Water Conservation

2023-24 performance and forward plan

Sydney WATER

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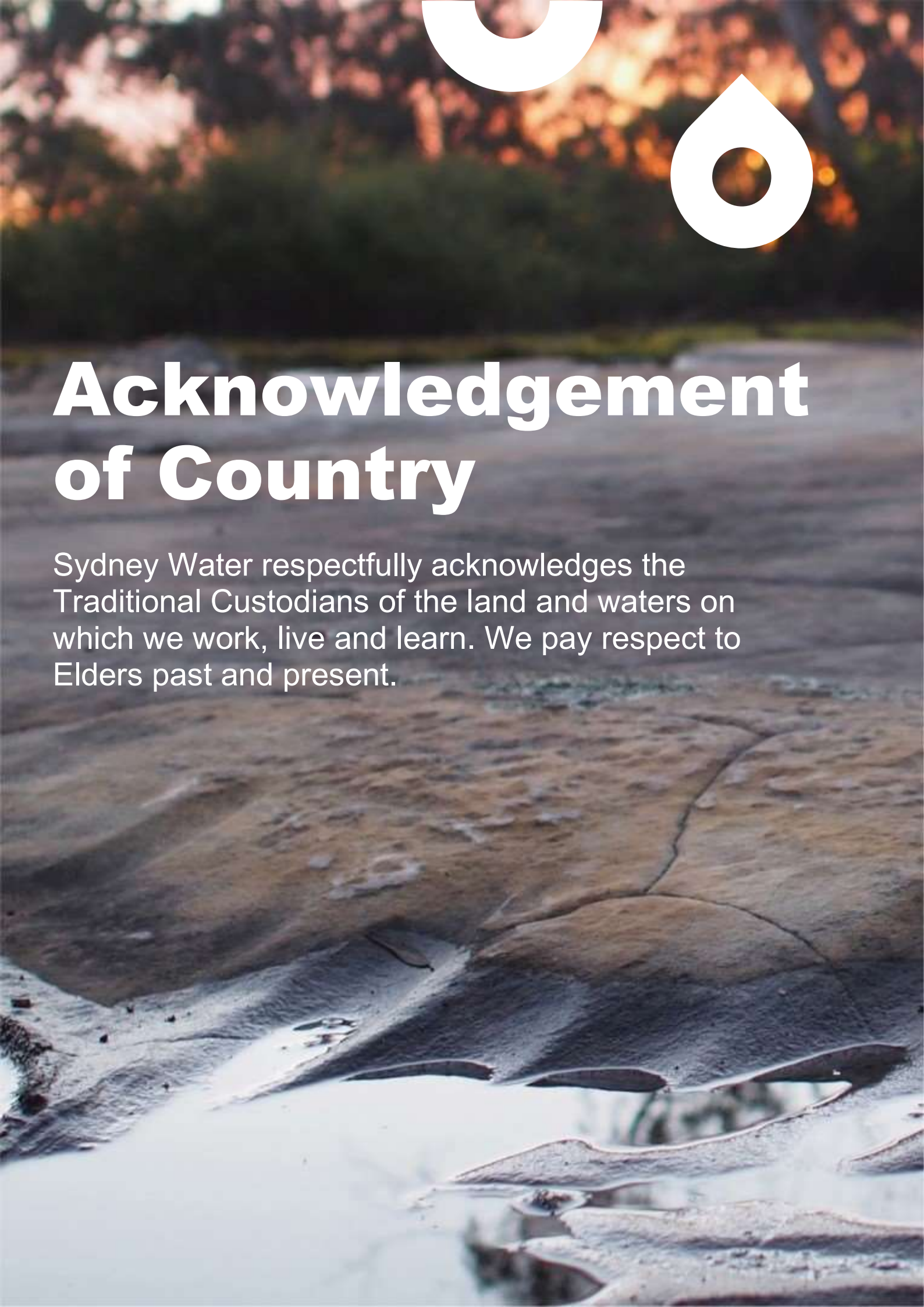

Acknowledgement of Country

Sydney Water respectfully acknowledges the Traditional Custodians of the land and waters on which we work, live and learn. We pay respect to Elders past and present.

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Executive summary

Our city is changing, and our water services will need to respond to a rapidly growing population, changing climate, changing customer expectations, and competing demand for drinking water use for city green spaces, urban cooling, and public health. Customers have told us that they see water as a precious, valuable resource. They have also told us that it is important to reduce water loss in our network by minimising leaks and breaks, help them save water and be more efficient through community-based programs, and to recycle and reuse to build the city's water supply resilience.

In 2023-24, Sydney Water supplied 547,710 million litres (ML) of drinking water to our customers and for use in our system operations across Greater Sydney, the Illawarra, and the Blue Mountains.

Water conservation plays an important role in meeting our customer expectations and supporting the implementation of the Greater Sydney Water Strategy (GSWS) and our Long-Term Capital and Operational Plan, by making our drinking water supply go further. This may delay the need for investment in new large-scale drinking water supply sources like desalination, improve our resilience to dry conditions, and help to manage affordability of our services.

In 2023-24 we invested $14.2 million in water efficiency activities, $34 million in leakage management activities, and $39 million in recycled water schemes. This report showcases the achievements of our water conservation activities carried out in the past year, as well as outlining our forward plan and how it meets the reporting requirements under our Operating Licence.

Our investment in water efficiency activities to date achieved almost 24 GL of drinking water savings towards the Greater Sydney Water Strategy water efficiency target to save 38 GL per year of drinking water by 2030. During 2023-24 we invested:

- $9.2 million in delivering community-based water savings programs that have helped our customers save an estimated 1,514 ML of drinking water. This represents an increase from previous year’s savings of 1,485 ML. This investment included $300,000 in research and innovation projects focused on developing knowledge and testing new products to improve water efficiency, leakage, and recycled water programs. This was in addition to collaborations with NSW Government and industry bodies to improve standards, regulation, and policy to drive long-term and sustainable water efficiency outcomes.
- $5 million in delivering broad behavioural change campaigns and targeted education programs in schools and at community events to maintain and build upon the water wise behaviours adopted by our community during periods of drought.

Our investment in leakage management activities to reduce the volume of water lost from our assets included, $2 million in proactive leak detection, and $32 million in responding to and repairing leaks. The rolling 12-month leakage result of 132 ML per day is higher than the upper bound of the Economic Level of Leakage (ELL) of 108 ML per day ±16 ML. Our leakage result has remained stable at 9% of the volume of drinking water supplied over the last three years, and performance also remains 'A rated' using the International Water Associations Infrastructure Leakage Index (ILI) for developed countries, with a Q4 Infrastructure Leakage Index (ILI) of 1.46. However, we take our leakage performance seriously and have refined our Leakage Management Plan which includes initiatives that drive performance towards ELL.

