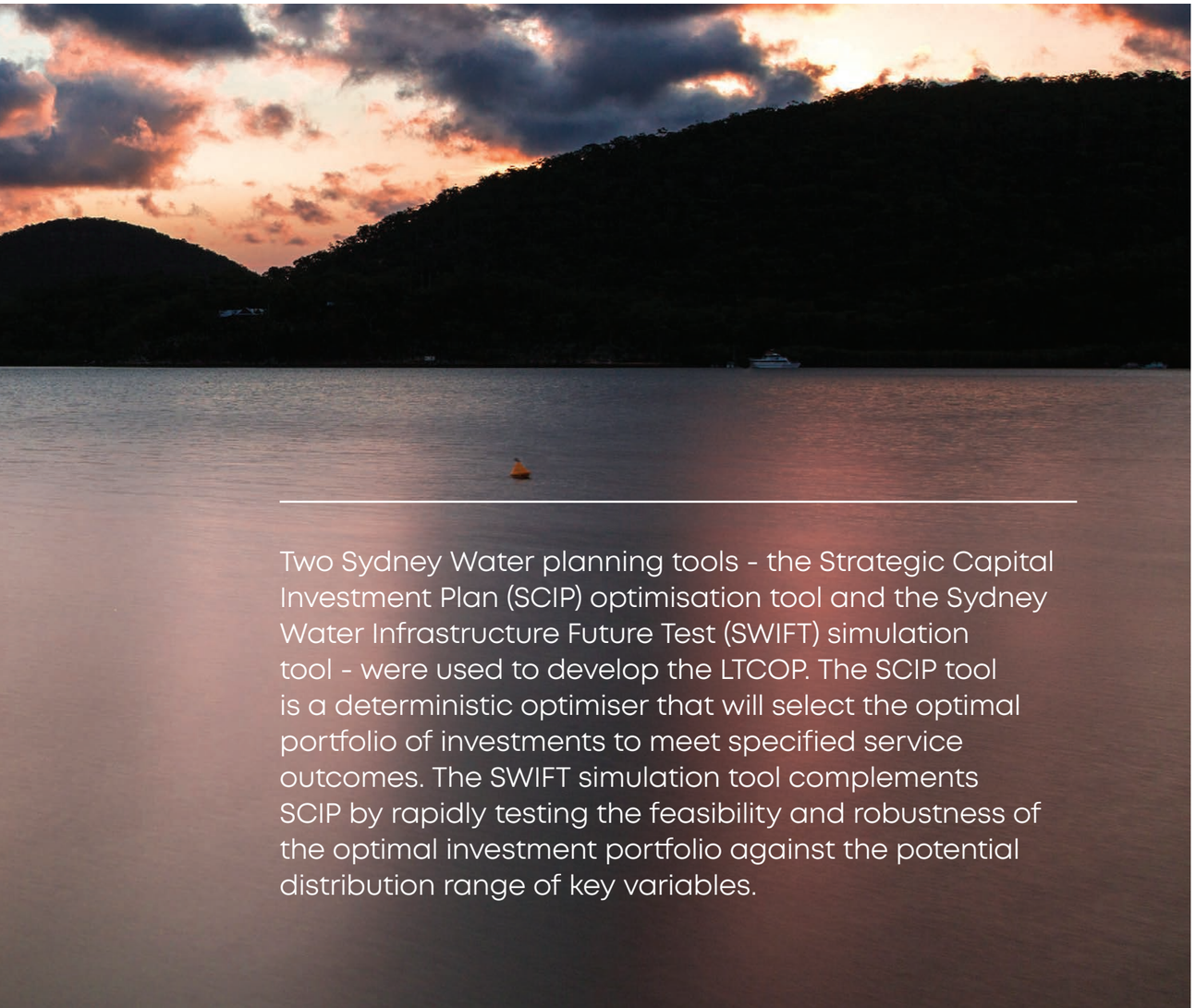


| Choice | Customer priority | Recommended option and action | Risks/benefits to customers | How this aligns with customers risk/ cost/performance preference |
|---|---|---|---|---|
| **Environmental Protection**<br>Deliver upgrades to our wastewater services for both new and existing customers to protect our waterways and environment<br>(~4 per cent of CAPEX to 2050) | | | | |
| **7. Timing and approach to compliance with current wastewater treatment plant licence requirements** | Ensuring waterways and water recreation areas remain clean and safe to use (3)<br><br>Improving natural waterways and habitats (7) | Work with the EPA to review selected Environmental Protection Licence (EPL) clauses where environmental benefits are low, while progressing higher priority planned upgrades. Environmental performance achieved by 2026. | Some EPL conditions are based on historic performance, rather than environmental outcomes. This approach focuses resources and investment where the most environmental benefit can be derived. | Customers were concerned that the current state is not acceptable, given that they heard EPA standards were being breached.<br><br>Customers advocated strongly against activities that would increase the risk of poor performance. |
| **8. Timing and extent of increased level of wastewater treatment at inland plants** | | Await further information on future requirements, but in the meantime, increase recycling in all forms where economic and investigate greater use of nutrient offsets1. | Timing and extent of future requirements is highly uncertain but expected to be well over 10 years away given the extent of monitoring and modelling required to support. Potential to scale up water recycling and offsets in the meantime. | Customers wanted Sydney Water to prioritise areas that were urgent and business critical and to seek out improvements where possible, but to not 'go overboard' and chase higher levels of service.<br><br>Customers are willing to pay more on their quarterly bills to see an increase in the number of healthy waterways above current levels. |

| Choice | Customer priority | Recommended option and action | Risks/benefits to customers | How this aligns with customers risk/ cost/performance preference |
|---|---|---|---|---|
| **9. Timing and extent of increased level of wastewater treatment at deep ocean outfall (DOOF) plants** | Ensuring waterways and water recreation areas remain clean and safe to use (3)<br><br>Improving natural waterways and habitats (7) | Proactively invest in solutions to remove flow and loads from coastal systems via recycled water and PRW in line with economic assessment | Need and timing of increased treatment highly uncertain but considered a significant risk as land constraints may make upgrade of DOOF plants infeasible, irrespective of technology improvements. DOOF structures will become hydraulically constrained in the future unless flows are removed from the wastewater system. | Customers want to see waterways, including beaches, rivers and creeks maintained in their current state or improved.<br><br>Customers are happy with the current state of the region's beaches and want Sydney Water to prioritise other areas that are urgent and business critical. |
| **10. Extent of wet weather overflow reduction** | | Linear extrapolation of current wet weather overflow abatement program, which is focused on source control (an estimated additional 26 per cent volume reduction between 2024 and 2050). | Program aligned with current EPA expectations. Improved benefits compared to expensive storage solutions, though takes longer to implement. There is a risk that benefits will be more difficult to realise as areas with highest stormwater ingress are addressed earlier. | Customers were supportive of a medium cost, risk and performance profile for prevent pollution. This included reducing the volume of wet weather overflows to current performance. |

# Determining our optimised expenditure profile

In response to our changing operating context, Sydney Water has considered a variety of servicing pathways. This ranged from our conventional servicing approach to an enhanced servicing approach that would deliver improved customer and stakeholder outcomes. We used complex modelling tools to develop and assess portfolios of investment to 2050 for each pathway. Our pathway assessment approach has ensured an optimum, balanced portfolio of investment that also achieves our success criteria as detailed earlier in this section. Our modelling methodology and analysis can be found at Appendix 4.3 and 4.4 respectively.



Two Sydney Water planning tools - the Strategic Capital Investment Plan (SCIP) optimisation tool and the Sydney Water Infrastructure Future Test (SWIFT) simulation tool - were used to develop the LTCOP. The SCIP tool is a deterministic optimiser that will select the optimal portfolio of investments to meet specified service outcomes. The SWIFT simulation tool complements SCIP by rapidly testing the feasibility and robustness of the optimal investment portfolio against the potential distribution range of key variables.



The process we have followed to optimise our investment portfolio has included assessing different levels of service and approaches to servicing, customer insights, and tradeoffs between risk, levels of service, and cost. Through this assessment and in agreement with our key stakeholders, we have informed our position against the key choices nominated earlier in this section and determined the scope and size of our investment profile.

In consideration of deliverability, we have smoothed our investment over the first 10 years out to 2035, deferring some investments to be delivered from 2036 onwards. We stress tested our investment profile, particularly over the first 10 years, to ensure an appropriate balance of risk, levels of service, and cost. This approach provides us with the confidence that our resultant investment profile can meet the needs of our evolving city in line with customer and community expectations. The portfolio of investment represented in the LTCOP aligns with the Final Optimised scenario as shown in Figure 22. Additional information can be found on the other scenarios considered in Appendix 4.5.

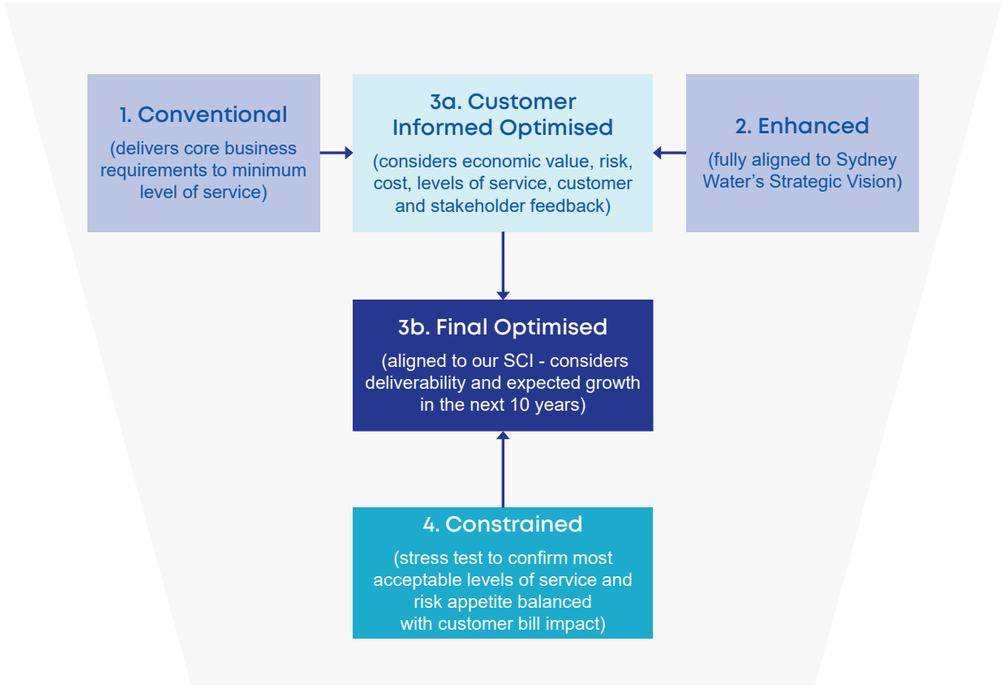



Figure 22: Determining our optimised expenditure profile

## Sensitivity assessment and stress-testing the plan

The LTCOP has been tested to ensure it is responsive to change and strengthens Sydney Water's capability to adapt should circumstances change relative to our base set of assumptions. These assumptions have been assessed for robustness to deviations through several sensitivity and stress tests. We have tested the performance of the plan and the impact on our planned investments against the following variations:

- Demand for drinking water
- Growth scenarios
- Climate change impact on long term average surface water availability (yield)
- Non-average weather conditions – design droughts – Median time to FSL
- Maintenance and renewals expenditure (no change in first 10 years)
- Unplanned change to wastewater and drinking water standards
- Changes to growth in connections and new services
- Changes to Warragamba Dam FSL

The results have demonstrated the robustness of the plan, ensuring a measured approach is applied to near term investment such that our largest servicing risks (drought and wastewater capacity) are managed whilst non-regrettable investments are made.

The results also support action to assess whether a change in servicing approach is required should circumstances change. For example, modelling of our design drought has highlighted that our current system is at risk of hitting minimum operating level in less than four and a half years once dam levels hit 90 per cent and continue to fall in drought. This is less than the expected time to build a new water supply source including SDP expansion. To manage this risk, further assessment is required to determine whether investment in our next water supply is brought forward to prepare for any future drought.

Further analysis is provided in Appendix 4.6 which describes the direct impact to both plan performance and plan investment should one of the underlying LTCOP assumptions change.

## Quality assurance of the long term plan

In assuring the quality of the LTCOP, we have conducted assurance of our key modelling inputs, our modelling methodology and the investment outcomes. In this manner, we have followed our own internal quality assurance (QA) methods and sought external independent reviews from a range of specialists. These external reviews focused on our costing approach, modelling methodology, key inputs (such as assumptions and drivers), incorporation of uncertainties in our modelling, and risk management approach. A summary of key QA activities and results can be found at Appendix 4.7.

We engaged experts to undertake a completely independent review of our plan. Our reviewers used their specialised experience in review and assurance of water company pricing submissions in the United Kingdom (UK), working with both water utilities and regulators and were able to bring a heightened level of scrutiny and challenge to the plan. The review included assessing alignment with Government and Sydney Water policy and customer and stakeholder needs, logic of investment decisions and benchmarking our cost estimates (Appendix 4.8).

In 2024, the NSW Government asked Infrastructure NSW to also undertake a review of the LTCOP, focusing on alignment with new housing policy and the first 10 years of investment in particular (the Essential Infrastructure for Housing Review). Infrastructure NSW produced a Cabinet paper that supported Sydney Water's investment program.

As each of our investments in this plan progress across the project lifecycle, they will also be subject to validation, reviews, and external scrutiny to ensure robust and rigorous assurance across our portfolio. Importantly, 80 per cent of our proposed investments for the first 10 years has already been through internal or external business case approval. All projects are subject to investment assurance scrutiny prior to delivery, with major projects observing the NSW Government investment assurance processes.



Aqua Consultants has undertaken an independent rapid review of Sydney Water's LTCOP utilising our extensive water industry knowledge, in the UK and internationally, of long term strategic plans. We have seen clear direction and proactive engagement in the development of Sydney Water's LTCOP. The proposed long term plan provides a robust platform to address the known issues of growth and security of supply. Furthermore, it sets out a clear need to resolve competing pressures of meeting long term challenges, affordability, and deliverability.

05

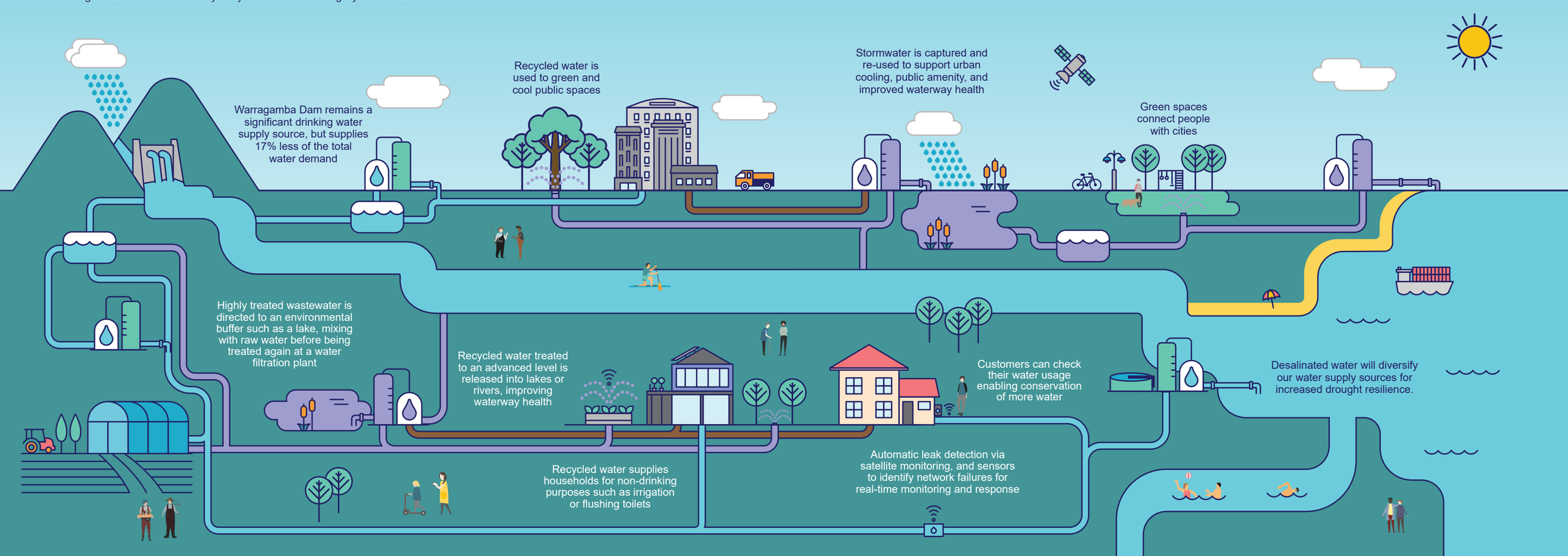
# Our adaptive plan to support Sydney's servicing needs

Our long term plan has been developed to support a thriving, liveable and sustainable Greater Sydney, including the needs of our customers, stakeholders and the environment. We have identified eight drivers in determination of our investments, each with consideration of future trends and uncertainties in our operating environment.

# Our long term plan enables a thriving, liveable and sustainable Greater Sydney by...

- **Ensuring we have resilient and reliable services**
- **Maximising community value through protecting the health of our waterways and parks**
- **Integrated servicing of infrastructure to deliver long term value for customers**
- **Embedding Circular Economy principles across our planning, delivery and operations**

Figure 23: Overview of Sydney Water's servicing system in 2050



# Our key areas of investment

In the context of our existing servicing system and the trends shaping our future, we need to invest now to configure our systems for the future.

We are at a critical juncture where transformative investment in our water, wastewater and stormwater systems is required to meet the city's future needs in a way that is more integrated, resilient and sustainable. This will protect our city against the impacts of climate change, while ensuring the health and amenity of Greater Sydney's beautiful waterways.

Our recommended plan provides a balanced approach, enabling management of the most significant public health, environmental and economic risks while maintaining the levels of service that customers expect. Our plan is optimised for both capital and operating costs to ensure we can provide services to customers in line with their expectations, meet our obligations to regulators and stakeholders, while also managing future risks at the lowest total cost.