We invested $39 million in producing 40,068 ML of recycled water in 2023-24. This reduced the demand for drinking water by 13,061 million litres. This is similar to production in 2022-23, though ongoing delivery of projects and maintenance has resulted in lower recycled water volumes compared with the longer-term average, this work will ensure ongoing operation in the long term. Our customers have told us that more stormwater and wastewater should be intercepted, recycled, and reused to help the city's water supply resilience. Sydney Water plans to continue to invest in major projects and renewals on our larger schemes to maximise recycled water production in the coming years.

Our water conservation plan will enable us to use our water more efficiently and support our community to save water now and in the long term, through the delivery of a diverse program of water efficiency, leak reduction and recycled water activities. It will also help to prepare the city and our customers for periods of water scarcity, where water supply is constrained. We will continuously monitor, review and adapt our program and forward plan to reflect lessons learnt, changing circumstances and ensure that it continues to deliver value for our customers and the community.

1. Water Conservation

1.1 Introduction

Water plays an important role in our city, supporting the economy and our communities. Sydney Water will service an additional 1 million people by 2040 and nearly 2 million more by 2050, according to Department of Planning, Housing and Infrastructure (DPHI) projections. With growth, continuing to provide sufficient water to meet all customer and community needs is a challenge, heightened by increased climate variability.

Water conservation was identified in the Greater Sydney Water Strategy (GSWS) as a key action to support a thriving, sustainable and resilient Greater Sydney. Water conservation aims to make the most of our available water supplies, through the efficient use of water, reducing water waste and using non-drinking water in place of drinking water where it is feasible to do so.

1.2 What we heard from customers

To clearly identify customer priorities that drive our strategy, Sydney Water has carried out in-depth customer engagement. Our Water Our Voice, a six-phase program run over the course of two years from 2022 – 2024, engaged deeply with our customers to learn what truly matters to them. This has been used to inform our strategy and business decisions.

Our customers told us that they see water as a precious, valuable, resource. They accept that, even outside of times of drought, they have an individual responsibility to save water and reduce their personal use of water. They feel Sydney Water plays an important role in helping customers reduce how much water they use, and in delivering community-based water savings programs to improve our resilience and reduce the need for severe water restrictions. They also expect Sydney Water to reduce the water loss from leaks and breaks in the network, as seeing water leaking in a public space is frustrating and appears wasteful. Our customers have also told us that more stormwater and wastewater should be intercepted, recycled, and reused to help the city's water supply resilience.

Table 1 summarises the top 15 priorities identified by our customers from Our Water, Our Voice engagement and their link to water conservation.

Table 1: Top 15 customer priorities from Our Water, Our Voice engagement

Ranked top 15 Customer Priorities		Link to Water Conservation	Customer Outcomes
01	Maintaining clean and safe drinking water		Water quality and reliability
02	Ensuring bills remain affordable via cost management, payment plans and avoiding future cost spikes	✓	Customer experience
03	Maintaining clean, safe waterways and water recreation areas by reducing pollution		Environmental protection
04	Enhancing the water network's resilience to drought through building more water recycling and/or desalination capacity	✓	Water quality and reliability, Environmental Protection
05	Reducing water loss by minimising leaks and breaks in Greater Sydney's pipe networks	✓✓✓	Water quality and reliability
06	Increasing water savings and reducing usage through community-based water saving programs	✓✓✓	Water quality and reliability
07	Improving natural waterways and habitats to protect the environment		Environmental protection
09	Reducing the chances of your drinking water occasionally smelling or tasting different		Water quality and reliability
10	Minimising the impact of outages both planned and unplanned	✓	Customer experience, Water quality and reliability
11	Contributing to a cooler environment and more pleasant green public spaces through trees and vegetation	✓	Environmental protection
12	Maintaining a standard of customer service that meets or exceeds your expectations	✓	Customer experience
13	Reducing net carbon emissions to zero by 2050 or sooner via energy efficient operations and renewable energy	✓	Environmental protection
14	Reducing the frequency and duration of severe water restrictions	✓✓	Water quality and reliability
15	Ensuring better informed customers through improved/modern communications to assist and manage water use	✓✓	Customer experience

We will face future challenges

In 2050, Greater Sydney will be a very different place to what it is today. To ensure we continue to provide safe and reliable services that are sustainable for present and future generations, there is a need for us to plan for a combination of challenges.

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. This will require increased drinking water supply, new wastewater treatment facilities, and augmentation and expansion of existing water and wastewater systems.

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 insights from our customers on the outcomes they expect Sydney Water to deliver over the longer term, preferences for how those outcomes will be delivered, and insight into relative willingness to pay for those outcomes and service levels.

Competing demands for drinking water for city green spaces, urban cooling and public health

As heatwaves become even hotter and the role of water will become more important in supporting greenspaces, tree canopy, urban cooling, environmental health, and public health. We support the sustainable increase of urban greening in urban landscapes and provide alternative water sources for greening and cooling, using drinking water as a last option.

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. The probability of concurrent and compounding events will increase, including heatwaves, droughts, fires, storms and floods. Variations in weather have a direct impact on our customers, our network and our services.

Reduced sustainable inflows

Inflows to Greater Sydney's dams have almost halved since the early 1990s. 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. We have plans to increase rainfall independent water sources to build resilience in our current supply.

Increased severity of droughts

Drought frequency, duration and severity is expected to increase in the future. The severe 2017-20 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.

More intense heatwaves

Heatwave frequency, duration and severity is expected to increase in the future. By 2030, NSW is expected to experience 10 more days in heatwave each year, with heatwaves becoming even hotter.

Increased bushfire risk

Bushfire frequency, duration and severity is expected to increase in the future. Bushfire is one of the main natural hazard impacts on our operations and services, with NSW being one of the most bushfire-prone regions in our country.

More severe storms and floods

Storm frequency, duration and severity is expected to increase in variability in the future. Since February 2020, Greater Sydney has experienced four major flood events. 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 Water Filtration Plants.

1.3 Our strategy

Sydney Water aspires to our vision of creating a better life with world-class water services (Figure 1). Our Strategy has been shaped by what our customers told us was important to them. In our recent customer engagement program 'Our Water Our Voice' our customers highlighted their priorities which has shaped the key customer outcomes that drive our strategy - Customer Experience, Environmental Protection, and Water Quality and Reliability. 'Saving Water - Our water is used more efficiently, and we support the community to save water' is a key objective underpinning the Water Quality and Reliability outcome.

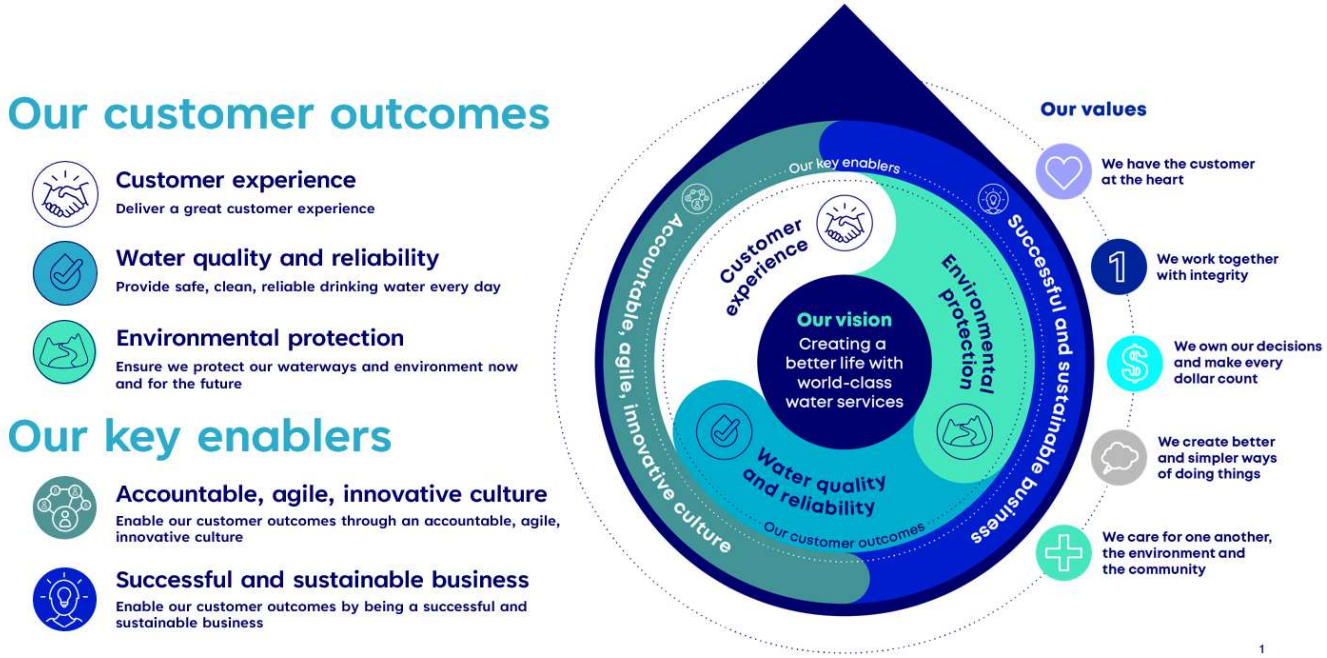


Figure 1: Sydney Water's strategic framework

1.4 Alignment with NSW strategy

In response to the 2019 drought, the 2020 NSW Audit Office's Performance Audit Report into water conservation found that the now Department of Climate Change, Energy, the Environment and Water (DCCEEW) and Sydney Water had "not effectively investigated, implemented or supported water conservation initiatives in Greater Sydney…and as a result, Greater Sydney's water supply may be less resilient to population growth and climate variability, including drought".

The NSW State Water Strategy and the Greater Sydney Water Strategy (GSWS) highlights the need for greater emphasis on water efficiency and conservation under all weather conditions to prepare for drought and manage the affordability of water services by making the most of the assets we have and defer the need for investment in new supplies. The GSWS calls for a concentrated focus on water conservation and water efficiency, saving 38 gigalitres[1] (GL) per year of drinking water by 2030 and 49 GL per year by 2040.

Our Operating Licence expects us to implement water conservation where it is economic and feasible, and so contribute to the delivery of the GSWS and its outcomes.

[1] ie billion litres of water per year

1.5 Water Conservation Plan

Sydney Water has developed a diverse and adaptive Water Conservation Plan, shaped by what is important to our customers. It aims to ensure that "**Our water is used more efficiently, and we support the community to save water**". To do this we will:

- build community awareness of water and drought and provide information on how to be water wise
- provide services to customers to help them save water and be prepared for drought
- support policy and market change to drive long term improvements in water efficiency for the community
- maintain and renew our water assets to reduce the volume of water lost from our water network
- use water efficiently in the operation of our business
- provide recycled water as an option to customers (and/or in our own operations) where it feasible to do so
- support effective delivery and continuous improvement in delivery and planning of the program through research, data, analytics and technology adoption, and
- monitor, review and adapt our plan to prioritise initiatives to deliver on our performance targets and deliver the greatest benefits at the most efficient cost for our customers.

Our plan is delivered through 3 sub-plans, one each for of water efficiency, leak management and water recycling, as illustrated in Figure 2.

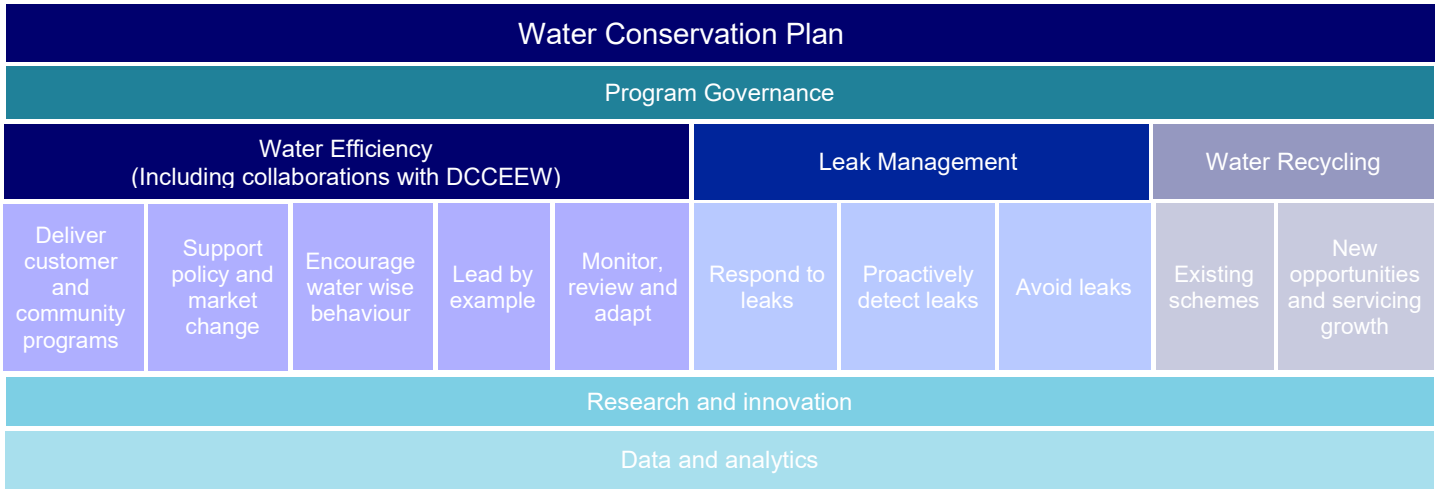


Figure 2 Delivering our water conservation plan

We will monitor our plan and its delivery by tracking the total volume of drinking water supplied and average total drinking water use per person. We will also monitor the performance and delivery of activities within each of the sub-plans. We have established performance targets for each area (Table 2) and will continuously monitor, review and adapt our plan and activities to achieve our performance targets over the long term.