In support of our changing city and customer priorities, we will prudently invest in response to eight key capital expenditure drivers as detailed in Table 6. Each of these drivers align with IPART's expectations and regulatory requirements as stipulated in their water regulation handbook using their newly developed framework which focuses on customers, costs and credibility. Some of our key capital investments and servicing outcomes are depicted on the following page. In parallel, we will invest in enabling more effective and efficient operations as explored in the latter part of this section.

Our investment profile represents a total investment of about $83 billion. By comparison, the alternate servicing scenarios we considered (Conventional and Enhanced servicing, Appendix 5.1) represent an upper bookend for the total investment to 2050 of between $83 and $120 billion. Our profile includes a total of $16 billion to fulfil our new accountabilities for water supply augmentation and stormwater management. These investments account for some, but not all, of the step change in investment outlined in this plan compared to past levels of investment by Sydney Water. Most of our investment is driven by growth, with renewing our aging asset base the second largest contributor.

Although our investments in Table 6 have been linked to a single driver, they are not exclusively proposed in response to a single driver. Sydney Water always seeks to integrate planning to resolve several issues with single investments to ensure best value outcomes for customers. By example, investments in PRW are primarily driven by avoiding wastewater costs associated with growth. Therefore, these investments are included as a growth investment. However, PRW schemes also build resilience through diversification of our raw water supply, they protect and enhance the environment, and they alleviate stress on our aging assets.

A more detailed breakdown of our investments is included in Appendix 5.2.

It should be noted that expenditure is always presented in real dollars (excluding inflation) in this report, unless otherwise stated. It is also important to note that while our first 10 years aligns with our IPART submission, and is therefore constrained for deliverability and affordability, the period beyond this is not constrained. Opportunities to reduce long term expenditure will be further assessed over time (e.g. optimising growth and renewals when more certainty in forecasts and condition is available).

Table 6: Key drivers of capital expenditure

| | Key strategic driver | IPART driver | Forecast costs (billion) 2026-2035 | Forecast costs (billion) 2036-2050 |
|---|---|---|---|---|
| 1 | **Enable the government's growth ambitions** through expanding infrastructure capacity to support the delivery of Sydney's regional growth plan. | Growth | $14.3 | $15.3 |
| 2 | **Renew our assets** to meet customer service expectations today and in response to the external trends shaping our future. | Renewal of existing infrastructure | $8.6 | $24.9 |
| 3 | **Build a resilient and reliable water supply** through investing in rainfall independent sources, eliminating single points of failure across our assets, interconnecting our systems, and managing cyber security threats. | Growth | $2.6 | $6.6 |
| 4 | **Expand our stormwater services** to contribute to improved waterway health through more integrated servicing of recycled water across Western Sydney. | Growth | $3 | $0 |
| 5 | **Digital enhancements to our physical assets** to lay the foundations of our asset management system and support data driven decision making for improved customer outcomes. | Improvements | $0.6 | $1 |
| 6 | **Protect public health** to ensure the wellbeing of our customers and community through the products and services we offer. | Renewal of existing infrastructure | $1.6 | $0.4 |
| 7 | **Protect and enhance the environment** by improving the way we manage our wastewater and stormwater systems to prevent pollution and protect against failure. | Renewal of existing infrastructure | $1.3 | $2.2 |
| 8 | **Enhance our climate change response** through delivering against our environmental and social obligations and identifying new sources of value that deliver a positive benefit to the economy | Improvements | $0.2 | $0.7 |
| | **Total** | | **$32** | **$51** |

The first 10 years of the investment profile aligns with our IPART submission and is therefore constrained for deliverability and affordability. For the 2036-2050 forecast, a set of assumptions have been made regarding future uncertainties in order to present an estimate of long term expenditure. While long term investment is best considered as a range based on scenarios, given these uncertainties, in order to present insights into the future, a forecast for the 2036-2050 period is presented here. The forecast for renewals for the period 2036-50 considered a similar approach of the forecast for the first 10 years and that an asset performance and risk-based approach would be adopted in selecting assets for renewals. An efficiency was also applied to the 2036-2050 growth program, to ensure that growth and renewals investments in particular are not "double counted", given we always seeks to optimise between co-drivers and make the investment once where practicable.

In this document, we have nominated the key investments across each of these eight drivers. Investments presented are at a real value of at least $100 million for our water system and at least $200 million for our and wastewater, recycled water and stormwater systems, or for any other categories of spend. Our complete investment profile and associated costs and timings for each investment can be found in Appendix 5.2.

# LTCOP key investments and servicing outcomes to 2050

**65%** of our drinking water supply will be rainfall independent

**Up to**
**163 GL**
**recycled water each year**
across 6 purified recycled water schemes to replace up to 23% of Greater Sydney's water use

**8**
**New rainfall independent water supplies**

**Upgrade all major WFPs**
in protection of public health, improving our drinking water quality and upgrading capacity to treat poorer water quality following extreme weather

**3**
**new major interconnecting water supply pipes to build system resilience**

**2**
**new water resource recovery facilities**

**1**
**new integrated stormwater harvesting scheme**

**Upgrade the capacity of our WRRFs**
to ensure we meet our future licence requirements in protection of environmental health

**13,000 km**
of water supply pipes and wastewater transfer pipes to service new suburbs

**500 km**
of new recycled water pipes to service new suburbs

Avoid **49 GL** of drinking water use by 2040

Figure 24: LTCOP key investments and servicing outcomes to 2050



# Our Plan diversifies our water supply sources and optimises re-use of wastewater

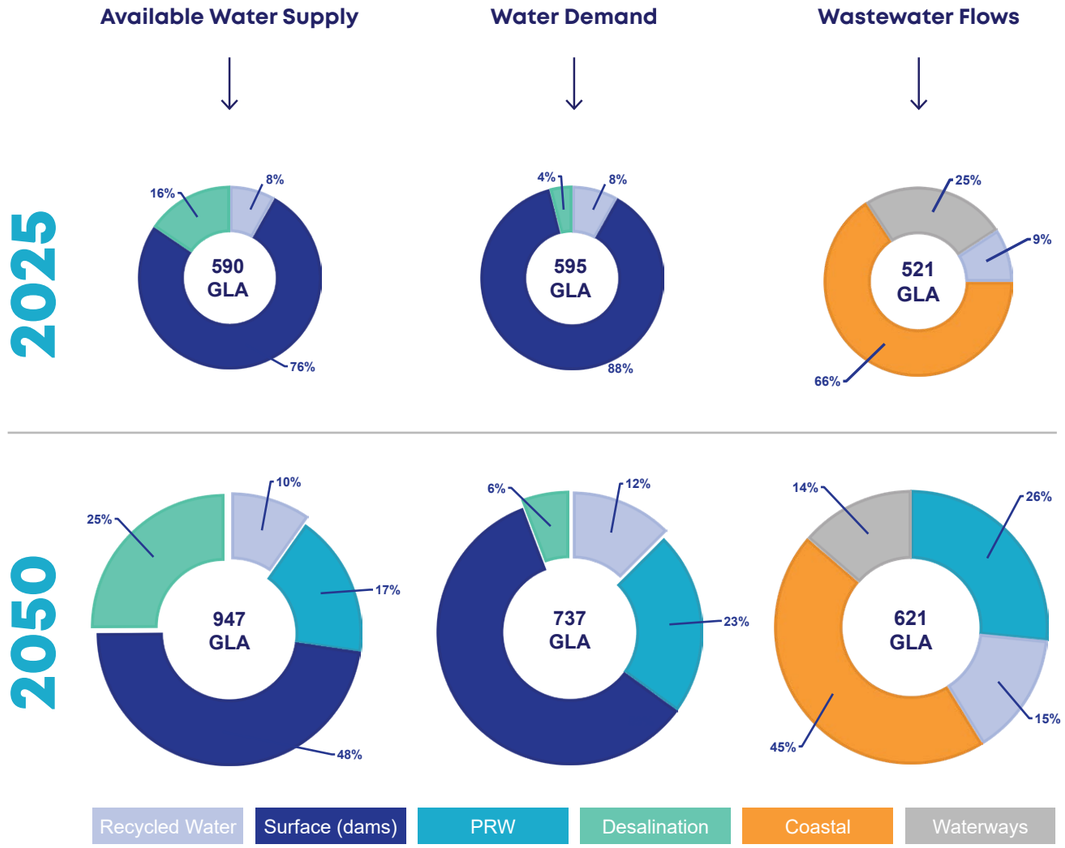



Figure 25: How this investment will ensure a resilient and reliable water supply

**Notes:**

- Current 2025 water balance is extracting more than our long term sustainable surface water supply.
- Purified Recycled Water is the drinking water produced after treating wastewater three times. Firstly, at a WRRF, then via membrane technology under advanced treatment, before being transferred to an environmental buffer such as a reservoir or dam. Here, it mixes with stored surface water before undergoing treatment for a third time at a WFP and entering the distribution network.
- Recycled Water is treated wastewater used in industrial processes, in irrigation for agriculture, in urban parks and landscapes, and in households for flushing toilets, car washing and watering gardens. It is not for drinking or personal use.
- For further analysis on supply and demand, refer to Appendix 5.3.

Although driven by different factors, our investment can be categorised across our key water products, such as for water, wastewater, recycled water and stormwater. Figure 26 and Figure 28 demonstrate the spread of our capex investment in this manner, demonstrating a large focus on expenditure in our wastewater system.

As we face the pressing challenges of aging assets in the future, there is an increasing investment on renewal programs to ensure the sustainability and reliability of water and wastewater services. By proactively addressing asset aging through systematic renewal efforts, we can safeguard public health, reduce long-term expenses, and build resilience against future infrastructure challenges. While investment is increasing, the efficiency of this investment improves over time as our customer base grows. This means we will be spending less per customer over time, despite this increased level of expenditure.

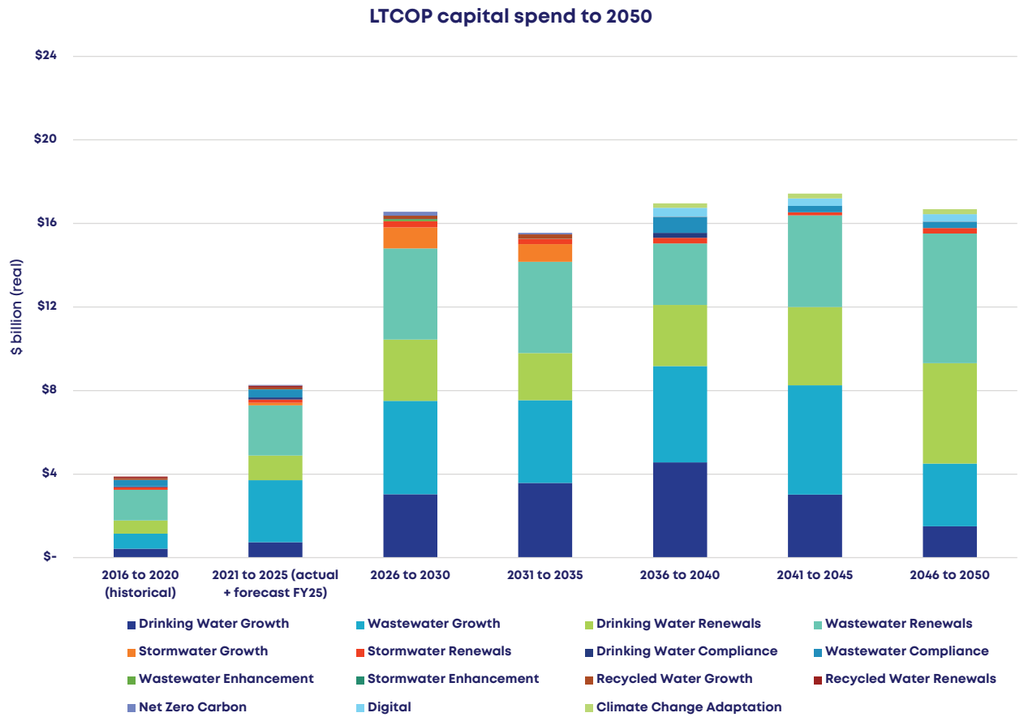



Figure 26: LTCOP capital spend to 2050 per IPART price path

To minimise cost to customers while maintaining an appropriate level of performance, the renewals investment profile for the first 10 years has been informed by asset performance, cost and risk analysis from deterioration models. This exercise compared the cost of different intervention options to achieve the optimum performance and risk to service levels.. We are building the capability to apply and embed these techniques systematically across all asset classes, and extend their application beyond the 10 year investment horizon, where practicable. This analysis underpins our proposed renewal and maintenance investment and extrapolates the investments beyond 10 years as illustrated in Figure 26.

To cater for deliverability and financeability of the program, a growth program level rescheduling and adjustment has been applied.



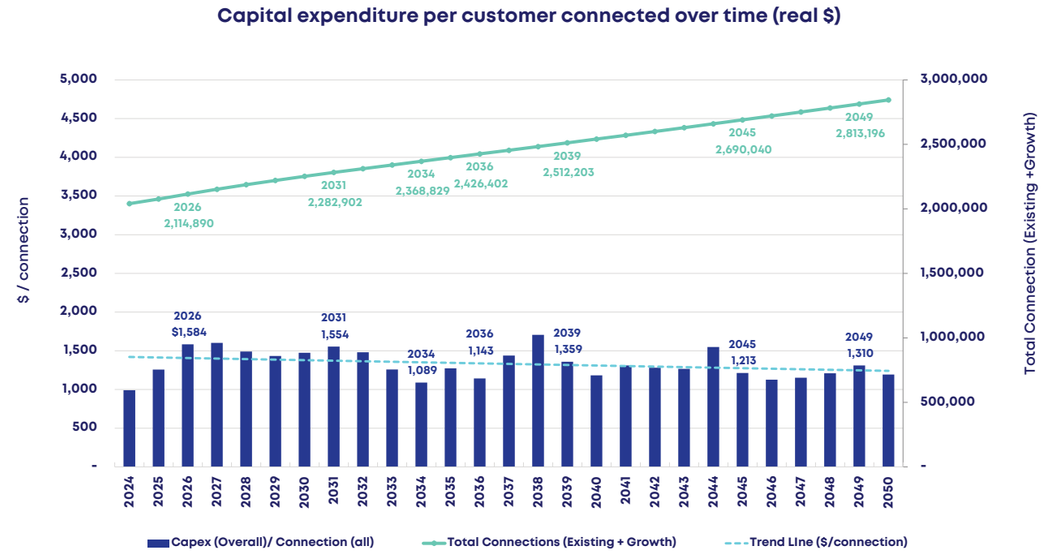



Figure 27: Capital expenditure per customer connected over time

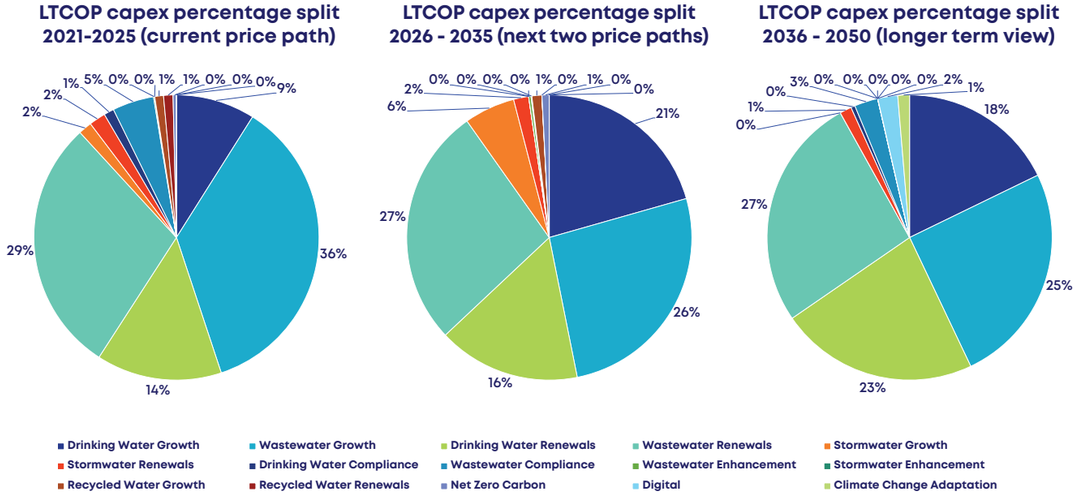



Figure 28: LTCOP capex percentage split per IPART price path

# Our core investment pathway

As part of our adaptive planning method, our core investment pathway is supported by understanding of cost, risk and service impacts in the event we deviate from our Plan and follow different servicing directions or scenarios. Planning in this way will help us make key choices through the life of the plan. Deviations from our proposed path in response to changing assumptions or planning context will result in changes to our planned investment costs. The alternative pathways outlined in Figure 29 could reduce Sydney Water's capital expenditure to $80 billion (if Mamre Rd & Aerotropolis stormwater servicing reverts to on-lot servicing with Councils) or increase to $92 billion (if coastal wastewater discharge performance requirements increase and PRW is not accepted by the community). Our core investment pathway is shown in Figure 29, demonstrating our proposed key investments and the critical enablers that will ensure we can follow our recommended path, such as approval of business cases or community and regulator support for PRW and river flows. The investments will be staged to have the flexibility to move towards the recommended pathway with no regret investments. It is essential to adopt this investment approach now to realise the quantified maximum benefits for our wastewater systems.

In our scenario analysis, we also included alternate levels of service as part of our assessment. If levels of service were further enhanced (would need to be supported by customer willingness to pay or regulatory requirements), expenditure could increase to $120B to 2050.

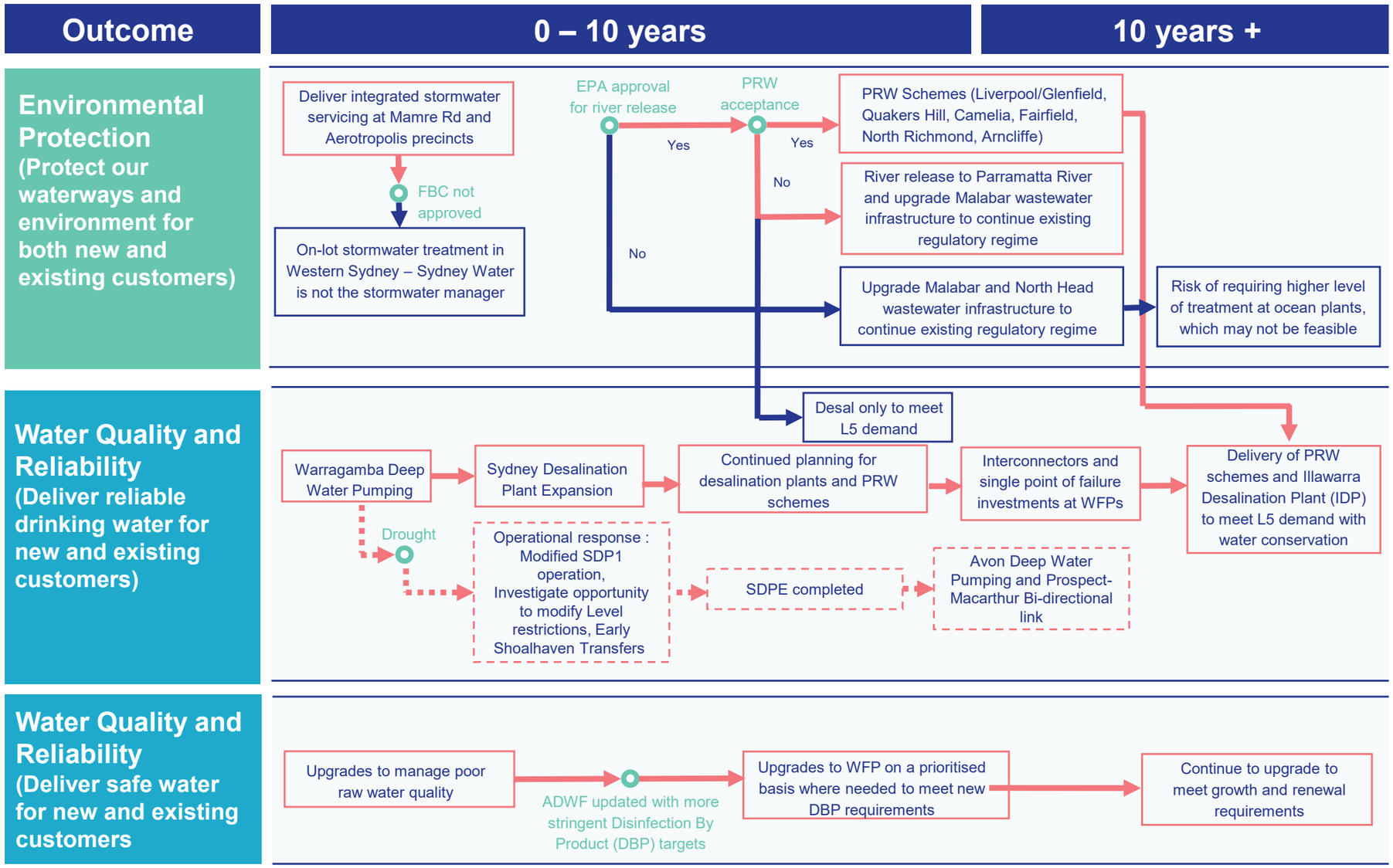



Figure 29: Our core investment pathway

# Evaluation of our plan against its critical success factors

## Deliverability

Our long term plan represents delivery challenges, but is deliverable. Sydney Water has established contracts that position us well, and there is more we are doing. The capital expenditure profile largely matches industry assessment of market ability to deliver capital works (when adjusted for land acquisition, higher market costs and altered productivity during the recent global pandemic).[15] The steady renewals program has an established delivery mechanism (Partnering for Success contracts). The higher value major projects (about 50 per cent portfolio value) are proactively working in market-building bespoke delivery strategies.

We recognise that construction industry capacity, supply chains and skills have all been stretched by COVID-19 and other world events. In response to these complexities and to optimise delivery of our planned investments, we must implement a series of strategic interventions to enable a portfolio approach to delivery. These interventions are focused on industry intelligence, procurement and supplier management as per Figure 30 below.

## Financeability

Our long term, predictable income stream from our essential services, as well as our strong regulated asset base (RAB) are considered attractive for financing. We can borrow (through T-Corp) to relatively high levels against our RAB and future cash flows, while meeting our Capital Management Policy and maintaining our Fitch BBB+[16] investment grade credit rating (good credit quality).

The reintroduction of Infrastructure Contributions, anticipated to be under a staged approach from July 2024, is critical to financing. Infrastructure Contributions bring forward user funding from developers as opposed to long term customer payments. The quantum and timing of these cash flows significantly impacts the amount of borrowings and the financing risk profile.

The regulatory model assumes the higher capital investment program is paid for by developers through infrastructure contributions and through customer bills. However, financing of our forward program in this way will still result in higher bills to customers, particularly in the next price period. Therefore, financing of the program needs to be considered alongside affordability.

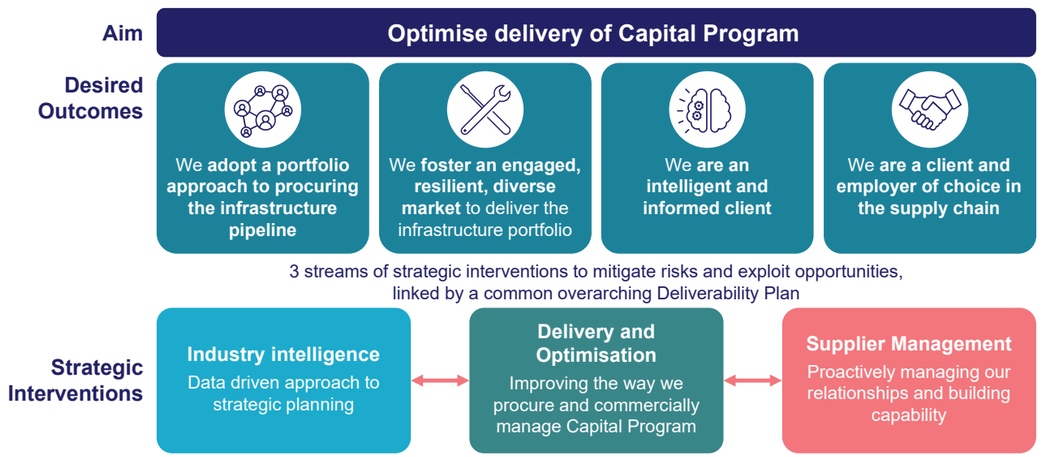



Figure 30: Strategy to ensure deliverability of the LTCOP

## Affordability

Our long term plan indicates a large step-change in investment as we are challenged to maintain and improve our customer services outcomes in an ever-changing operating environment, while also delivering on new responsibilities. Optimising and maximising the performance of our current systems in recent decades has resulted in comparably lower levels of investment. Hence, we have seen Sydney Water's bills decrease in real terms, currently delivering the most affordable bill of the major Australian water utilities. Figure 31 demonstrates that our bills represent only 0.79 per cent of the average disposable household income.[17,18] Importantly, relatively low costs of capital over the past decade have contributed to our prices.

Our long term planning and modelling indicate that customer bills will increase year on year to 2050. Under our existing regulatory model, more substantial bill rises could be expected within this decade. Our bill modelling includes financing from infrastructure contributions from July 2024, enabling us to increase revenue and access substantial increased borrowings to partly fund our increased capital investment program. Our baseline bill modelling uses Sydney Water's forecast of WaterNSW's pass-through costs for bulk water supply. Alternate WaterNSW pass-through cost scenarios are discussed at the end of this section.

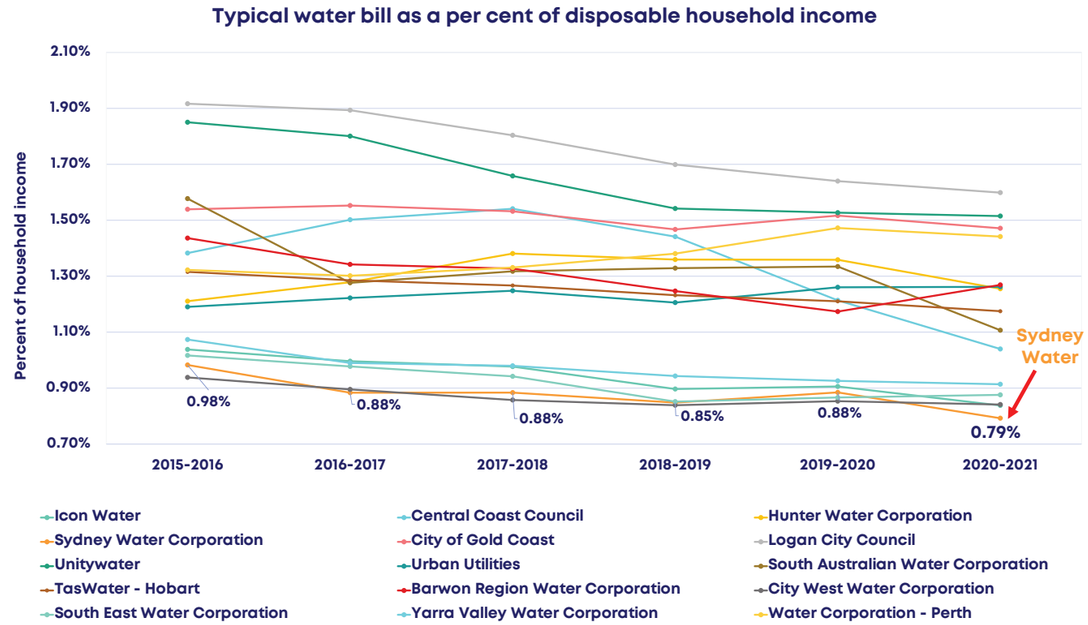



Figure 31: Typical water bill as a percentage of disposable household income across major Australian water utilities

15 Infrastructure Australia, 2021, Infrastructure Market Capacity 2021 Report

16 Fitch Ratings 2023, [accessed 4 May 2023], Rating Definitions

17 Australian Bureau of Statistics (ABS), 2022, Household Income and Wealth Survey Australia (Reference period 2019-20 financial year)

18 Australian Bureau of Meteorology (BoM), 2021, National performance report 2020–21: urban water utilities

We continue to work with stakeholders and IPART to consider alternative approaches to billing and revenue recovery that could improve intergenerational equity outcomes and smooth prices over time. These options have also been shaped by our customers including their preference for Sydney Water to maintain single block tariff structure.

As described earlier in this document, we have tested the levels of service, cost and risk associated with a range of investment scenarios, including the impacts on our critical success factors if expenditure is deferred. As such, our plan optimises cost impacts to customers by investing at the right time to mitigate risk, saving up to $2 billion in avoided cost opportunities. We have also had our plan independently reviewed, including cost modelling and to ensure we have applied robust methodologies in determining our expenditure profile.

We understand increases to customer bills have the potential to exacerbate cost of living pressures on customers, especially in a period of high inflationary and cost of living pressure in response to the COVID-19 pandemic. However, removing or deferring investment to reduce costs is not feasible without introducing significant economic, public health or environmental risks. As such, we will work with customers and our key stakeholders to ensure our Plan's affordability.

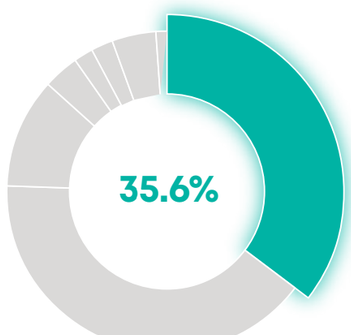
We have identified the following options to improve affordability for our customers:

1. **Review how costs are recovered after investment is made** to smooth bill prices in consideration of inter-generational equity. As part of our IPART pricing determination, we are proposing a combination of a one-off increase that lowers the average bill increase across the regulatory period, and a smoothed increase that minimises the financial pressure households experience when paying their September 2025 Bill.
2. **Introducing different tariff structure (e.g. tiered pricing)** guided by our customer's preferences to compensate for higher usage customers and to reward low use.
3. **Identifying operational efficiencies** to reduce the operating cost per property through ongoing improvements in performance and targeted investment in digital infrastructure to deliver more for less while improving decision making.
4. **Sustaining financial support programs** that provide ongoing support to our customers under financial duress for any short-term bill increases that are beyond their capacity to pay. We will uplift our services with the assistance of the NSW State Government, where we forecast Sydney Water will offer over $1 billion in payment assistance programs between 2025-2030. We will continue to collaborate with new community groups to ensure that we are generating awareness of existing support programs.
5. **Enhancing the effectiveness of our water conservation programs** to place demand in the hands of our customers through supporting and encouraging them to save water where appropriate to reduce bill in the longer term. We will continue to support our customers through water efficiency programs such as WaterFix Residential, Strata and non-residential (WaterFix Commercial and Schools) and offer monitoring programs that identify concealed leaks to assist our customers in finding leaks.
6. **NSW Government adjusting its rate of return on the RAB** through time to help flatten the bill curve.

Our IPART submission provides more detail on opportunities to improve affordability for customers including addressing customer impact and providing support for our investment profile to 2035.

## Driver 1:
## Enable the government's growth ambitions

**$29.6 billion**
**to 2050**




### Key Investments

| FY2026-2035 |
|---|
| Upper Nepean new Advanced Water Resource Recovery Facility and wastewater network |
| Purified Recycled Water Schemes at Liverpool and Glenfield, and Quakers Hill |
| Camelia new Water Resource Recovery Facility |
| Delivery of Upper South Creek Water Resource Recovery Facility |
| Bulk supply and transfer infrastructure – water, wastewater and recycled water |
| Water Resource Recovery Facility Upgrades at Malabar, Picton, Riverstone, Rouse Hill, Castle Hill, Liverpool, Glenfield, Fairfield, West Hornsby and Quakers Hill |
| Water Filtration Plant expansions at Macarthur |
| GMAC water networks |
| WSAGA and SWGA water and wastewater networks |
| WP200 Upgrade |
| **FY2036-2050** |
| Bulk supply and transfer infrastructure – water, wastewater and recycled water |
| Upper South Creek Water Resource Recovery Facility expansion |
| Purified Recycled Water Schemes at Camelia and Arncliffe |
| WSAGA and SWGA water and wastewater networks |
| Water Resource Recovery Facility upgrades at North Head, Riverstone, West Hornsby, Rouse Hill and Castle Hill |
| Quakers Hill Purified Recycled Water Scheme |
| Water Filtration Plant expansions at Nepean |
| GMAC wastewater networks |

NSW and the rest of Australia is experiencing a generational housing crisis. This combined with increasing population means that responding to growth comprises a large proportion of our long term investment profile at 36 per cent of total investment forecast out to 2050. Given the significance of growth in Greater Sydney and changes to our climate, we are proposing a significant shift in the configuration of our systems to enhance and build resilience. The NSW Government and customers' want to see greater recycling, green landscapes and healthy waterways, and our proposed approach aligns with integrated water cycle management for delivery of these outcomes in the highest value and most cost-effective way.

Most of our growth investments will be delivered within the next decade, although they remain a significant portion of our investment profile all the way to 2050. Across the full profile, our focus is on upgrading our wastewater system. Under our current West to East wastewater flow service model, increased growth in Eastern and Central Sydney is prompting the need for us to create capacity in our coastal wastewater systems. To create this additional wastewater capacity, we are pursuing PRW schemes and building new or upgrading existing WRRFs. Although we are cognisant to the efforts required to enable community acceptance of PRW, our modelling indicates that these schemes are the most economical way to service our growing city and provide the best opportunity for enhanced environmental outcomes for waterways.

Although much of our growth investment is focused on our wastewater system, we are expanding our water system in service of future growth. Our key water growth investments are to expand our WFPs to be able to treat and supply more water into our distribution system.

By nature of our ever-changing operating environment, changes to our servicing systems are prompted by a multitude of drivers. Although primarily driven by the need to build resilience and reliability into our water supply, diversifying our drinking water supplies through desalination and other PRW schemes will also support our growing city (Driver 1) and contribute to improved environmental health (Driver 7).

### New Wastewater Treatment Plants in Western Sydney

Growth into new suburbs in Western Sydney requires the development of two new WRRFs, one in Upper South Creek (currently in delivery) and one in Upper Nepean, servicing the Western Sydney Aerotropolis and Greater Macarthur Growth Areas respectively. The new Upper Nepean WRRF will support approximately 60,000 new dwellings and 40,000 new jobs by 2040, and the new Upper South Creek WRRF will support 4,500 new dwellings and more than 100,000 new jobs by 2056.

These WRRFs will treat wastewater that would have otherwise flowed and added additional pressure to our coastal wastewater treatment facilities, principally Malabar. They will be able to treat water to an advanced level, providing potential for environmental flows, for river extraction downstream at North Richmond WFP (Upper South Creek), and river release into the Hawkesbury Nepean River (Upper Nepean). Some recycled water produced from the Upper South Creek plant will be re-used to supplement our water supply, and the recycled water produced at Upper Nepean may be considered for PRW in the future.

### Upgrades to our Water Filtration and Water Resource Recovery Plants

We will upgrade our WFP and WRRFs to service future growth. Key WFP upgrades include expanding our Macarthur, Orchard Hills, and Nepean plants. For our WRRFs, key upgrades are planned at our North Head, Malabar, Picton, Riverstone, Rouse Hill, Castle Hill, Liverpool, Glenfield, Fairfield, West Hornsby and Quakers Hill facilities. Following initial growth upgrades, some of these WRRFs are anticipated to undergo further changes to support the delivery of PRW schemes, namely at Liverpool, Glenfield, Fairfield and Quakers Hill. As such, we will consider future PRW related requirements in the delivery of these upgrades.

### Bulk supply and transfer infrastructure | water and wastewater

We will invest in new bulk transfer infrastructure for both water and wastewater to service growth in new suburbs. We will build up to 13,500 km of pipework in these greenfield areas by 2050 to service new customers. We will also incur additional costs as we augment the existing network to cope with increased density in established areas.

In line with the NSW Productivity Commission's recommendations[19], we are working towards the reintroduction of infrastructure contributions for water, wastewater, and stormwater services to help recover the cost of providing infrastructure to new developments. Developers will continue to fund and construct minimum reticulation mains (lead-in pipelines to service individual properties), before usually handing them over to Sydney Water at no cost.[20]

### Purified Recycled Water Schemes | Liverpool and Glenfield, Camellia, Arncliffe, and Quakers Hill

We intend to invest in several 'indirect augmentation' PRW schemes as defined in the Australian Guidelines for Water Recycling (AGWR).[21] In indirect schemes, wastewater is treated three times. Firstly, at a WRRF, then via membrane technology under advanced treatment, before being transferred to an environmental buffer such as a reservoir or dam. Here, it mixes with stored surface water before undergoing treatment for a third time at a WFP and entering the distribution network.