Table 2: Key performance targets for Water Conservation

	Measure	Aim	FY25	FY26	FY30
Water efficiency	Volume of drinking water saved (billions of litres per year GL/yr)	GSWS Action 2.1 – a concentrated focus on water conservation and efficiency delivering 38GL/yr of savings by 2030 and 49GL/yr by 2040	>24	30	38
	Residential drinking water use per person per day – average weather (litres per person per day - LPD)	Improve the efficiency of residential drinking water use to achieve less than 182 LPD by 2030 helping customers use water efficiently	<186	<183	<182
Water leakage	Percentage of drinking water supplied lost as leakage	Improve the efficiency of our network, by reducing the volume of water lost as leakage from our drinking water network	≤ 8% (124)	≤ 8% (119)	≤ 7% (112)
Water recycling	Recycled water use Volume of recycled water available (Billions of litres per year)	Improve the volume of recycled water available for supply by increased recycled water from treated wastewater and harvested stormwater and reduce water loss to the environment	33	≥46	≥62
	Drinking water savings Volume of drinking water saved (Billions of litres per year)	Reduce the volume of drinking water used for non-drinking purposes by replacing it with recycled water	10	13	16

2023-24 Performance and forward plan

2. Water use trends

Total drinking water demand in Sydney Water's area of operation in 2023-24 was 547,710 ML in 2023-24 (Figure 3). This is equivalent to 275 litres per person per day (LPD), which is consistent with last year (Figure 4). The estimated weather corrected average water use has decreased to 278 LPD, down from reported 280 LPD last year. Table 3 summarises the key water use statistics for 2022-23 and 2023-24.

Overall, total demand remains around 8%, almost 48,000 ML, lower than it was prior to the introduction of restrictions during the 2017-2020 drought (see Figure 6). This reflects ongoing water-wise behaviours adopted during the last drought and in response to price increases, ongoing impacts from the COVID-19 pandemic and the impact of water conservation activities.

Table 3 Breakdown of water use in 2023-24

Breakdown	2023-24	2022-23
Volume of drinking water produced for supply[2]	548,807 million litres	527,529 million litres
Drinking water demand[3]	547,710 million litres	524,171 million litres
- Metered residential	65%	67%
- Metered Non-residential	22%	21%
- Leakage - Economic level of leakage 108 ± 16 ML/d	9% (132 million litres per day)	9% (129 million litres per day)
Non-metered water (excluding leaks)[4]	4%	3.4%
Observed average water use per person	275 litres per day (100 thousand litres per year)	275 litres per day (100 thousand litres per year)
Weather corrected average water use per person	278 litres per day (101 thousand litres per year)	280 litres per day (102 thousand litres per year)
Observed average residential water use per person	180 litres per day (66 thousand litres per year)	178 litres per day (65 thousand litres a year)
Volume of drinking water saved by using recycled water	13,061 million litres	11,912 million litres
Volume of water sourced from recycled water (in megalitres)	40,068 million litres	39,783 million litres

[2] Volume of drinking water produced for supply into the urban water supply system (ML) which excludes unfiltered (raw) water. Note that, unfiltered water is also supplied to specific customers in the order of 1,346ML

[3] Does not include unfiltered

[4] Includes billed unmetered consumption, unbilled unmetered consumption, unauthorised consumption and customer meter under registration.

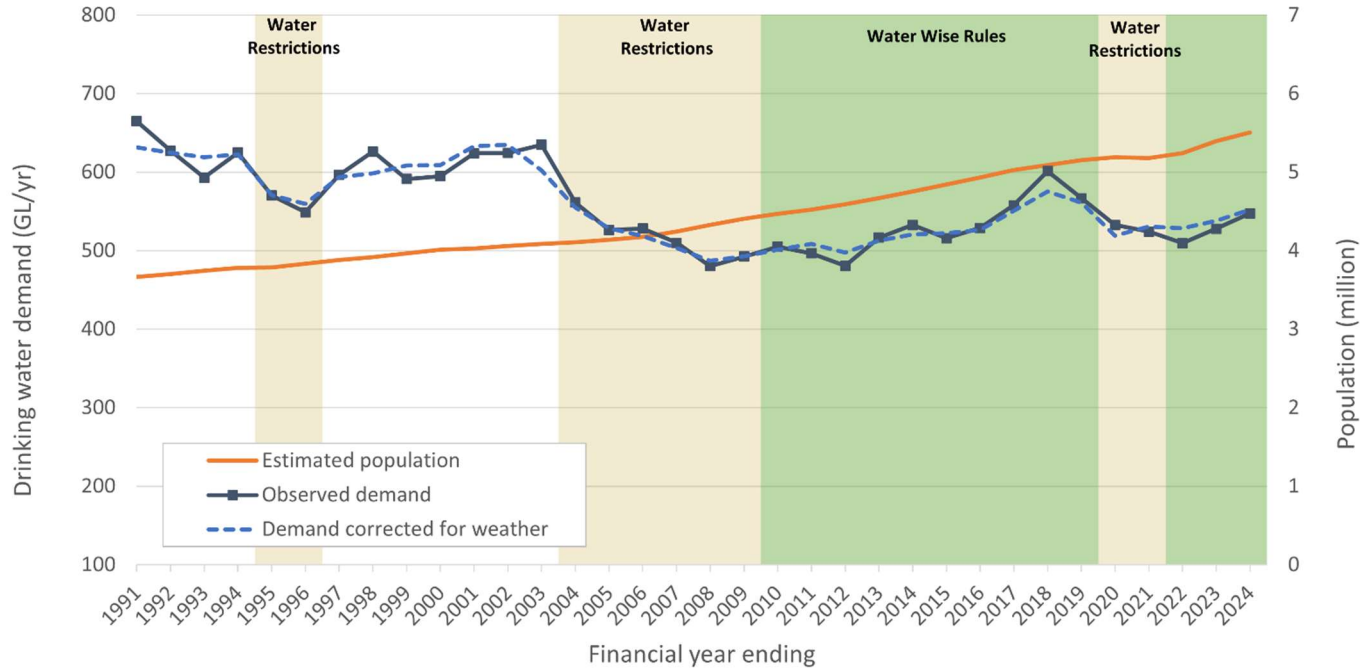


Figure 3: Demand for drinking water and population growth over time (observed and weather-corrected in billions of litres per year i.e. Gigalitres or GL/year)

The following figures translate total demand into per capita demand both as a total and as an estimate of the residential and non-residential components of demand.