Implementing PRW schemes at Liverpool, Glenfield, Camellia, and Arncliffe will avert the capacity impacts on our existing coastal wastewater infrastructure from growth. Upgrading our existing WRRFs to treat water to an advanced quality and building new ones such as at Camellia and Arncliffe will support the delivery of these schemes. Upgrades will also be required at Prospect

19 NSW Productivity Commission 2022, Infrastructure Contributions Review
20 Sydney Water 2022, Funding infrastructure to service growth
21 Australian Government 2006, Australian Guidelines for Water Recycling (AGWR)

Reservoir so that it can process the PRW flows sent there from these new and upgraded WRRFs. If we are still pending full community support and social licence for PRW at the estimated time of delivery for these schemes, we will work with the EPA and seek to send these flows to a nearby waterway with their approval.

The additional flows we intend to process via these PRW schemes would have otherwise placed additional capacity and contaminant load on our coastal systems which are already nearing capacity. We have estimated a total avoided cost of up to $2 billion by pursuing PRW schemes compared to increasing the capacity of our coastal wastewater systems. For example, treating up to 100 ML/d of flow at the Liverpool WRRF under the Liverpool and Glenfield PRW scheme reduces the cost of upgrading the large wastewater transfer pipe into Malabar WRRF, the SWSOOS, by up to 15 per cent. There is also a longer term opportunity to implement a PRW scheme at Arncliffe to remove additional flows from the Malabar system to further defer any system upgrades. Further, treating up to 100 ML/d of wastewater at a new WRRF at Camellia under the Camellia Recycled Water and PRW scheme removes the need to upgrade the major wastewater transfer pipe into North Head, the NSOOS. In addition to the deferral or removal of upgrades for the SWSOOS and NSOOS, these PRW schemes defer major treatment plant growth and compliance upgrades at the North Head and Malabar coastal WRRFs. The Quakers Hill PRW scheme additionally addresses growth and compliance requirements in the system for discharge into the Hawkesbury Nepean River.

Alongside better and cheaper management of our wastewater system as our city grows, PRW schemes have significant benefits in diversifying our water supply sources. They can be cost and energy competitive to other supply options, such as desalination (as described under Driver 3). We are pursuing investment in PRW schemes alongside desalination projects, seeking customer and stakeholder input and considering economic and environmental outcomes.




Figure 32: Purified Recycled Water Schemes

Our Purified Recycled Water (PRW) Discovery Centre opened in October 2023. After wastewater is treated at the Quakers Hill WRRF, recycled water is fed into the centre to undergo several treatment processes – ultrafiltration, reverse osmosis, ultraviolet and advanced oxidation, and finally chlorination. The facility demonstrates the performance and reliability of some of the treatment technology used to treat recycled water to a quality suitable to supplement our drinking water supply. As an educational tool, it also helps to build community understanding and acceptance of PRW.

Over 1,800 people have visited the PRW Discovery Centre since opening, including more than 700 stakeholders, 400 community members and 700 employees. The facility has also hosted several international visitors, as well as representatives from other water utilities and organisations from across Australia. We've seen overall media coverage of 3.6 million people for PRW, had 100,000 website visitors, 1.9 million social media users reached, and our Wonders of Water van engage over 25,000 community members.

Statistics from the January to March 2024 Water Literacy Tracker show that 64% of our customers are comfortable with the idea of purified recycled water being used for drinking water.



## Servicing Growth in the next 10 years

DPHI's 2021 growth forecast (released in 2022) was the basis for our growth investment. However, the LTCOP has included sensitivity testing to the latest 2023 (released in 2024) DPHI growth forecast and targets. The LTCOP includes costs to service the government's full forecast growth to 2050.

Growth is volatile and forecasts can vary year on year. The location of growth can also change costs to service quite significantly. Infill growth often requires minor local investments as latent capacity from years of water conservation is able to be used (though the trunk infrastructure upgrades when triggered can be very large). Greenfield areas adjacent to existing services are much faster and cheaper to service than greenfield areas that lack any neighbouring pre-existing infrastructure. With the current housing supply deficit, the recent changes to growth policy, the introduction of Urban Development Plans by DPHI and the reintroduction of water infrastructure contributions, we anticipate that growth in areas that are comparatively faster to service, and at lower cost, will accelerate, while other areas may potentially slow. These factors could help provide more houses than in the government's forecast at a lower cost

In forecasting the next 10 years of growth investment, we used our extensive growth intelligence data (gathered from developers, Councils and DPHI) to review and calibrate growth investment in the nearer term. As a result, investment for areas not represented in our Growth Servicing Plan[23] (which publicly documents the planning, design and delivery timing of infrastructure to support growth) has been deferred to beyond 2033, to enable increased focus on the Government's priority growth areas.

For the Greater Macarthur region, where the costs to service are the highest in the city, we made a 40% risk adjustment over the next 10 years, anticipating that the growth in this area may be slower than anticipated given the lack of enabling public infrastructure and higher costs to service. However, Sydney Water will monitor the development movements in this region and respond accordingly if the situation changes

These adjustments are intended to ensure we have not been conservative in our growth expenditure forecasts in the near term, while still achieving the government's growth ambitions in the longer term. Our forecast represents what we anticipate will be the truer cost of growth over the coming 10 years. These adjustments do not mean that we would not service growth if the services were required.

22 New South Wales Department of Planning and Environment (DPE), 2022 [accessed 11 May 2023], Population projections

23 Sydney Water, 2022, Growth Servicing Plan

## The National Housing Accord, Transport Oriented Development (TOD) and low to mid-rise housing reforms

The NSW Government has signed up to the National Housing Accord, which sets an ambitious target of 1.2 million homes across Australia by June 2029. NSW's share of this target is 377,000 new well-located homes.

The Transport Oriented Development (TOD) program is a key NSW Government policy to deliver housing around 45 transport hubs. Part 1 of the TOD program focuses on eight accelerated precincts to create infrastructure and capacity for 47,800 new homes over 15 years through the rezoning of land, and that Part 2 of the program focuses facilitating higher density within 400 metres of 37 stations to create about 138,000 new homes over 15 years through State Environment Planning Policy (SEPP) amendments. The 15-year TOD related growth represents about an additional 3% on our existing customer base of nearly 5.3 million people.

Sydney Water was consulted in the identification of TOD precincts, working collaboratively with DPHI to provide advice on serving within the Housing Accord period to 2029. It is anticipated that further TODs will be developed, and Sydney Water will continue to work with DPHI as this occurs.

The NSW Government has also made changes to the Housing SEPP to fast-track a greater diversity of homes in suburbs where they were previously not allowed. This includes terraces, townhouses, duplexes and 1-6 storey apartment blocks.

Infrastructure NSW was asked to review Sydney Water's ability to accommodate the changes to NSW Government housing policy. The review confirmed that Sydney Water had taken a prudent approach in how it has planned and then budgeted for growth. The review identified that to achieve the full housing targets, some additional investment would be required, but that this could be potentially offset by improved staging of greenfield growth, particularly in Western Sydney and Greater Macarthur.

## Growth of Data Centres

The Data Centre industry is the backbone of Artificial Intelligence (AI) and just about everything digital. It is projected to grow 10% per year through to 2030 and Western Sydney will be one of the key places these centers are expected to grow. The AI businesses are looking for alternate water sources such as recycled water for cooling systems. Sydney Water will be working collaboratively with these industries to facilitate their needs through commercial agreements.

Data centre sector growth is still highly uncertain and very technology dependent. As such, is not currently factored into current water demand forecasts for infrastructure planning or expenditure forecasts. However, scenario analysis shows that water demand from this sector could account for up to 20% of baseline demand by 2030 if all proposed data centres were to progress. Sydney Water is in the process of establishing agreements with potential proponents to gather information to enable development of a strategy to service this customer subset.

The water demand for the data centres also provides Sydney Water with an opportunity to expand our recycled water services across Sydney metropolitan area. This has consequential benefits for waterway health and EPL compliance by diverting treated effluent from our WRRF that would otherwise be discharged to waterways.



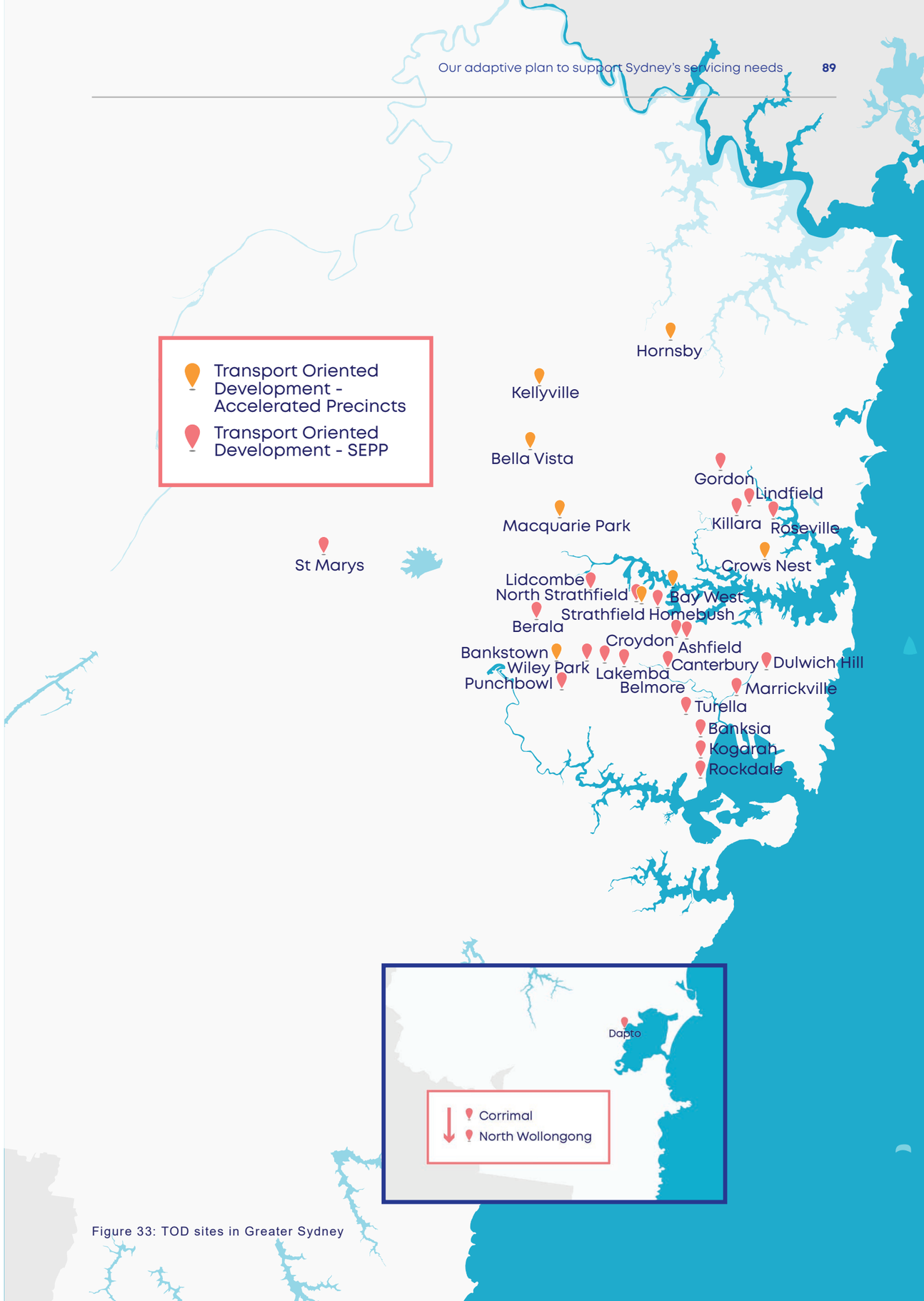
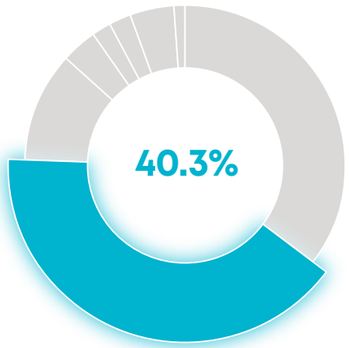



Figure 33: TOD sites in Greater Sydney

## Driver 2:
## Renew our assets

**$33.5 billion**
**to 2050**




### Key Investments

| FY2026-2050 |
|---|
| Treatment Facility Renewals |
| Network Facility Renewals |
| Water Reservoir Renewals |
| Water and Wastewater mains and reticulation Renewals |

A large portion of our forecast expenditure, 40 per cent, is targeted towards renewing our assets so that we can continue to maintain our service outcomes. Our long term planning caters for replacement of end-of-life assets, and we will continue to use best practice and emerging techniques to extend service life and replace assets only when condition or performance has deteriorated. However, we have consistently invested less in renewing our water and wastewater assets over the last decade based on benchmarking with other utilities.[24]

Our historical investment levels in renewals have not kept pace with the growing size and age of our asset base. Whilst this level of investment has helped keep customer bills low, it has resulted in deteriorating asset and service performance. Approximately 15 per cent of our in-use regulated assets are fully depreciated and about 26 per cent are past their theoretical end-of-life. We maintain around 49,000km of water and wastewater pipes across our area of operations, and nearly half of this length is now over 50 years of age and usage of existing assets has increased with growth, development and economic change. Along with more frequent and extreme weather events, this means that an older asset base is being subjected to additional stress. Alongside our assets reaching the end of their life, the existing configuration of our systems and increased usage prevents us from taking certain assets offline for long term maintenance, increasing their likelihood of failure. Without a focus on renewals, a growing percentage of the asset base will be operating past its end-of-life, placing even greater risk of asset failure and service performance deterioration. In general, this will often increase lifecycle costs, if failure rates increase and reactive workloads increase.[25]

Our renewals expenditure is weighted towards our wastewater system, comprising 72 per cent of total renewals spend. Key investments are focused on our wastewater treatment assets, rising mains, and desilting and rehabilitation of major trunk gravity mains. These tend to be assets which have a much higher consequence of failure, where consequences can be:

- Financial – for example, a major sewer collapse would cost many times more than the cost of a planned, systematic rehabilitation.
- Environmental / public health – where a wastewater asset failure leads to a wastewater overflow in a sensitive or highly populated area.

Within our water system, our key renewals are critical water mains and water reservoirs

Importantly, our forward looking renewals strategy for the LTCOP is not limited to considering only like for like replacements. For assets that need to be renewed, we plan to upgrade them to meet evolving service expectations or deliver enhanced capability to ensure we meet the needs of our changing city, and the broader objectives of our plan. This is in line with the assessments done when individual assets reach end of life – interactions with other local needs are considered and an efficient option is progressed.

Assets which reach capacity are enhanced, expanded or duplicated to increase servicing capacity, taking account of likely future growth. In line with our approach to multi-driver integrated planning and for efficient allocation of expenditure, we will identify opportunities to build additional system capacity and resilience when assets need replacement.

24 Bureau of Meteorology 2022, Urban national performance report

25 Reactive work is generally more expensive than planned work, once additional effort such as fast response and clean-up are considered, and when disruption is factored in. For lower value, low consequence asset types, this is less of a problem and these may be managed on a ‘plan to repair’ basis.


## Treatment facilities

All treatment facilities are categorised as significant assets as they are either a major single point of failure or can trigger an extreme consequence with failure. The performance of water and wastewater treatment facility assets currently requires improvement, as is evidenced by the failure rate trending upwards (Figure 34). Therefore, sustained investment in maintenance and renewal of the WFPs and WRRFs assets is critical to manage long term service performance and arrest continued deterioration is required out to 2050.

## Network facilities

Water and sewer pumping stations and water reservoirs, are critical for service delivery as they ensure we meet the required service standards outlined in our operating licence. Wastewater pumping stations are critical for conveying wastewater safely toward treatment plants mainly via a network which operates via gravity. Water pumping stations maintain pressure and replenish reservoirs. Reservoirs have a critical dual role – they provide local supplies for high demand periods but also maintain the quality of drinking water through disinfection and monitoring. The performance of all of these network facilities has continued to decline (Figure 35) and therefore require significant investment to improve performance. The renewal profile for each of these asset classes in LTCOP is critical for sustainable, and reliable service delivery.

## Water and Wastewater mains and reticulation

The pipe network, including critical water and wastewater mains, and reticulation mains, has improved in performance recently, however requires continuous renewal investment for this to be maintained (Figure 36). The performance of these assets is also influenced by the weather. The larger and more critical water and gravity sewer mains, as well as the pressure mains, are at higher risk of performance failure due to their condition influenced by the climatic conditions and capacity upgrades.

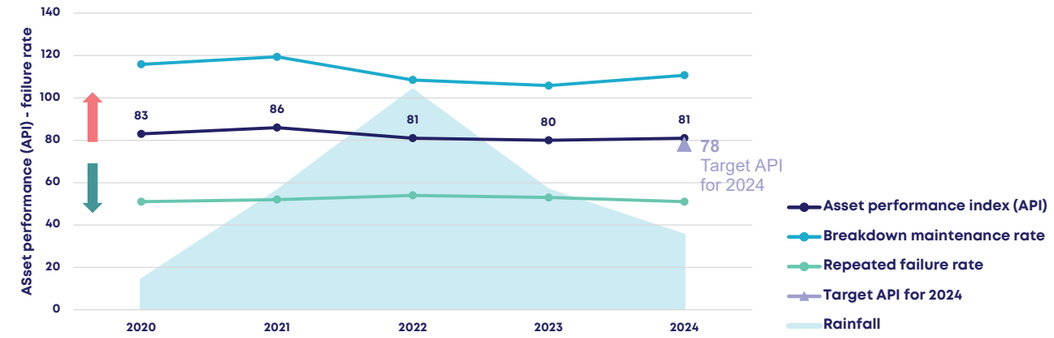



Figure 34: Treatment facilities | asset performance index (API)

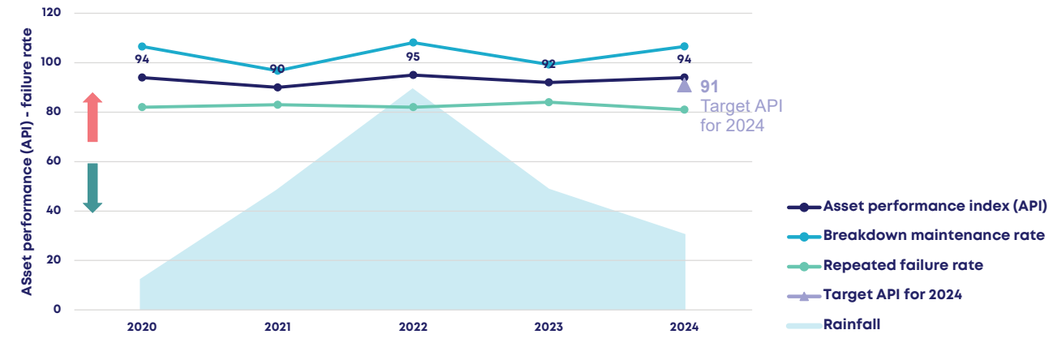



Figure 35: Network facilities | asset performance index (API)

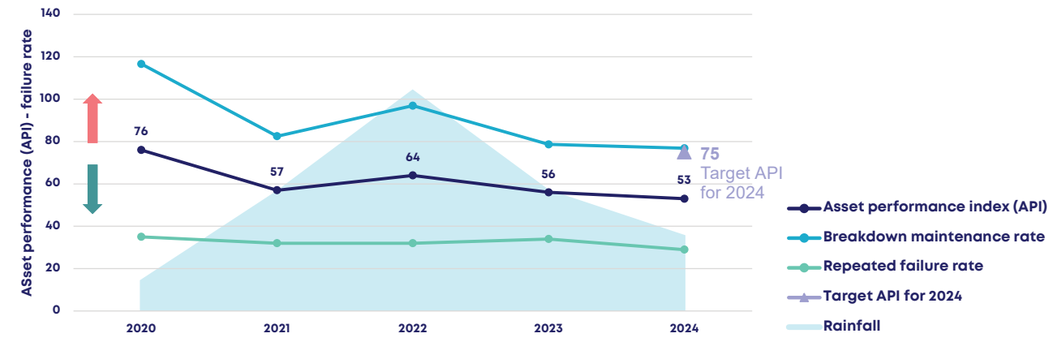
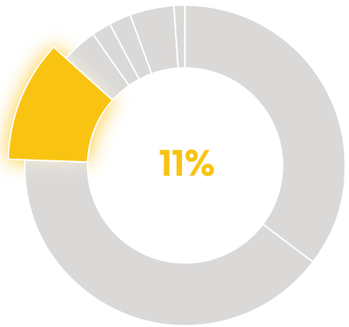



Figure 36: Water, wastewater and reticulation mains | asset performance index (API)

There are several actions underway to improve sewer rising main performance. Accumulation of silt in gravity sewer mains has caused silt banks to occur, reducing hydraulic capacity and increasing overflow events. This has particularly impacted the largest wastewater mains in our systems – the NSOOS, SWSOOS and BOOS, with rehabilitation and silt removal programs in place for these significant assets. These programs will be delivered over many years while we continue to use these assets to service our customer base

## Driver 3:
## Build a resilient and reliable water supply

**$9.2 billion**
**to 2050**




### Key Investments

| |
|---|
| **FY2026-2035** |
| Water Filtration Plant Upgrades to remove single points of failure |
| Expansion of Sydney Desalination Plant |
| PRW Infrastructure at Prospect Reservoir |
| **FY2036-2050** |
| System Resilience Interconnectors between Prospect, Orchard Hills and Macarthur water supply systems |
| Fairfield PRW Scheme |
| North Richmond Water Filtration Plant PRW Scheme |
| Quakers Hill PRW Scheme Stage 2 |
| Illawarra Desalination Plant |

It is critical that Sydney's water supply system evolves to build resilience to drought. We intend to increase the amount of rainfall independent supply (RFIS) within our water supply system from 15 per cent to up to 60 per cent over time, through PRW and desalination schemes. Building additional supply in this manner diversifies our supply sources and reduces our reliance on surface water. Our investments are intended to avoid the economic impacts that very severe water restrictions would have, not only on Greater Sydney, but on NSW.

There is an immediate need to add about 210ML/d additional water supply capacity to address the current supply/demand imbalance and to reduce the likelihood of severe water restrictions during the next prolonged and severe drought. To meet this need, we intend to expand the Sydney Desalination Plant (SDP) as a priority.[25] Expanding the SDP is expected to increase the time we have until reaching 15% minimum operating level from from around 4 years to around 5.5 years under a 1:100,000 drought event. Expansion of the SDP is not included in our capital cost estimates, as this would be incurred as an operating expense to Sydney Water.

We will seek to progressively supplement this investment with PRW schemes in line with growth and later, another desalination plant in the Illawarra.

It is also critical that we improve resilience of our systems and assets to failure through not only new water sources, but also interconnectivity and removing single points of failure. We are prioritising reducing our reliance on the Prospect Water Supply System which is heavily reliant on Warragamba Dam, its pipelines and the Prospect WFP, supplying 80 per cent of Greater Sydney's water. Our new proposed water sources, interconnecting pipes between Prospect and other water supply systems, and removing single points of failure at our key WFPs, will ensure a resilient supply system.

Further information on our current planning and analysis of our water supply augmentation options can be found in our Resilient and Reliable Water Supply Strategic Business Case, which was submitted to INSW in April 2023. This is currently being reviewed through the development of the integrated Water Master Plan.

25 Note: The SDP expansion is an operational (opex) expense under the LTCOP.



### Removal of single points of failure in Water Filtration Plants

Upgrading our major WFPs will ensure continuity of regular operation in the event of some single points of failure. For Prospect and Orchard Hills WFPs, we will build new bypasses and flow paths to ensure water can still be supplied under a range of possible failure modes. At Prospect, additional flow paths will particularly allow maintenance on critical assets to be completed in isolation without impacts to supply. Further, Macarthur will be upgraded to build power supply redundancy, currently a major risk for the system. For all major WFPs, we will build resilience to cyber vulnerabilities.

### System Resilience Interconnectors

We are planning to construct two interconnecting pipelines from the Prospect water supply system to the Orchard Hills and Macarthur systems, providing treated water supply redundancy benefits for all connected systems. These interconnectors will be planned and designed to target specific risk areas of the distribution network, such as areas within Prospect North for the Prospect-Orchard Hills Interconnector, and the Liverpool area for Prospect-Macarthur. For Prospect, up to 390 ML/d can be supplied by Macarthur and 300ML/d from Orchard Hills combined, with adopted plant augmentations. This volume offers partial supply redundancy for the Prospect System (around 50 per cent of current average demands). With additional investment in RFIS with the expansion of SDP and augmentations to the Prospect system, these interconnectors will enable an equivalent to a level 5 restricted demand to be supplied into the Prospect System via means other than Prospect WFP.

### Desalination Plants

In the absence of at least 250ML/d of additional rainfall independent supply (RFIS) available prior to the next drought commencing, supply could fail if the next drought is severe. By doubling our desalination capacity to 500ML/d, we can increase the time it would take to reach Level 5 water restrictions from only 4 and a half years to about six years in a 1 in 100,000 drought. Even with an additional 250ML/d of RFIS Greater Sydney could still experience at least level 3 restrictions for three to four years should we encounter a severe drought. Water restrictions remain a critical intervention to managing the supply failure risk in drought.

#### Sydney Desalination Plant expansion

The SDP, located in Kurnell, was built in 2010. The design of the plant accommodated for a doubling of capacity if required. Expanding the capacity of this plant provides a near-term solution to build urgently needed RFIS and is the lowest cost desalination option on a $/ML supply basis. As the expansion planning is further progressed and making use of existing infrastructure at the plant (particularly the intake and outfall tunnels), 125MLD extra supply capacity at this plant can be delivered within a short construction period of under 4 years. An additional 125MLD can be implemented in the subsequent two years, following investments in large network infrastructure to distribute the treated water further West towards Potts Hill.

Supplying a larger volume of desalinated water via SDP reduces supply risk in the Prospect system and increases the proportion of RFIS in our water system from 15 per cent to 30 per cent. Expansion of SDP will also reduce the need to transfer water from the Upper Nepean Dams to Prospect WFP. This will benefit the Greater Macarthur region, by slowing depletion of those dams too.

While expansion of SDP is our recommendation for the next water supply augmentation for Greater Sydney, this is dependent on favourable commercial terms being met, as the plant is leased and operated by a private entity. As a result, an alternative option will be developed in parallel to ensure value for money.

### Illawarra Desalination Plant

In addition to the expansion of the SDP, construction of a desalination plant in the Illawarra region will be delivered later. Illawarra is currently an isolated system, with one source of water. Building a desalination plant in this region introduces rainfall independent drinking water supply into the region, thus improving resilience of its supply. A desalination plant in the Illawarra could be staged to supply the Illawarra initially, but could potentially supply up to 300ML/d, if connected to the Greater Macarthur system, and ultimately back into the Prospect system.

## Purified Recycled Water Schemes | Fairfield and North Richmond

In addition to the PRW schemes identified to help manage wastewater growth (Driver 1), PRW schemes at Fairfield and North Richmond, as well as the expansion of the Quakers Hill PRW scheme to treat flows from Rouse Hill and Riverstone would strengthen our water supply resilience. Although all PRW schemes (Liverpool, Glenfield, Camelia, Quakers Hill, Arncliffe) dually respond to both growth and resilience drivers, these schemes strongly support the diversification of our water supply sources as their primary driver. The Fairfield scheme has been identified to easily connect into the Liverpool and Glenfield scheme (Driver 1) to further increase PRW supply. North Richmond WFP extracts water from the Hawkesbury River at Richmond. As additional flows are made available from Upper South Creek Advanced Water Recycling Centre (AWRC) in the future (currently in delivery), there is an opportunity to extract more water at North Richmond and to connect this supply back into the Prospect System.

## Drought Triggered Investment

The cost profiles and bill impacts presented in our LTCOP are based on planned investments. Drought could bring forward planned investments or trigger additional investments, depending on the timing, severity, and duration of the drought. As further options (such as additional desalination projects) progress through planning and design, these options are likely to become options that could be triggered during a drought. We currently do not intend to accelerate PRW schemes during drought, as extensive research into past schemes emphasises the importance of community support for PRW prior to its implementation. Our plan is to always be ready to build the next supply augmentation to ensure Greater Sydney does not enter severe water restrictions.

Sydney Water recently completed an interim Drought Asset Response Plan (April 2024) and the plan has recommended the followings:

### Operational Response

- Ensure business case is progressed for the operational rule change of existing Sydney Desalination Plant
- Implement water conservation program
- Investigate the opportunity to modify level restriction triggers which will require ministerial approval
- Investigate the opportunity to allow more access to water in Tallowa Dam beyond the current FSL -1m to -3m which will require ministerial approval and potentially a change to the Water Sharing Plan

### Capital Response

The following assets should progress up to a shovel ready (concept design completed) stage and ready for mobilisation to respond to any drought trigger:

- The SDPE is assumed to in place in the analysis assumptions.
- Avon deep water pumps - required only in the instance of Avon Node reaching MOL. This is WaterNSW's asset and included in their LTCOP
- PROMAC link related to drought (100MLD interconnector link) - Required only in the instance of Upper Nepean Node reaching MOL

**Drought Critical assets** – actions to be progressed to completion in preparation for drought, irrespective of drought trigger. The following assets have been identified as "critical assets":

- Warragamba deep water pumping station
- Mulgoa water pumping station
- Broughton Pass and Pheasants Nest Weir (upgrade raw water pumps to prevent spilling of water due to changing demands)
- Orchard Hills to Cascade transfer
- Nepean Dam raw water pumps for deep storage access
- Sydney Water's Water Filtration Plants for pre-treatment resilience.

Please refer to Appendix 5 for the drought response summary.

## Warragamba Dam

The NSW Government has committed to not progressing with the 14-metre Warragamba Dam wall raising. The NSW Reconstruction Authority will progress an alternative Western Sydney Flood Resilience Plan, as part of the disaster adaptation planning.

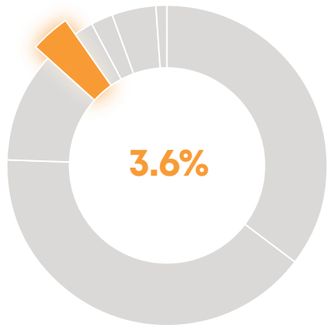
Alternatives considered to the Warragamba Dam wall raising included lowering the FSL of Warragamba Dam by either 5 metres (18% of Warragamba's supply), 12 metres (40%) or 25 metres (67%). Only a 25-metre reduction provides flood mitigation commensurate to the redundant wall raising project. The NSW Reconstruction Authority (NSW RA) is developing the Hawkesbury Nepean Valley Disaster Adaptation Plan and Sydney Water is on the Working Group and Steering Committee. This plan is considering ways to minimise flooding in the Hawkesbury-Nepean Valley, which includes potential options to lower the FSL in Warragamba Dam. Sydney Water is working collaboratively with The NSW RA, WaterNSW and DCCEEW, including providing inputs on risks, opportunities and costs associated with the options under consideration.

Reducing the FSL of Warragamba Dam by any amount would further reduce Sydney's water security and reduce operational flexibility to manage source water quality. This could be managed by first building rainfall-independent water infrastructure to replace the water supply that would be lost. This would be at least another desalination plant in addition to expansion of SDP, which is needed to improve the current water security issues. Alternatively, or in parallel, extensive implementation use of purified recycled water could be considered prior to lowering the FSL. Given the inherent uncertainty regarding the ultimate decision, and the very large cost impacts, the costs of this are not modelled in our LTCOP.

WaterNSW are currently in the process of planning for future investment in dam resilience upgrades for Warragamba Dam that are required now that the raising of the dam wall is not proceeding. Over the next 2025-30 determination period, we are expecting our bulk water costs from WaterNSW to average about $333.4 million per annum. This represents a 40% increase on our annual WaterNSW bulk water costs (through availability and usage charges) in the current determination period. This proposed increase is largely driven by the proposed dam safety upgrades to maintain water security as well as investment to increase environmental flow releases from Warragamba Dam which will improve waterway health. This is discussed further in at the end of this section.

## Driver 4:
## Expand our stormwater services

**$3 billion**
**to 2050**




### Key Investments

| FY2026-2035 |
| --- |
| Mamre Rd and Aerotropolis Integrated Servicing |

The outer fringes of our city are urbanising. Rural agricultural land and open space are transitioning to an environment characterized by hard surfaces, increased roof space and roads to service expanding city. As such, greater volumes of stormwater need to be managed. To significantly reduce urban runoff in this new environment and mitigate the impact of pollutants running into our waterways, a rethink of the way we have traditionally designed stormwater systems is required.

City greenspaces are also increasing demand on our water supply. They are critical in supporting urban cooling objectives, and for delivering the livability expectations of a modern, thriving city. Taking an integrated water management approach through better capturing and using stormwater will ensure that we can best improve the amenity of these spaces.

We have an opportunity to harvest and re-use more stormwater in support of urban cooling, public amenity, and improved waterway health. In Western Sydney, as we adopt the role of stormwater manager, we will expand our current stormwater services to be responsible for delivering, managing, and maintaining the regional stormwater network along with our drinking water, wastewater, and recycled water networks. To deliver against these responsibilities, we plan for stormwater to flow through natural water channels and wetlands in a natural and non-intrusive design. Rather than flowing through concrete pipes or drains, stormwater will be collected via the environment and reused as recycled water for non-drinking water purposes for a cooler, greener Western Sydney.

As we expand our stormwater services, we are aware to the need for effective Government policies and place-based planning approaches to enable stormwater to be retained in our landscapes. We must recognise First Nations' knowledge, science and needs to enable a more sustainable approach to using water for green and liveable places.



## Mamre Road and Aerotropolis Integrated Servicing Scheme

Integrated Servicing Schemes provide an opportunity for us to harvest more stormwater and recycle more water to meet waterway health targets. Across the Mamre Rd and Aerotropolis, we are planning the largest stormwater harvesting scheme in Australia, characterised by a natural stormwater management system. In this region, we will rely on water channels, wetlands, and bio-retention basins to capture and transport stormwater in addition to a man-made stormwater distribution network inclusive of gravity and pressure mains, pumps, gross pollutant traps (GPTs), an AWRC and a reservoir (Figure 37). This infrastructure will allow stormwater to be collected, treated and harvested as recycled water to support greening and cooling in the local area, and for non-drinking water purposes such as flushing toilets and irrigation of parks.

These regions are quickly transforming from rural to urban, with significant growth expected. As such, maximising the re-use of stormwater in these areas will reduce flows and pollutants into waterways for improved waterway health.

The Final Business Case for the integrated stormwater servicing scheme for Mamre Road has been assured by INSW and awarded a medium confidence rating. The timing and funding strategy for this project is dependent on the outcomes of the IPART Mamre Road Stormwater Scheme review, expected to be finalised in September 2024.