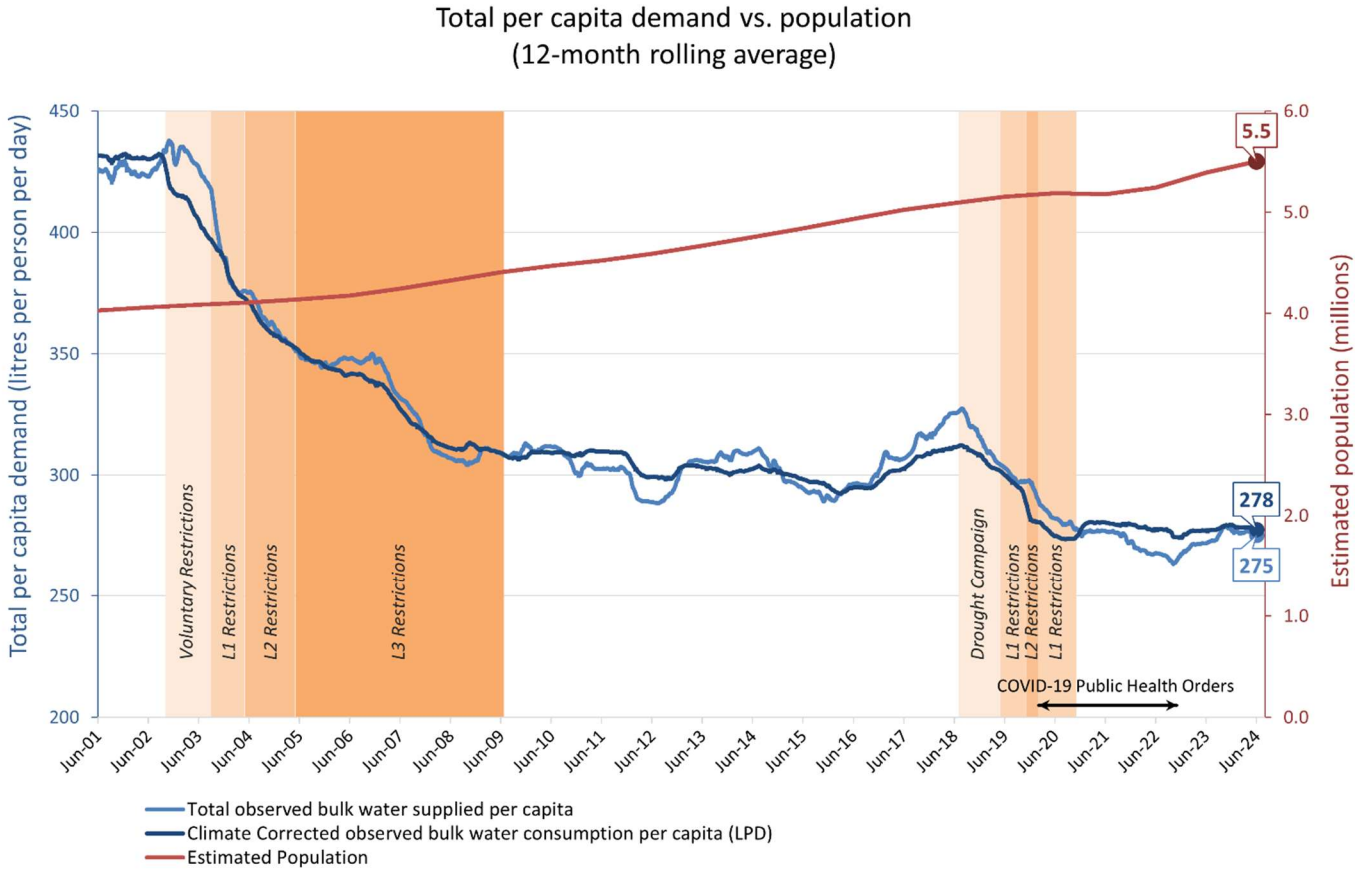


Figure 4: Demand for drinking water (observed and weather-corrected in litres per person per day) and population growth over time