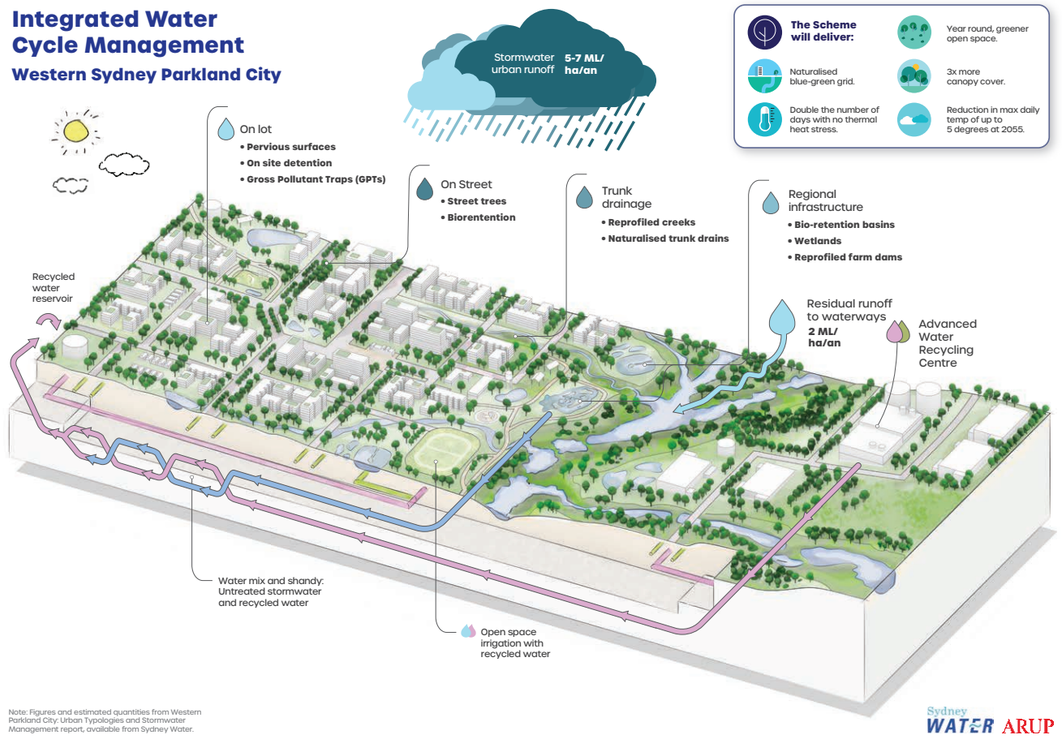
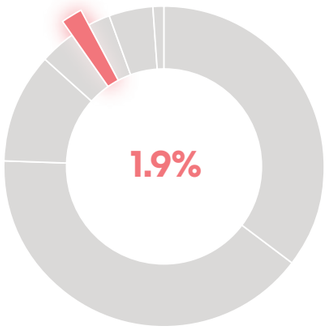



Figure 37: Mamre Road and Aerotropolis Integrated Servicing Scheme

# Driver 5: Digital enhancements to our physical assets

**$1.6 billion**
**to 2050**




### Key Investments

| |
|---|
| **FY2026-2035** |
| Customer meter program |
| **FY2036-2050** |
| Customer meter program |
| Base digital investments |

Our future environment is one that will require us to operate with a strong focus on digitalisation. Technology is becoming widely adopted across our organisation to enable us to drive more value and make better decisions for our customers and partners. Investment will see us grow our digital capabilities and realise efficiencies across our expenditure profile and operations. By 2050, we expect to be a digital water utility; laying the digital foundations now for how we will manage and operate our assets in the future.

Our forecast investment in digital technologies will allow us to operate in a more interconnected and interoperable style, gaining a real or near-real time awareness our operations, asset performance and asset condition. In this manner we can identify when and how to make the optimum interventions so that we can improve service, cost and risk outcomes and make data driven decisions. Our customer digital meter program is proposed in pursuit of this goal, alongside helping our customers understand their water usage volume and patterns so that they can make educated choices about how they use water. Through enabling customer behaviour change in this manner, we can strengthen water conservation efforts to reduce the demand on our water supplies.

We are making base digital investments for our physical assets in the short and longer term. These investments focus on; the Connected Customer, Intelligent Asset Management, Data Driven Decisions, People Experience and Cloud-Hybrid Optimisation. This focus will transform us into a Digital Water Utility that services the customer prudently and efficiently.

Digital investments are also critical to improving how we engage with our customers and enable an efficient workforce. As a core component of our operating expenditure, these investments are explored at the end of this section.



## Customer meter program

Sydney Water's customer meter fleet is predominantly mechanical. We are targeting to convert over 90 per cent of our meters to smart meters by 2035 under our 'Enable Smart Metering and implement at scale' program. The program will ensure that most households and businesses can monitor and measure water usage, detect leaks, and receive insights regarding water consumption and costs.

Through this program, Sydney Water will gain a more granular understanding of customer water usage and usage patterns. Further, we will have increased visibility over our water network operations for better identification of leakages and pressure losses so that we can respond to such issues sooner and minimise service interruptions to our customers. This program is a critical enabler of water conservation and efficient data-driven decision-making in water network operation and investment and enables potential enhancements to billing flexibility in the future including monthly bills or peak/off-peak pricing opportunities.

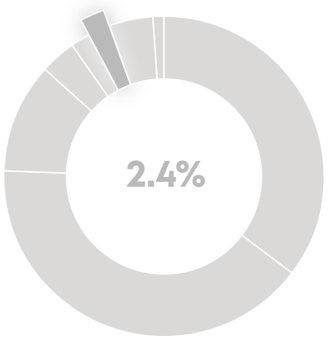
## Base digital investments

Our base digital investments will support us in uplifting our asset management approach and systems in contribution to insight lead and integrated decision making. Investments will be across the following key areas:

- **Intelligent Asset Management**
  Our assets will inform us in real-time of their performance, achieved through integration asset management with smart sensors. That is, using Integrated Instrumentation, Controls, Automation and Telemetry (IICATS), Supervisory Control and Data Acquisition System (SCADA) systems, Internet of Things (IoT), Digital Meters, Laboratories and hydrometrics to acquire data to feed into our Asset Management System. We will also need to transform our Spatial Platform, Asset Management Platform, Field Scheduling Platform and Digital Twins and incorporate our smart sensor data for end-to-end autonomous system control and intelligent data driven decisions.
- **Connected Customer**
  Digitalisation will shift customer advocacy and engagement though bill affordability, better customer experience and partner of choice, achieved through digitised education, digital meters, and customer centric services and systems.
- **People Experience**
  Technology is embraced by our people, and we are highly flexible, productive, and collaborative. We will improve our people experience through employee centric platforms, partner interoperative services and immersive human to virtual interactivity.
- **Data-Driven Decisions**
  We will empower and connect our organisation to use reliable and secure data to drive actionable insights at speed, achieved through improved data governance, data platforms and data aliteracy. We will transform our Modelling, Analytics, Artificial Intelligence (AI) and Machine Learning (ML) systems and shift from manual to automated operational reporting.
- **Cloud-Hybrid Optimisation**
  We will build secure, modern, and optimised technology platforms that enable our business, and we will consider digital by default in all we do. In this manner we will work with technology partners to provide platforms that drive resilient digitalisation services.

## Driver 6:
## Protect public health

**$2 billion**
**to 2050**




### Key Investments

| FY2026-2035 |
| --- |
| Pre-treatment and disinfection by-product upgrades at Prospect, Nepean, Orchard Hills and Cascade Water Filtration Plants |
| **FY2036-2050** |
| Pre-treatment and disinfection by-product upgrades across other Water Filtration Plants |

Public health is a high priority for Sydney Water. Our customers expect us to deliver water that is safe for drinking. Whilst we currently deliver high quality drinking water, requirements for and expectations regarding drinking water quality are likely to evolve. In response, we will invest primarily in upgrading our WFPs.

The Australian Drinking Water Guidelines (ADWG) have recently been updated with new Health Based Target (HBT) requirements.[26] The costs of implementation are relatively small and have been included in our program. Upgrades will be undertaken for each WFP as required.

Following the HBT updates to the ADWG, we expect to need to upgrade our WFPs more significantly to meet projected additional requirements. We estimate that an update to the guidelines could reasonably be expected in 2025 imposing stricter Disinfection By-product (DBP) limits. We have engaged with NSW Health and have agreed that a period of about five years from 2025 would be a reasonable assumed timeframe for upgrading our WFPs, with some possible exceptions. As such, necessary upgrades would need to be completed by around 2030.

Upgrades are also required at our WFPs to address existing raw water quality risks. These investments in pre-treatment will also reduce DBP risk and are considerate of future guideline requirements. Our proposed and costed DBP WFP upgrades will build off these previous upgrades but will benefit from our ability to monitor performance of those systems once the pre-treatment investments are in place. In some instances, we may find that some WFPs require no further upgrade, or only minor upgrades to meet the ADWG.

The National Health and Medical Research Council (NHMRC) is currently conducting an independent review of the health-based guideline values for per- and polyfluoroalkyl substances (PFAS) in drinking water. Following outcomes of this review, we will consider what steps are to be implemented in consultation with NSW Health. Further substantial updates to the ADWG are not anticipated to be implemented before 2050.

26 National Health and Medical Research Council 2022, Australian Drinking Water Guidelines

### Water quality upgrades at our Water Filtration Plants

Our WFPs are prone to treatment failure when processing deteriorated water quality following extreme weather. Consequently, we are at risk of experiencing supply shortages and service disruptions if we cannot treat water to the required quality. Through diversifying our supply sources, the risk is reduced. However, we will upgrade our WFPs on a prioritised basis to ensure that they can better process poorer quality water during events such as floods, storms, droughts, and bushfires.

The National Health and Medical Research Council (NH&MRC) has been undertaking a review of the management of DBPs, which are produced through the water treatment process when chlorine reacts with organic matter. As such, the ADWG is likely to be updated with new monitoring requirements and guideline limits for key DBP's, which is expected to prompt upgrades to our WFPs. We will work with NSW Health to sequence upgrades of our plants between, which we anticipate will occur from 2025, to ensure we can best distribute resources and effectively manage the works whilst ensuring the health of our customers, including consideration of other WFP upgrades for growth.

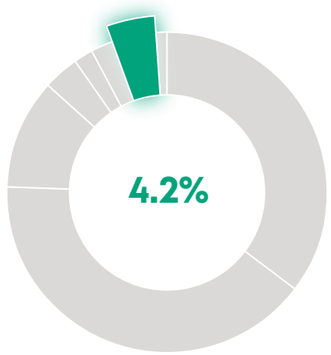
Our approach is to prioritise any additional upgrades for future ADWG DBP requirements at our higher risk WFPs (Prospect, Nepean, Orchard Hills and Macarthur) by 2030. This is due to their high risk of not meeting demands during poor raw water quality events at these plants. Upgrade of the Macarthur WFP for DBPs is expected to be deferred (pending performance against the future guidelines) due to commercial considerations and the contract being up for renewal in 2030.

### Treatment plant upgrades for forever chemicals

Our WFPs currently have no ability to treat PFAS, except for North Richmond. However, current raw water PFAS concentrations are below ADWG requirements and do not require treatment and our drinking water remains at safe levels as stated in the ADWG. While the United States Environmental Protection Agency (USEPA) have recently set stricter advice around safe levels of PFAS in drinking water, we will continue to monitor and manage our drinking water in accordance with current ADWG advice. The NHMRC is currently conducting an independent review of the health-based guideline values for PFAS to determine if the current advice remains appropriate. Following outcomes of this review, which are anticipated to be completed by late 2025, we will consult with NSW Health to consider what steps are to be implemented.

## Driver 7:
# Protect and enhance the environment

**$3.5 billion**
**to 2050**




### Key Investments

| |
|---|
| **FY2026-2035** |
| Wet Weather Overflow Abatement Program (WWOA) |
| Implementation of Parramatta River Masterplan |
| **FY2036-2050** |
| Wet Weather Overflow Abatement Program (WWOA) |
| Implementation of Parramatta River Masterplan |
| Bondi WWTP to Malabar WWTP transfer main |
| Compliance upgrades for inland treatment plants (metals and wet weather) |
| Gasification Plants for Biosolids PFAS Removal |

Sydney Water is committed to protecting the environment, a high priority for our customers and critical to ensuring public health and a sustainable city for years to come. As described under Driver 1, growth has placed enormous pressure on our WRRFs, with most of these facilities being upgraded over the next several years to build capacity and meet more stringent requirements. Those investments are substantial and are not repeated here. Further, additional investments relating to PRW schemes, stormwater management and our climate change response will improve the environmental health and are described in other sections (Drivers 3, 4 and 8).

If we were to continue under our current servicing model, discharges to waterways would continue to increase. As such, the health of the surrounding ecosystems could be impacted, subject to the type of receiving waterway, the volumes and timeframes for discharge, and level of treatment. To sustain and improve waterway health we are planning to better manage the impacts of our operations to the environment through more integrated water management. For example, our investment will deliver a reduction in treated wastewater discharged from our ocean WRRFs from 80 to 67 per cent.

In support of environmental health, we are progressing our existing Wet Weather Overflow Abatement (WWOA) Program to reduce the amount of wet weather overflows and therefore minimise public and waterway health risks. We are continuing to work in partnership with councils on a variety of initiatives and programs, namely regarding the Parramatta River Masterplan.[27] Under this program, we are both leading and supporting works to create a cleaner and more accessible river for communities to enjoy and interact with.

In delivering these investments, we will engage and collaborate with First Nations in support of their interests and access to water and discern valuable knowledge for improved integrated water management.

27 Parramatta River Catchment Group, 2018, Ten Steps to a Living River – The Parramatta River Masterplan



## Wet Weather Overflow Abatement Program (WWOAP)

The ingress and infiltration (I/I) of stormwater into the wastewater system during heavy rainfall can significantly increase the volume of flows in the wastewater system. As a result, the wastewater system can overflow, with the potential to impact on public and waterway ecosystem health. Sydney Water is regulated for wet-weather overflows by the NSW EPA Environment Protection Licences (EPLs) on each wastewater system.

Our WWOA Program aims to reduce the frequency and volume of wet weather overflows at emergency relief structures (ERS) in line with the requirements of the EPLs. The program ensures that Sydney Water is compliant as a wastewater service provider, meeting the expectations of the NSW EPA. Our WWOAP program primarily focusses on reducing risk to the environment and the public, by prioritising sites with the highest environmental and public amenity value first.

Progressing activity under this Program, we plan to decrease the number of wet weather overflow events and reduce the silt and grit in major infrastructure. In reducing the frequency of these events, we are investing in minimising ingress and infiltration of stormwater into the wastewater system in two primary ways. Firstly, through preventing stormwater from entering the wastewater system, and secondly, managing the impact of stormwater once it enters the wastewater system. Under these methods, our goal is to reduce wet weather overflow volumes by 1 per cent each year, for a total reduction in volume of 26 per cent by 2050.

## Implementation of Parramatta River Masterplan Works

In support of a healthier Parramatta River that can be enjoyed by surrounding communities, Sydney Water is leading and supporting a range of activity under the Parramatta River Masterplan.[27]
To create a swimmable river, we are standardising policies and practices that impact water quality, minimising stormwater runoff, and reducing wet weather overflow events. Further, we are leading the establishment of the Riverwatch monitoring program to assist in measuring water quality change over time, protect existing swimming spots and open new swimming sites. These works are critical in creating amenable spaces within and surrounding the Parramatta River for our customers to enjoy.

## Bondi to Malabar transfer main

The Bondi WRRF and BOOS trunk network has a growing number of assets that need renewal and has major capacity constraints (even if the level of treatment is not increased). The treatment system improvements to meet existing compliance itself is challenging due to land availability. These constraints make maintenance, renewals and upgrades at the site difficult or potentially infeasible and make it impossible in the future with growth. Given the location, should network and or treatment assets fail, it could result in major reputational damage to Sydney Water. In addition, the BOOS is one of the oldest assets in Sydney Water's fleet, build over 130 years ago. This asset is very difficult to maintain and renew, as it also services Sydney's CBD. Though highly unlikely, if it were to fail, it could have devastating environmental consequences for Sydney's famous Harbour, as well as Sydney Water's reputation.

As such, we intend to invest in a transfer main from Bondi to Malabar WRRF, so that wastewater can initially be transported and treated during planned and unplanned maintenance at Bondi, and to transfer additional flows in the future to service potential future population increase within Bondi system. The transfer thus builds additional resilience in the Bondi wastewater system by providing another pathway for wastewater to flow, improving operability, safely maintaining the Bondi wastewater system, and lowering total life cycle costs.

## Potential future compliance upgrades for inland treatment plants (metals and wet weather)

A series of possible infrastructure upgrades were identified with the aim of achieving compliance in response to the EPA's Stage 1 Concentration Limit Review across all of Sydney Water's wastewater treatment plants. The Stage 1 concentration limits were revised by the EPA in 2017 based on the performance of the plants between 2006 and 2016. This has caused some issues due to a change in weather patterns with more rain in recent years as well as plants reaching capacity. Further analysis of water quality will be completed as part of Stage 2 which will be undertaken over the next 5-10 years.

In addition, most wastewater treatment plants have existing load limits and the implementation of the Hawkesbury Nepean Framework looks to maintain the nitrogen and phosphorus loads going into the river system as growth occurs. The basis of this model was done in a drier period than Sydney has seen over the last few years and the volume of flow in wet weather can cause reported loads to be much higher regardless of performance in dry weather.

Given the water quality analysis needed in Stage 2 and the unknown effects of extreme wet weather events collaboration is ongoing with the EPA to confirm requirements and test proposals around performance reporting in extreme wet weather conditions, prior to committing to significant upgrades across the treatment plants. In addition, the application of nutrient offsets in both dry and wet weather across the Hawkesbury Nepean basis is currently being discussed with the EPA and a range of options will be considered.

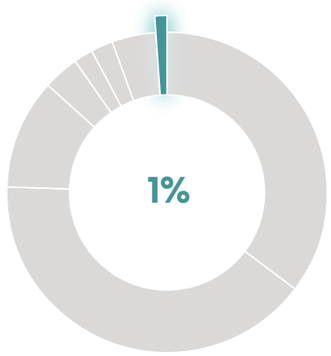
## Treatment plant upgrades for changing Biosolids Guidelines

We anticipate future changes to the NSW EPA biosolids guidelines around the concentration of various emerging contaminates in our biosolids, which are currently reused for beneficial agricultural application. In particular, per- fluoroalkyl and poly-fluoroalkyl substances (PFAS) have potential revision of limits that are less than currently observed in some of our catchments. Due to the current uncertainty we continue to explore different options for beneficial use beyond land application of biosolids to farms from our most affected catchments. The impact of the proposed limits is not universal across our program with some more adversely impacted whilst others will potentially continue to be allowed to operate as currently. We are also considering the role of new technologies, including carbonisation, to reduce concentrations of these emerging contaminants below regulatory levels. This may result in lower operating costs for disposing of treated biosolids as well as producing a valuable biochar product, which can be marketed for reuse. It is expected though that the TOTEX for this method of treatment will be higher than our current operations

We continue to push for greater source control and tighter restrictions at state and national levels on the use of these products to reduce the amount flowing down the catchment. These products have the potential to negatively impact our biosolids program into the future.

## Driver 8:
# Enhance our climate change response

**$0.9 billion**
**to 2050**




### Key Investments

| |
|---|
| **FY2026-2035** |
| Renewable energy generation at select sites |
| **FY2036-2050** |
| Renewable energy generation at select sites |
| Climate Change adaptation investments |

Sydney Water's climate change response is divided into two parts: abatement in the form of reducing our carbon emissions, and adaptation relating to reducing the impacts of a changing climate on our assets and operations.

We recognise that our water and wastewater services are energy intensive and that the water industry experiences the impacts of climate change very acutely. Hence, Sydney Water has committed to achieving net zero carbon emissions (scope 1 and 2) by 2030 and by 2040 (scope 3). This is an accelerated target compared to the NSW Government's ambitions, which is in line with our customers' expectations as identified in section 3.3. We recognise that our pathway to achieving net zero emissions will require the use of carbon offsets from 2030 and beyond while we continue to progress options to reduce our scope 1 wastewater fugitive emissions. We will explore the right balance between purchasing credible carbon offset credits from the market and self-generating our own carbon credits.

Our investment focus to reduce our emissions is on renewable energy projects and decarbonising our infrastructure. To achieve our goal, we are championing circular economy principles and actively collaborating with our utility partners, industry, government, private sector, universities, the research sector, suppliers, and our customers. With the expansion of our services, we expect to see increased energy demands on our operations supported by continued investment in renewable energy generation. We are aiming to generate 141 Gigawatt hours from renewable projects (including biogas, solar and hydro), save 11 Gigawatt hours from energy efficiency and source market renewable electricity to achieve our commitments.

For new infrastructure, we will focus on working with our suppliers to reduce embedded emissions and design for energy efficiency, as well as reviewing our current asset profile for energy efficiency improvements.

Amidst our abatement actions and considering our climate change modelling, we must plan for the effects of a warming planet. Recent extreme weather events will become more frequent and severe, and we need to ensure resilience to them. As such, we have estimated an asset value-at-risk cost in our plan to be able to effectively plan for, respond to and recover from extreme weather events.

28 Sydney Water 2022, Our path to net carbon zero and beyond



## Our pathway to net carbon zero

Sydney Water currently has capacity to generate up to 85 Gigawatt hours per year of renewable energy from its existing operational sites through Biogas, Hydro and Solar Schemes. By 2035, we are planning to increase renewable energy generation to 141 Gigawatt hours, equivalent to powering around 20,000 homes. Based on current projections, we expect total electricity usage in 2050 (grid + self-generated renewables) to be approximately 1.2 Terawatt hours or roughly double our existing consumption (approximately 440 Gigawatt hours). Self-generation capacity is limited by site and space constraints and market-based solutions need to be integrated to ensure continuation of Carbon Zero commitment past 2030. Our plan forecasts that the NSW electricity grid will decarbonise by 2040 based on the Australian Energy Market Operator's Progressive Change scenario.

Our plans and designs will seek to significantly reduce energy consumption compared to a Business-As-Usual (BAU) baseline. Current projects seek reductions in the order of 30 per cent against baseline and continuous improvement initiatives and research will continue to push for further reductions.

We will generate renewable energy in a variety of ways across our area of operations:

- Generation of biogas from wastewater treatment processes and potential co-digestion with food waste at 11 WRRFs (Malabar, Riverstone, North Head, St Marys, Bondi, Cronulla, Glenfield, Wollongong, Liverpool, Upper South Creek and Warriewood).
- Generation of biomethane from wastewater treatment at Malabar WRRF to blend directly into the gas network.
- Generation from hydro schemes using water (two generators at Prospect and Woronora) and wastewater systems (North Head).
- Generation using solar at nine sites (Potts Hill, Homebush, Bondi, Allawah, Artarmon, Fairfield, Rockdale, Waterloo, West Ryde).
- Co-digestion of food waste at Upper South Creek Advanced Water Recycling Centre.

For example, work has commenced on to Malabar Biomethane Project, co-funded by Jemena and the Australian Renewable Energy Agency (ARENA).[31]

It will be a first in Australia to blend biomethane from a wastewater treatment plant directly into the gas network and the first zero emissions renewable gas source available for purchase in Australia. The initial capacity of 95 Terajoules of gas per year is expected to meet the needs of approximately 6,300 local homes.

Additionally, Sydney Water is exploring a range of options for the development of a circular economy zone at our planned Advanced Water Recycling Centre (AWRC) in Western Sydney for the management of water, energy and bioresources. Opportunities being explored include Co-digesting food waste, nutrient recovery, biofuel production and vegetable production. We are looking to develop the zone under a curated lease model as this minimises investment and enables industrial symbiosis between the AWRC and private industry tenants. We will continue to explore circular economy opportunities at our other WRRFs as opportunities become viable.

## Climate Change adaptation investments

The impact of extreme weather events due to our changing climate is going to increasingly impact our asset performance. Our approach to integrating climate change adaptation into planning is still being finalised and we have yet to undertake a comprehensive review of adaptation related costs. However, due to the impact that weather events have had on our assets over recent years and our climate change modelling, we have nominated a placeholder asset value-at-risk cost in this plan to prepare and respond to future weather events.

Our analysis has identified that Sydney Water faces a 50 percent increase in climate hazards over the next 30 years. Conservative estimates indicate that by 2050 Sydney Water will spend around $50 million a year to recover from climate events. Without action to mitigate climate risks, there is significant risk to the future delivery of customer services and environmental compliance, as well as of efficient core business operations. Timely action to improving climate resilience can reduce costs significantly.

Our Operating Licence 2024–2028 includes an approach to climate risk management to reach an advanced level of maturity by the end of the licence period. In response, we plan to establish governance for climate change adaptation decision making & embed climate resilience into our processes & people capability.

31 Australian Renewable Energy Agency (ARENA) 2023, Malabar Biomethane Injection Project

# Enabling effective and efficient operations

Out to 2050, our operating expenditure (opex) is expected to increase by 64 per cent. By the 2050, we anticipate annual average opex to be around $1 billion higher per annum than what it is today. A key driver of this increase is an over doubling of our wastewater system opex; necessary to manage an increasingly distributed, integrated, and complex wastewater system, including new network and treatment facilities along with digital expenditure that will enable more effective service delivery. Corporate costs and the cost of purchasing water from WaterNSW will remain core components of our opex investment (Figure 38) This increase in opex will be offset by an innovative business culture allowing us to identify and create efficiencies across our operations, with the average operating cost per customer expected to remain stable over time. Key assumptions behind increases to operating expenditure are summarised below.

**LTCOP opex profile to 2050**

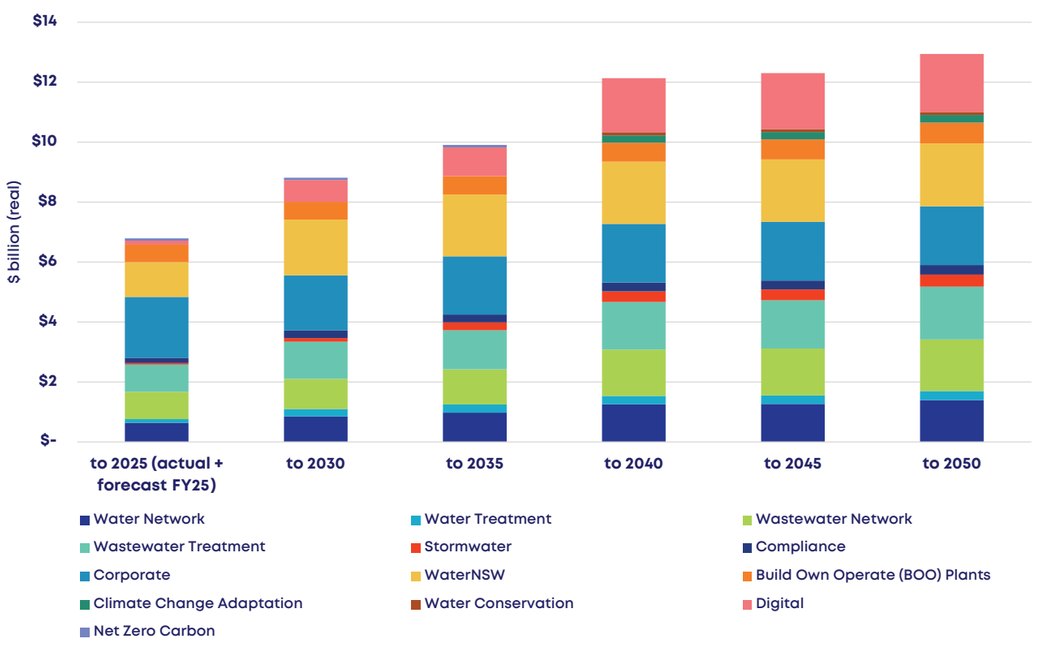



Figure 38: LTCOP operational expenditure profile to 2050*

*opex profile does not include proposed pass through costs from Sydney Desalination Plant Authority regarding the expansion of the Sydney Desalination Plant



## Increasing cost of bulk water, water and wastewater treatment and distribution

There are implications for the increased capital spend associated with each of the investment drivers. As we expand our sources of rainfall independent water supply, the cost of providing bulk water will increase due to the additional energy required to source and treat. Additional costs will also be required to support the operation of each new asset forecast under our capital growth program.

With operation of SDP now required to support Greater Sydney's water supply needs outside of growth, we can expect reliance on this asset to increase, and hence opex paid to SDP to increase.

Notwithstanding increased the increased rainfall independent supply available over time, dam water is expected to remain our most affordable source of water. WaterNSW are also forecasting an increased cost of bulk water from the dams. This is resulting from their proposed capital investment and depreciation, higher funding costs driven by higher WACC, and the impact that lower demand has on unit price.

Our baseline LTCOP modelling includes our projection of WaterNSW's costs. In August 2024, as per our Raw Water Supply Agreement, WaterNSW provided updated pass-through cost projections and these have been incorporated into our LTCOP and IPART expenditure forecasts. Using WaterNSW's pas through costs (which remains dependent on the outcomes of their IPART price determination) bills would increase further year on year.

## Increasing investment to maintain service performance and asset life

Our infrastructure maintenance program has served an important role to ensure reliability in performance while seeking to extend the life of certain assets. External factors including wet weather, prolonged drought, the recent pandemic, increasing costs and labour shortages are challenging our ability to deliver these services. As such, we have observed some reductions in reduced asset and service performance and increased compliance risk. Additional investment in maintenance and operations is therefore required to help proactively manage our infrastructure and improve performance to ensure our products and services are delivered as efficiently as possible.

Ongoing work is required to help prioritise investment in this area using asset management practices, a bottom-up build of our maintenance work plan as well as a dedicated resourcing pipeline. The increase in maintenance investment will be offset by process improvements allowing for a better targeting of maintenance effort including consideration to both the existing and future condition of our assets. These improvements will lead to removal or rationalisation of lower priority tasks and the ability to target work with greatest benefit to service delivery. We will also over time see a reduction in backlog maintenance tasks allowing for regulatory compliance requirements to be met.

Further investment is also required to enhance our operational resilience due to climate change. Without this investment there is an increased risk of reactive maintenance, greater stress on infrastructure and product quality as well as a deviation from our day-to-day operations due to more frequent climate change events. We will continue work to understand the impacts of different climate events (flood, heatwave, bushfire etc.) across our system to inform future maintenance planning.

## Increasing investment to maintain our facilities

Our facilities serve an important role in the delivery of our products and services. Facilities maintenance has similarly been impacted by the recent pandemic, increasing costs and labour shortages. At the same time, new land secured for stormwater management will require ongoing investment to ensure it remains well vegetated and can provide ongoing benefits to our community and the environment. We will continue to investigate ways in which we can provide community benefits through the way we manage the land we own, such as by enabling public access for neighbourhood community gardens and open space for recreation.

## Digital investments for operational efficiency and personalised customer communications

Our digital investments are important to enable effective service delivery and improved outcomes for our customers. As the technological landscape evolves, we will transform into a digitised utility supported by a future-ready and digitally literate workforce. As such, we will increase our reliance on technology services to deliver more integrated solutions and to identify and create efficiencies across our operations. Our investments will allow us to capture additional data to enable insight led decision making and proper monitoring and control, supported by a cloud secure model to protect our customers, assets, and services.

In addition to realising operational efficiencies, we are making digital changes to the way we engage with our customers. We are aiming to create a future where water is used efficiently and sustainably through providing transparency and visibility of our services, and real-time information to our customers. In addition, we will invest in personalising communications to suit individual customer needs in an automated and timely fashion. Giving customers more control over their accounts will ensure that they can engage with us at their convenience. However, we will ensure proactive engagement with our customers on matters relating to service interruptions. Supporting our customers through these digital enhancements will ensure increased customer satisfaction with our services.

## Continued inflationary pressure is driving an increase to our baseline operations

The pandemic has caused major interruptions to supply chains across the world and Sydney Water has been directly impacted through inflationary pressures. Particularly, we are seeing additional pressures on energy markets increasing the cost to produce energy to provide our services. We have observed price increases of five times historical prices within the space of 24 months, increasing operational expenditure due to increased electricity usage and demand from severe wet weather conditions. We are also observing increases to the cost of chemicals used to provide water and wastewater services.

## Enhancing the effectiveness of our Water Conservation program

Supporting more efficient and effective water use across Greater Sydney means that we can get the most from our water supply investments, minimise future investments and respond more effectively to different supply shocks and disruptions.

Our customers are looking to us to help them save water, provide them with alternative options to drinking water for alternatives to drinking water supplies for non-drinking purposes, support them to manage their bills and to avoid water waste. They expect that we will role model water conservation practices and react quickly to leaks and breaks.

As a city we use as much drinking water today as we did back in the 1970s, despite having two million more customers. On average, Greater Sydney uses around 275 litres of drinking water per person per day, declining from around 500 litres per day in the 1990s. During the wetter and cooler conditions of 2021-22 our residential customers used around 180 litres per day. Although this has dropped from around an average of 200 litres per person per day prior to the most recent drought, it is still higher than residential demands observed in other Australian cities. For example, Melbourne's observed residential demand in 2021-22 was 160 litres per person per day. There are some environmental and structural reasons for variation in demands between locations, however it illustrates that further improvements in the efficiency and effectiveness of water use across the city is possible.

The GSWS[1] highlighted the need for a concentrated focus on water conservation and efficiency, under all weather conditions, to make the best use of all our available water and reduce or defer investment in costly new supply infrastructure, with little or no impact on water users. It poses a challenge to Government and Sydney Water and the Greater Sydney community to achieve 38 GL of drinking water savings by 2030 and 49 GL by 2040.

We are posing to invest around $575 million by 2050 in a diverse water conservation program to empower our customers to make water wise choices and to make it easier for them to adopt more water efficient and effective options and practices everyday. We will provide services to our customers that are economic to deliver and work with Government and key stakeholders to drive regulatory and policy change that will embed water conservation into the city.

Enhancing our water conservation program and increasing our program investment will help to defer investment in new supply infrastructure by offsetting growth in demand for drinking water. It will also defer capital risk associated with delivering new infrastructure, including in response to drought, and reduce future opex associated with new supply infrastructure. Alternatively, if we were unable to enhance our water conservation program than we are likely to see investment in new supply infrastructure brought forward and operational spend go up over time.

# 06
# Delivering value for our customers

To ensure we deliver on our Plan, Sydney Water will work proactively with its delivery partners, Government and other stakeholders across a range of policy considerations.



To secure the future outlined in this Plan, there are several Enterprise Planning actions that Sydney Water will need to progress as a priority, as reflected in our Price Proposal. These are summarised in Figure 39.

In delivering value for customers, Sydney Water will also work proactively with its delivery partners, government, and other stakeholders to enable effective implementation of the Plan. Engagement activities will be further detailed as part of Sydney Water's Enterprise Government Stakeholder & Community Engagement Plan. Leveraging existing governance measures and meeting structures where possible, we will work with government across ten key areas as depicted in Figure 40 to support improvements in affordability, financeability and deliverability.

| | |
|---|---|
| 01 | Scale-up the business to deliver the increased investment program through three key strategic interventions relating to industry intelligence, optimising delivery and supplier management |
| 02 | Continue our engagement with customers ensuring that our enterprise strategy and plans align with the latest customer preferences, values, expectations and willingness to pay |
| 03 | Increase community water literacy and work with stakeholders to maintain support for new water supply options, including PRW, as well as water conservation initiatives |
| 04 | Embed our 'Future Ready' organisational realignment to ensure ways of working are effective and that we are set up to deliver our customer priorities |
| 05 | Enhanced monitoring and control of infrastructure through the Internet of Things (IoT) program, uplifting existing automation capability and implementation of a digital twin |
| 06 | Reduce service and asset performance risk and sustain good asset management practices to support long-term planning and asset creation and improve service outcomes for our customers |
| 07 | Deliver Net-Zero Carbon Program ahead of government targets, accelerating investment based on customers demonstrated willingness to pay. |
| 08 | Implement Protective Security and Emergency Management uplift including the delivery of physical security services to ensure continued protection of critical assets in line with the Security of Critical Infrastructure Act |