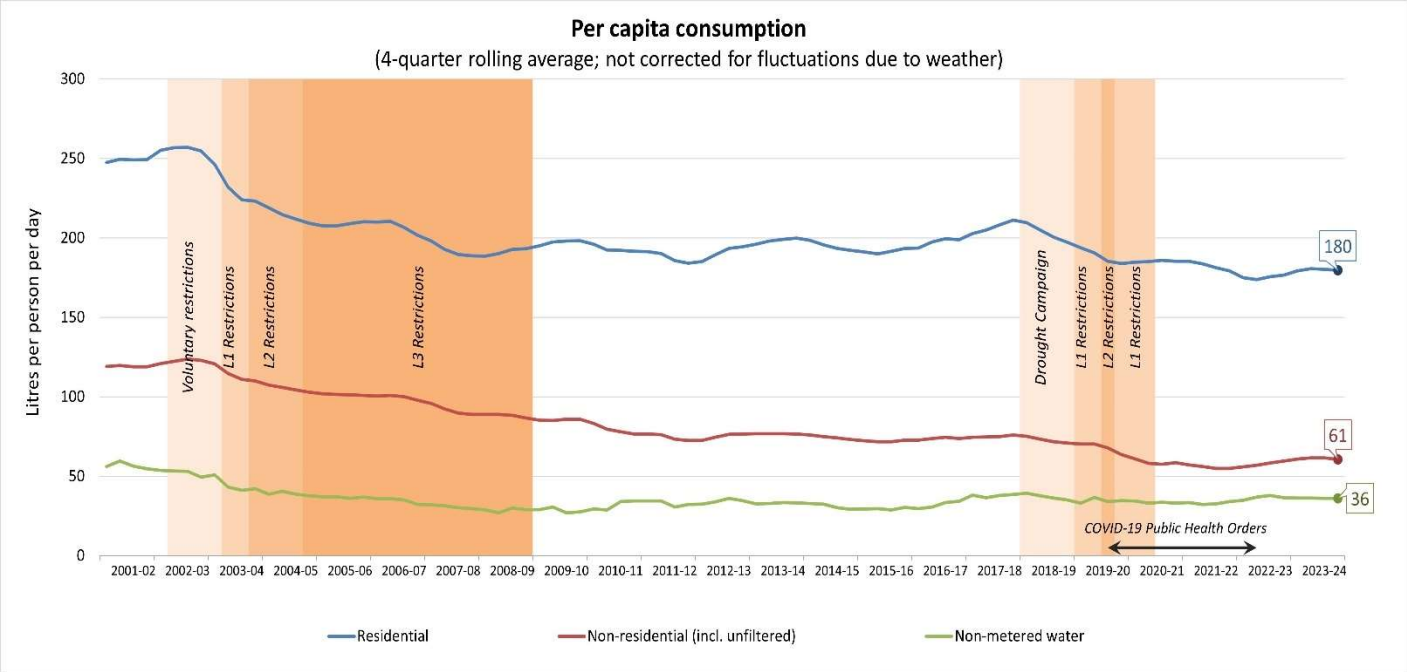
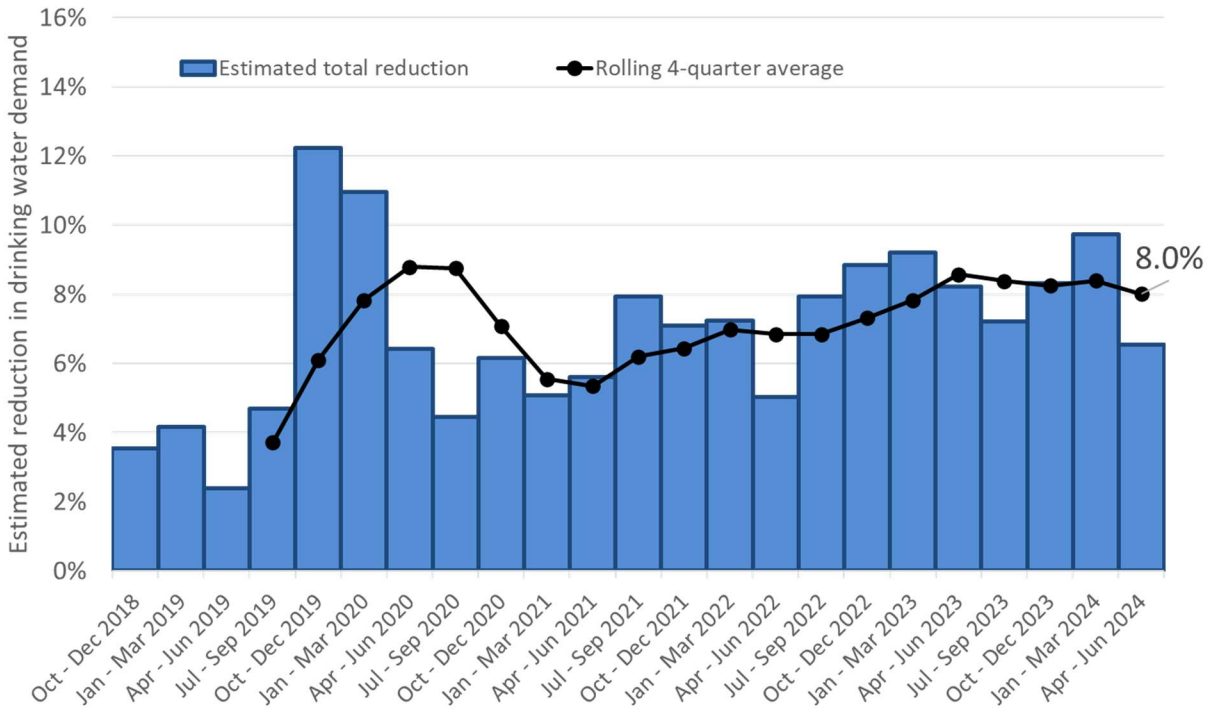


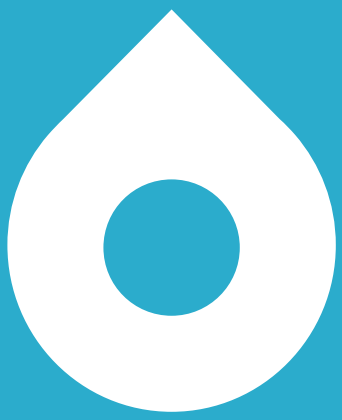
Figure 5: Total observed per capita residential and non-residential consumption breakup in litres per person per day (LPD)



Note: The estimated total reduction includes the impact of water efficiency programs, campaign, restrictions and COVID-19.

Figure 6: Reduction in drinking water demand since water restrictions. Includes restrictions, campaigns, efficiency programs, price increases and COVID-19 impacts.

Water Efficiency



3. Water efficiency performance and forward plan

3.1 Overview

Water efficiency activities aim to help our customers, the community and ourselves to improve the efficiency of drinking water use, under all weather conditions, now and in the future. In doing so, we can make the most of our available water supplies, help customers manage their water bills and prepare for drought.

Our plan for water efficiency has been developed in collaboration with DCCEEW to deliver on the GSWS water efficiency targets. We have identified the following focus areas to deliver water savings now and drive improvement over the long term.

Figure 7: Water Efficiency Plan focus areas to support greater efficiency of water use

Research and innovation and data and analytics are fundamental to the ongoing monitoring, review and adaptation of our plan. Providing insights into new opportunities and providing evidence for change.

3.2 Performance 2023-24

Water efficiency activities to the end of 2023-24 have delivered around 24GL of drinking water savings towards the GSWS water efficiency target, to save 38GL per year of drinking water by 2030. Most of these savings have been achieved by customers continuing to maintain water wise behaviours adopted during the 2017-2020 drought.

In 2023-24, we have continued to see strong uptake of our customer and community programs and other efficiency activities, contributing 1,514 ML/yr of annual water savings towards our water efficiency targets (Table 4). Whilst we have increased our water savings from last year, it is less than the target we set ourselves at the start of the year. Our established programs delivered more savings than expected and remain economic to deliver, as per the agreed economic method as outlined in Section 10.

WaterFix® Strata program and some of our less mature programs, such as Online Monitoring and CENRA did not meet their water savings expectations. We will look to adapt these programs to increase uptake and water savings in coming years. The WaterFix® Schools pilot took longer than expected to commence this year. We will continue to work with the Department of Education to complete water efficiency assessments of 100 high water using schools by the end of 2024-25. The washing machine replacement rebate did not progress this year, with the view to pause delivery and collaborate with DCCEEW on a state-wide program focused on targeting low-income households from 2024-25.

The rollout of smart meters to residential and non-residential customers provided an opportunity for us to notify them of continuous flows and potential leaks. We have also continued to work with DCCEEW to collaborate and progress the delivery of their water efficiency activities to enable water savings over the longer term.

We also continued investment into research and innovation and data and analytics activities to explore emerging opportunities and build evidence to inform future iterations of our water efficiency plan, reduce barriers to water efficiency and support policy and market change. Key areas of focus were in-home water efficiency and reuse technologies, commercial and industrial water technologies and water use for greening and cooling.

Refer to Section 6 for further information on our activities and our key achievements in 2023-24.