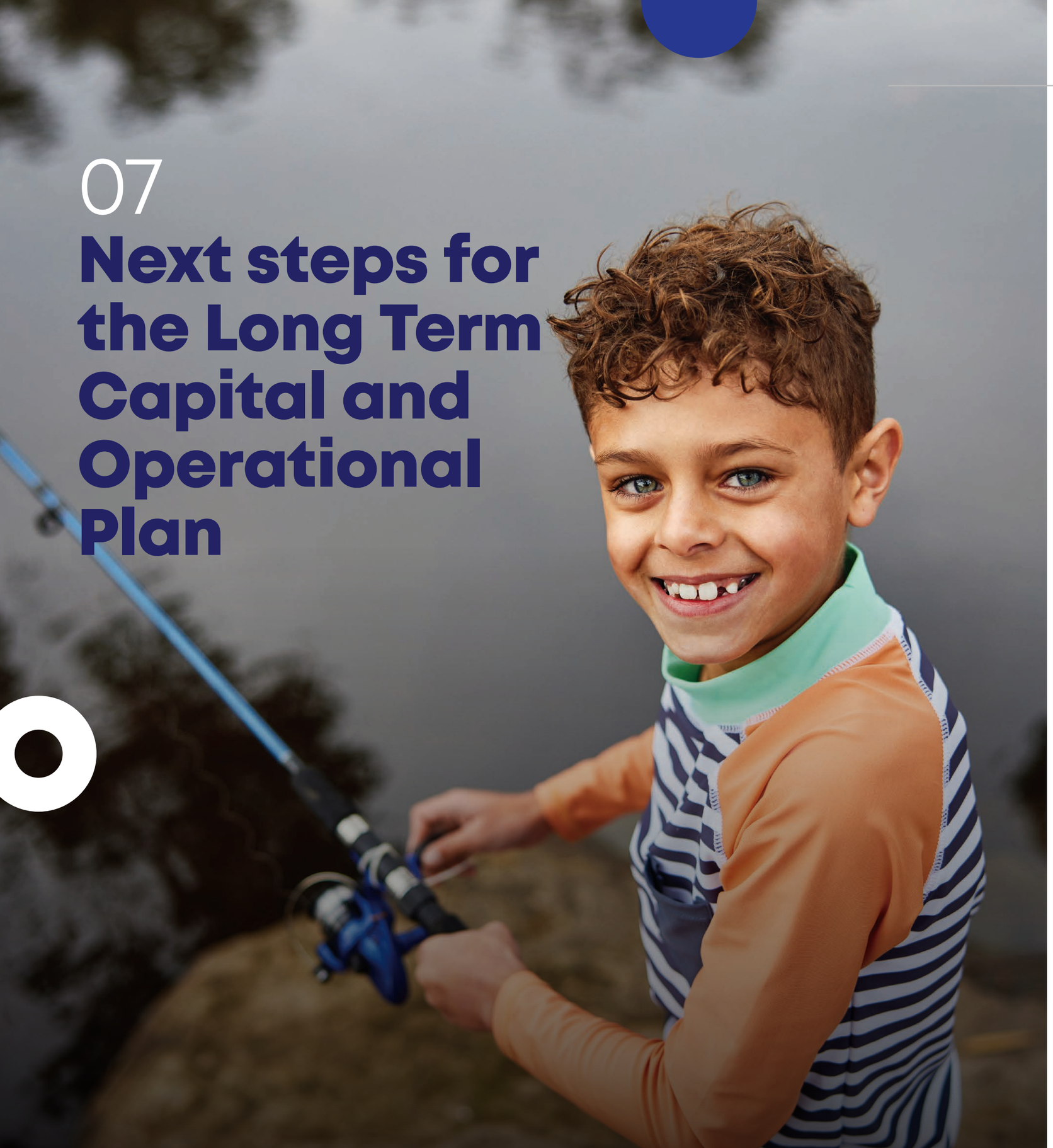
Figure 39: Sydney Water Enterprise Planning actions

| | |
|---|---|
| 01 | Support new housing policy, including prioritising investment to support Transport Oriented Development (TOD) sites and increasing infill capacity as required. |
| 02 | Contribute to development and implementation of Urban Development Plans that prioritises growth in areas that offer efficient and affordable infrastructure servicing from a whole of Government perspective, and greater certainty over the location and timing of growth. |
| 03 | Improved feasibility of Integrated Water Cycle Management (IWCM) servicing solutions for greenfield development areas in Aerotropolis and Mamre Road Precincts through providing greater guidance on how to achieve IWCM objectives |
| 04 | Contribute to practical actions that lead to improved resilience of critical infrastructure where significant economic or security impacts (State and Federal) exist |
| 05 | Ensure Infrastructure Contributions are implemented expeditiously and in way that ensures costs are shared appropriately between customers and developers and that contribution prices are phased in to ensure customers bear an appropriate share of development risk |
| 06 | Support discussions on whether it is appropriate to recover higher or lower near-term costs from customers, creating a smoother increase in bills (more now, less later or visa versa) irrespective of the particular investment approach |
| 07 | Secure support for potential interim river releases from recycled water facilities in the lead-up to proposed Purified Recycled Water scheme delivery, ensuring best value outcomes for customers and the environment |
| 08 | Lead constructive discussions on PRW as a water supply augmentation option within government |
| 09 | Support science-led and outcomes-based environmental performance requirements to ensure investment is focused on the highest impact areas. |
| 10 | Update water supply levels of service to reflect water system resilience objectives and ensure sufficient time to build new infrastructure during drought. |

Figure 40: Key supporting actions with Government and stakeholders to deliver on the LTCOP

07

# Next steps for the Long Term Capital and Operational Plan



The development of our first LTCOP is a milestone for Sydney Water, but like any great adaptive plan, it cannot sit on a shelf.

We need to continue to monitor and improve our long term planning to ensure it remains responsive to the needs of our customers, stakeholders and the changing world around us. Our Plan will receive a major update every five years (or if a major change triggers us to do so earlier), and a smaller review each year.

Since the release of our LTCOP in June 2023, we have updated this report to ensure alignment of our 10 year expenditure forecast with our Pricing Submission to IPART, developed additional growth scenarios to reflect the Government's growth direction, incorporated the latest customer insights from Our Water, Our Voice and addressed key recommendations from our independent reviewers. While these items have not changed the outcomes documented in this Plan, addressing them ensures our LTCOP and our Pricing Submission are in harmony.

Over the next five years, Sydney Water will progress additional recommendations provided by our independent reviewers including:

1. Optimisation of asset renewals including prioritisation based on risk rather than age
2. Further review and quantification of operating spend impacts associated with infrastructure investment delays and deferrals
3. Further economic assessment of individual portfolio investment
4. Review and finalise efficiency gains in operations
5. Test support for key LTCOP assumptions with customers and stakeholders, particularly around future timing of PRW.

# 08 Appendices



| Appendix | Document |
|---|---|
| Appendix 1.1 | LTCOP key assumptions |
| Appendix 1.2a | Minister letter Sydney Water responsibilities for urban water framework |
| Appendix 1.2b | B20 3655 letter Bruce Morgan SW |
| Appendix 1.2c | Letter Chair SW transfer responsibilities from WNSW |
| Appendix 1.2d | Letter from Min Pavey to Mr Roch Cheroux |
| Appendix 2.1 | Sydney Water Timeline |
| Appendix 2.1a | WaterNSW and Sydney Water - working together |
| Appendix 3.1 | LTCOP1.1 - Demand inputs |
| Appendix 3.2a | Climate change impact on water supply in Greater Sydney |
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# Glossary

| Term | Definition |
|---|---|
| **Annual Exceedance Probability (AEP)** | The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year. For example, a 1% AEP Flood means you have a 1-in-100 chance that a flood of that size (or larger) could occur in any one year. |
| **Advanced Water Treatment** | Advanced water treatment is the highest level of treatment. It uses reverse osmosis – the same technology used by the Sydney Desalination Plant – to treat water to a high quality. |
| **Biosolids** | Nutrient-rich, organic waste products that can be used in agriculture, composting and land rehabilitation. |
| **Bioretention** | Bioretention is the process by which vegetated soil filters treat stormwater through a soil filter. Bioretention systems can also slow and reduce stormwater runoff. |
| **Bypass** | Partially treated wastewater discharged from a wastewater treatment plant. |
| **Catchment** | An area of land surrounding a dam or water storage, or the area served by a wastewater treatment plant.<br><br>Rain falling over a water catchment drains to a dam and may contain nutrients, minerals and contaminants collected from the land surfaces.<br><br>Waste is collected from homes and businesses in wastewater pipes within a wastewater catchment and drains by gravity or is pumped to a specific wastewater plant. |
| **Conservation** | Resource use, management, and protection to prevent degrading, depleting, or wasting resources to ensure resources are sustainable for present and future generations. |
| **Conventional Servicing** | Servicing that is aligned to Sydney Water core business requirements, allows for compliance requirements to be met and generally aligns to the recommendations from the Greater Sydney Water Strategy |
| **Design Life** | The period of time over which a regulated asset may be expected to be physically operational |
| **Drinking Water** | Water treated to comply with Australian Drinking Water Guidelines 2011 to the satisfaction of NSW Health. |
| **Disinfection by-products (DBP)** | Disinfection by-products are chemical, organic, and inorganic substances that can form during a reaction of a disinfectant with naturally present organic matter in water. |
| **Emergency relief structures (ERS)** | Emergency Relief Structures are used to help prevent wastewater overflows from being released through maintenance holes or private plumbing connections.<br><br>They are effective in protecting the wastewater system from damage, particularly during extreme wet weather - by stopping uncontrolled wastewater overflows to protect homes in low lying areas, and the wastewater system from being damaged. |
| **Enduring Supply** | An amount of water that can be supplied confidently, to meet demand for water in a city or region, irrespective of the duration and intensity of a drought. |
| **Enhanced Servicing** | Servicing that is aligned to Sydney Water' strategic vision and is informed by directions and measures of success reflected through Strategic Blueprints |
| **Environment Protection Authority (EPA)** | An independent body that regulates and responds to activities that can affect the health of the NSW environment and its people. |
| **Full Supply Level (FSL)** | The normal maximum operating water level of a water storage when not affected by floods. This water level corresponds to 100% capacity. |
| **Gross Pollutant Trap (GPT)** | Mechanical filters which remove debris and pollutants greater than greater than 2mm from stormwater runoff, before the stormwater enters a waterway. |
| **Independent Pricing and Regulatory Tribunal (IPART)** | The independent pricing regulator for the water, public transport, local government, electricity and gas industries, as well as the licence administrator for water, electricity and gas. |
| **Infrastructure Contribution** | A council issued charge to a developer for a new development. They help fund infrastructure like parks, community facilities, local roads, footpaths, stormwater drainage and traffic management. |
| **Intergovernmental Panel for Climate Change (IPCC)** | An intergovernmental body of the United Nations established by the World Meteorological Organization and the United Nations Environment Programme in 2988. Its job is to advance scientific knowledge about climate change caused by human activities. |
| **Level 3 restrictions** | Severe water restrictions implemented when dam levels approach 35% of their FSL. These restrictions focus on constricting outdoor water use at homes, businesses and at community facilities, e.g. constricting the watering of gardens, parks and sporting fields, turf and plants, and the filling or top-up of pools. |
| **Level 3 restricted demand** | Estimated demand on drinking water supplies assuming Level 3 restrictions are in place and a broader community response to declining water availability and messaging. Currently assumed to be around a 19% reduction compared to pre-2019 drought demand levels. |
| **Level 5 restrictions** | Critical water restrictions that would commence as dam levels approach 15% of their FSL. These restrictions would prioritise water for essential needs and services, e.g. drinking, hygiene, firefighting, medical, food production. Non-essential services may temporarily close or at least need to demonstrate efficiency of water use. It should be noted that the use of Level 4 and 5 restrictions has not been endorsed by the NSW Government. |
| **Level 5 restricted demand** | Estimated demand on drinking water supplies assuming Level 5 restrictions are in place and a broader community response to severe water shortage. Currently assumed to be around a 39% reduction compared to pre-2019 drought demand levels. |
| **Kilolitre (kL)** | One thousand litres of water or approximately one tonne of water. |
| **Litre (L)** | A measure of liquid volume. |
| **Megalitre (ML)** | One million litres of water or approximately one thousand tonnes of water. |

| Term | Definition |
|---|---|
| **MBSW&S** | Metropolitan Board of Water Supply & Sewerage |
| **Modern Engineering Equivalent Replacement Asset (MEERA)** | The lowest cost of replacing the economic benefits of the existing asset assessed based on design and construction using modern technology. |
| **Operating Licence** | A licence issued under the Sydney Water Act 1994 (NSW) that sets many of our performance standards. IPART administers our Operating Licence. |
| **Purified Recycled Water** | The drinking water produced after treating wastewater three times. Firstly, at a WRRF, then via membrane technology under advanced treatment, before being transferred to an environmental buffer such as a reservoir or dam. Here, it mixes with stored surface water before undergoing treatment for a third time at a WFP and entering the distribution network. |
| **Rainfall independent water supply** | Sources of water for drinking and non-drinking uses that are not dependent on rain. The two key sources of rainfall-independent supply are seawater desalination and recycled wastewater. |
| **Representative Concentration Pathway (RCP)** | RCPS are climate change scenarios defined by the Intergovernmental Panel for Climate Change (IPCC). They describe different greenhouse gas concentration (not emissions) trajectories out to 2100 and the associated predicted temperature change. |
| **Recycled water** | Treated wastewater used in industrial processes, in irrigation for agriculture, in urban parks and landscapes, and in households for flushing toilets, car washing and watering gardens. It is not for drinking or personal use. |
| **Recycling** | Collecting and processing a resource so that it can be re-used. |
| **Regulators** | Organisations that set regulations and standards. Sydney Water's regulators include IPART, the EPA and NSW Health. |
| **Renew** | To make new, to restore or to make effective for an additional period. |
| **Reservoir** | A man-made water storage area. Water is transferred from dams and treatment plants by gravity or pumping stations to reservoirs, which are usually on high land. The water then flows through a system of mains and smaller pipes to our customers. |
| **Resilient water supply** | A water supply that can withstand or recover quickly from difficult conditions, such as prolonged and intense droughts. |
| **Servicing System** | Sydney Water's assets and network that deliver water, wastewater, recycled water, and stormwater services. |
| **Sustainable supply** | The sustainable supply of water refers to the estimated maximum amount of water that can be provided by the system on an annual basis over the long term while meeting the set system design criteria for failure risk, robustness, and reliability |

| Term | Definition |
|---|---|
| **Stormwater** | Rainwater that runs off the land, frequently carrying various forms of pollution such as litter, debris, animal droppings and dissolved chemicals. This untreated water is carried in stormwater channels and discharged directly into creeks, rivers, the harbour, and the ocean. |
| **Stormwater system** | The system of pipes, canals and other channels used to carry stormwater to bodies of water, such as rivers or oceans. The system does not usually involve treatment. |
| **Treatment (water)** | The filtration and disinfection process. |
| **Wastewater** | The dirty water that goes down the drains of homes and businesses and into the wastewater system. |
| **Wastewater overflow** | A wastewater overflow occurs when wastewater escapes from the wastewater system due to insufficient capacity or a blockage in the pipe. Wastewater overflows that occur during heavy rainfall are caused due to ingress/infiltration of stormwater into the wastewater system during heavy rainfall, and can be called a wet weather overflow. |
| **Wastewater system** | The system of pipes and pumping stations for collecting and transporting wastewater from each property to the wastewater treatment plant. |
| **Drinking water demand** | Total amount of water required from drinking water sources. This is seasonal and highly influenced by the weather. |
| **Water filtration plant** | A treatment plant that improves water quality by removing impurities through filtration. |
| **Water pumping stations** | Stations that house mechanical pumping equipment used to transport water from lower ground to higher ground through pipes. |
| **Water quality** | The physical, chemical, and biological measures of water. |
| **Water Resource Recovery Facility (WRRF)** | Treatment plants that treat wastewater before it's reused or discharged to rivers or oceans. They were previously known as wastewater treatment plants, water recycling plants and sewage treatment plants). These facilities follow strict licence conditions issued by the NSW EPA, which monitors the effect of discharges on water quality and aquatic life. They also produce biosolids – the nutrient-rich material created from treating wastewater solids. Biosolids are a rich source of phosphorus and nitrogen, which can be used in agriculture, composting and land rehabilitation. |
| **Waterways** | All streams, creeks, rivers, estuaries, inlets, and harbours. |
| **Wetlands** | Low-lying areas often covered by shallow water, such as marshes, mangroves, swamps, bogs, or billabongs. Rich in biodiversity, they store and filter water and replenish underground water supplies. |
| **Wet Weather Overflow Abatement Program (WWOA)** | A program designed to reduce the ingress/infiltration of stormwater into the wastewater system during heavy rainfall, and therefore the frequency and volume of wet weather overflows at emergency relief structures (ERS). The program ensures that Sydney Water is compliant as a wastewater service provider, meeting the expectations of the NSW EPA. Our WWOA program primarily focusses on reducing risk to the environment and the public, by prioritising sites with the highest environmental and public amenity value first. |

# List of acronyms

| Acronym | Definition |
|---|---|
| **ADWG** | Australian Drinking Water Guidelines |
| **AEP** | Annual Exceedance Probability |
| **AGWR** | Australian Guidelines for Water Recycling |
| **AI** | Artificial Intelligence |
| **ARENA** | Australian Renewable Energy Agency |
| **AWTP** | Advanced Water Treatment Plant |
| **BASIX** | Building Sustainability Index |
| **BOO Plants** | Bondi Ocean Outfall Sewer |
| **BOOS** | Bondi Ocean Outfall System |
| **DBP** | Disinfection by-products |
| **DCCEEW** | New South Wales Department of Climate Change, Energy, Environment and Water |
| **DOOF** | Deep Ocean Outfall |
| **DPC** | New South Wales Department of Premier and Cabinet |
| **DPHI** | New South Wales Department of Planning, Housing and Infrastructure |
| **EPA** | New South Wales Environment Protection Authority |
| **EPL** | Environment Protection Licence |
| **ERS** | Emergency relief structures |
| **FSL** | Full Service Level |
| **GPT** | Gross Pollutant Trap |
| **GSWS** | Greater Sydney Water Strategy |
| **HBT** | Health Based Targets |
| **I/I** | Ingress and infiltration |
| **IICATS** | Integrated Instrumentation, Controls, Automation and Telemetry |
| **IoT** | Internet of Things |
| **IPART** | Independent Pricing and Regulatory Tribunal |
| **IPCC** | Intergovernmental Panel for Climate Change |
| **LTCOP** | Long Term Capital and Operational Plan |

| Acronym | Definition |
|---|---|
| **MEERA** | Modern Engineering Equivalent Replacement Asset |
| **ML** | Machine Learning |
| **NARCliM** | Australian Regional Climate Modelling |
| **NHMRC** | The National Health and Medical Research Council |
| **NSOOS** | Northern Suburbs Ocean Outfall Systems |
| **OPEX** | Operating expenditure |
| **PFAS** | Polyfluoroalkyl substances |
| **PFOA** | Perfluorooctanoic acid |
| **PRW** | Purified Recycled Water |
| **QA** | Quality Assurance |
| **RCP** | Representative Concentration Pathway |
| **RFIS** | Rainfall independent water supply |
| **SCADA** | Supervisory Control and Data Acquisition System |
| **SCI** | Statement of Corporate Intent |
| **SDP** | Sydney Desalination Plant |
| **SOCI** | Security of Critical Infrastructure |
| **SWSOOS** | Southern Western Suburbs Ocean Outfall System |
| **WACC** | Weighted Average Cost of Capital |
| **WFP** | Water Filtration Plant |
| **WRP** | Recycled Wastewater Treatment Plant |
| **WRRF** | Water Resource Recovery Facility |
| **WSSA** | Water Services Association Australia |
| **WWOAP** | Wet Weather Overflow Abatement Program |

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