Table 4 Water efficiency activities delivered in 2023-24

Activities	Delivery cost $/kL[5]	Economic cost $/kL[6]	Meets ELWC	Target annual savings (ML)	Annual savings[7] (ML)	Investment ($M)	Participants
Deliver customer and community programs				1920	1368	$5.46	10456
Established initiatives				750	838	$4.98	10,048
WaterFix® Residential	$1.44	$0.66	Yes	180	202	$4.06	9,645
PlumbAssist®	$1.15	$0.37	Yes	50	50	$0.42	356
WaterFix® Strata	$0.27	< $0	Yes	280	152	$0.33	609
WaterFix® Concealed Leaks	$0.02	< $0	Yes	240	434	$0.16	304
Early lifecycle initiatives				550	499	$0.19	103
WaterFix® Commercial	$0.09	<$0	Yes	250	260	$0.03	48
Online monitoring	$0.12	<$0	Yes	300	239	$0.16	55
Pilot initiatives				620	31	$0.29	305
WaterFix® Schools	$1.05	$0.46	Yes	350	28	$0.08	18
CENRA	>$70	>$70	No	225	<0.1	$0.19	282
Water Efficiency Grants	$2.42	$1.86	Yes	20	3	$0.02	5
Washing machine replacement	N/a	N/a	N/a	25	-	-	-
Encourage water wise behaviour				0	63	$5.21	492
Smart metering continuous flow notification	N/a	N/a	N/a	-	63	N/a[8]	492
Waterwise campaigns	N/a	N/a	N/a	-	-	$ 5.21[9]	N/a
Data Drop pilot (DCCEEW)	N/a	N/a	N/a	-	-	-	-
Support policy and market change				-	83	$0.30	N/a
NABERS Water Starters (DCCEEW)	N/a	N/a	N/a	-	83	N/a[10]	33
Review of regulatory instruments (DCCEEW)	N/a	N/a	N/a	-	-	N/a[10]	N/a
Research and innovation	N/a	N/a	N/a	-	-	$0.30	N/a
Lead by example				N/a	N/a	$0.03	N/a
Operational water use improvements	N/a	N/a	N/a	N/a	N/a	$0.03[8]	N/a
Monitoring, review and adapt				N/a	N/a	$3.23	N/a
Project governance, support and resourcing				N/a	N/a	$3.23	N/a
			Totals:	**1,920**	**1,514**	**$9.23**	**11,812**
					Including waterwise campaigns	**$14.23**	

[5] Cost to deliver the program per kilolitre of water saved over the life of the intervention, also known as the direct levelised cost.
[6] Social economic assessment of costs and benefits using the Economic Level of Water Conservation method.
[7] New savings expected over 12 months from 2023-24 activities.
[8] Not all costs are captured, additional funding providedthrough other business activities
[9] Investment to build water literacy and maintain water wise behaviours in the community.
[10] DCCEEW led and funded activity

3.3 Forward plan

Our five-year plan, developed in collaboration with DCCEEW, includes a range of activities that:

- provide opportunities to residential and non-residential customers to reduce their water use, reduce waste and manage their water bills
- increase the adoption of water efficient practices and technologies in the community by working with government, industry and other stakeholders,
- build water literacy in the community and provide information to encourage water wise behaviours and choices,
- help us to effectively manage our operational water use
- support capability and capacity building of the industry and stakeholders to enable water conservation.

We support research and innovation and analytics to identify and assess new opportunities, new technologies and different approaches. Ongoing monitoring of our activities supports our annual review and shape our forward plan. It also helps us to prioritise our efforts to deliver on our performance targets and at the most efficient cost for our customers.

We will also continue to work with DCCEEW to advocate for changes to water efficiency related policies and regulation and to support the implementation of the NSW Water Efficiency Program in Greater Sydney where it is feasible.

As part of our annual review, we assess our water conservation activities using the Economic Level of Water Conservation (ELWC) methodology, as required by our Operating Licence. In doing so, we estimate the value our activities contribute to the community and compare that to an agreed value of water. If the community value of the activity exceeds the value of water, activities are deemed to be more cost-effective to deliver than not to. In this assessment we consider the direct costs and benefits of the activity, the 'delivery cost'.eg. program implementation costs and water savings, and other indirect costs and benefits such as avoid wastewater treatment and energy use.

We also consider other criteria when making decisions about our forward plan, such as alignment to broader policy outcomes, drought response enablement and scalability to ensure they deliver value to the community and support the delivery of our objectives. We prioritise initiatives based on their alignment to strategy and benefits.

The ELWC method is not applied to pilot or research and innovation activities as they are investigative in nature and seek to explore opportunities and challenges with implementation and build evidence of benefits. Pilot and early lifecycle activities must be assessed as economic before they progress to more mature established initiatives. Further information on the ELWC methodology is available in Section 10.

We have estimated the water savings we anticipate to achieve from planned activities in 2024-25 (Table 5) and our forward plan to 2029 (Table 6). These estimates are based on currently available information and the performance of our activities in 2023-24. Activities included in our plan for 2024-25, that are funded by the water conservation program have been assessed as economic according to the ELWC methodology.

Water savings have not been quantified for all individual activities, such as water wise campaigns and research and innovation due to the complexity of the program, interdependencies and/or data limitations. However, the ongoing impact of these activities will be monitored the through the tracking of total water demand, as mentioned in Section 1.5.

In addition to these identified savings, we have identified around 11 GL of potential savings by 2029 from emerging opportunities, including the successful deployment of research and innovation trials. Success of these emerging opportunities is highly uncertain at this point in time and no water savings have been included in the forward water savings estimates. However, they will inform future iterations of our plan.

We acknowledge the following that will be managed as we deliver, monitor and adapt the program:

- competitive neutrality principles and competition laws, may limit our ability to deliver and promote services, impacting participation and water savings
- actual savings achieved may differ from those assumed. e.g. the impact of activities may vary depending on the characteristics of program participants or weather conditions, actual customer uptake or roll out of initiatives may be different from than expected. e.g. lower customer engagement with digital metering information and advice
- the compound effect of multiple initiatives targeting behaviour change .e.g. the sum of impacts from pricing changes, digital metering and community awareness may be greater than what occurs in practice.

Table 5: Water efficiency activities planned for 2024-25

Activities	Delivery cost $/kL[11]	Economic cost $/kL [12]	Meets ELWC	Target annual savings (ML)	Investment ($M)	Participants
Deliver customer and community programs				1,568	$6.65	12,624
Established initiatives				743	$5.10	11,180
WaterFix® Residential	$1.49	<$0	Yes	179	3.84	8750
PlumbAssist®	$1.79	$0.70	Yes	40	0.75	250
WaterFix® Strata	$0.14	<$0	Yes	254	0.21	2000
WaterFix® Concealed Leaks	$0.02	<$0	Yes	270	0.30	180
Early lifecycle initiatives				569	0.75	1,362
WaterFix® Commercial	$0.10	<$0	Yes	250	0.19	25
Online monitoring / CENRA	$0.17	<$0	Yes	300	0.56	337
Inefficient washing machine replacement for low-income households – (DCCEEW)	N/a	N/a	N/a	19	CCF[13]	1000
Pilot initiatives				256	$0.44	82
WaterFix® Schools	$0.34	<$0	Yes	246	0.18	77
Water Efficiency Grants	$2.78	$1.69	Yes	10	0.26	5
Encourage water wise behaviour				159		
Smart metering continuous flow notification	N/a	N/a	N/a	159	N/a	N/a
Waterwise campaigns	N/a	N/a	N/a	Maintain savings	$5.00[14]	N/a
Data Drop pilot (DCCEEW)	N/a	N/a	N/a	N/a	CCF[13]	N/a
Support policy and market change				45	$0.25	
Research and innovation	N/a	N/a	N/a	N/a	$0.25	N/a
Review of regulatory instruments (DCCEEW)	N/a	N/a	N/a	45	CCF[13]	N/a
Lead by example				-	$0.40	N/a
Operational water use improvements e.g. smart standpipes, WRRF metering etc				N/a	$0.40	N/a
Monitoring, review and adapt					$3.06	N/a
Project governance, support and resourcing		N/a		N/a	$3.06	N/a
			Totals:	**1,772**	**$10.00**	**12,624**
				Including waterwise campaigns	**$15.00**	

[11] Levelised cost of delivering the program, considering the net cost to implement and the volume of water savings expected to be delivered over the life of the intervention.
[12] Social economic assessment of costs and benefits using the Economic Level of Water Conservation method.
[13] Sydney Water will contribute $3.55m in 2023-24 towards the NSW Government's Climate Change Fund (CCF) to promote water efficiency in Greater Sydney.
[14] Investment to build water literacy and maintain water wise behaviours in the community.

Table 6 Water efficiency plan for 2024-25 to 2028-29 based on the current value of water[15]

Activities	Meets ELWC	New Water Savings (ML/year)					Total Demand reduction by 2028-29 (ML/year)
		2024-25	2025-26	2026-27	2027-28	2028-29	
Customer and Community Programs	-	1,568	1,513	1,732	1,727	1,722	8,262
WaterFix® Residential	Yes	179	179	179	179	179	897
PlumbAssist®	Yes	40	40	40	40	40	200
WaterFix® Strata	Yes	254	152	152	152	152	864
WaterFix® Concealed Leaks	Yes	270	450	675	675	675	2,745
WaterFix® Commercial	Yes	250	250	250	250	250	1,250
Online Monitoring / CENRA	Yes	300	300	300	300	300	1,500
WaterFix Schools (pilot)	Yes	246	64	64	64	64	502
Water Efficiency Grants (pilot)	Yes	10	10	10	10	10	50
Inefficient washing machine replacement for low-income households (DCCEEW)	Yes	19	68	62	57	52	257
Encourage water wise behaviour	-	159	300	248	293	294	1,294
Smart metering	N/a	159	300	248	293	294	1,294
Waterwise campaigns	N/a	Maintain savings					
Data Drop pilot (DCCEEW)	N/a	N/a	N/a	N/a	N/a	N/a	N/a
Support policy and market change	-	45	7,910	3,116	254	127	11,451
Research and innovation	N/a	N/a	N/a	N/a	N/a	N/a	N/a
Review of regulatory instruments (DCCEEW)	N/a	45	93	93	93	85	409
Pricing and incentives	N/a	-	7,817	3,023	161	42	11,042
Lead by example	N/a						
Operational water use improvements	N/a	-	-	-	-	-	-
Monitoring, review and adapt	**N/a**						
Project governance, support and resourcing	N/a	N/a	N/a	N/a	N/a	N/a	N/a
Total	**-**	**1,772**	**9,723**	**5,096**	**2,274**	**2,143**	**21,007**

[15] Numbers have been rounded

Leakage management

4. Water leakage performance and forward plan

4.1 Overview

Sydney Water's leakage-reduction programs target the efficient transfer of water to customers, including response to customer-reported leaks and breaks, as well as leveraging proven technology to detect hidden leaks. This work falls into key areas illustrated in Figure 8.

Figure 8: Water leakage focus areas

These are underpinned by continuing research and innovation as well as advancing data analytics to maximise the value of activities performed. Adopting an Economic Level of Leakage (ELL) based target aims to ensure that leak-reduction activities are cost effective and represent best value for our customers. Sydney Water estimates leakage from our network through a water balance calculation using the total water supplied minus metered consumption and other known uses, adopting measured figures where possible and best estimates or industry benchmarks where required.

4.2 Performance 2023-24

At the end of the 2023-24 financial year, water leakage was estimated at 132 ML per day (rolling 12-month performance), compared with 2022-23 from 129 ML per day. Our leakage result has remained stable at 9% of the volume of drinking water supplied over the last three years. Our performance also remains 'A rated' using the International Water Associations Infrastructure Leakage Index (ILI) for developed countries, with a Q4 ILI of 1.46 However, this result is higher than the upper bound of the Economic Level of Leakage (ELL) at 108ML per day ±16ML, and we take our leakage performance seriously and have refined our Leakage Management Plan which includes initiatives to improve our performance. Key statistics provided in

Table 7, Figure 9 and the water balance in Table 8.

In 2023-24 we:

- invested $32 million in responding to leaks and breaks reported by customers and/or detected by our proactive leak detection programs,
- proactively inspected 16,081 km of water pipelines, at cost of $1.6 million, finding 3,796 leaks,
- continued operation of our existing pressure management and refined the pressure settings in 9 of our schemes to achieve additional water savings without impacting customer service,
- invested $80 million in the renewal of pipelines, and
- continued research, innovation and analytics to find better ways of targeting leak detection programs.

Refer to Section 7 for more details on specific activities delivered in 2023-24 related to leakage management.

We've analysed the available data to understand the drivers of performance and have identified some areas for improvement, these include:

- improving the accuracy and assurance around the water balance calculation and leakage estimation.eg. flow meter data validation, improving meter coverage and automation of the calculation,

- reducing barriers to improved response times e.g. interaction with third parties, resource and equipment availability and prioritisation,
- addressing gaps in active leak detection and/or repair technology e.g. trunk mains and leveraging data analytics.
- ongoing management of aging assets e.g. renewals and maintenance.

Table 7: Leakage management statistics

Key statistics	2023-24 (End Q4)	2022-23	2021-22
Actual Leakage (refer Water balance)	132 ML/d	129 ML/d	122 ML/d
Economic Level of Leakage (ELL) Target[16]	108 ML/d	108 ML/d	108 ML/d
Number of water main breaks, bursts and leaks	4,789	4,860	4,042
Number of water main breaks, bursts and leaks per 100 kilometres of water main	20	21	18
Average duration of an unplanned water interruption (minutes)	179	231	192
Length of mains inspected	16,081 km	13,923 km	15,455 km
Infrastructure Leakage Index (ILI)	1.46	1.44	1.37

Table 8: Water balance rolling 12 months as at end Q4 2023-24 [17]

<table>
<tr><th colspan="7">Water Supplied
547,710 million litres</th></tr>
<tr><td colspan="4">Water losses
58,821</td><td colspan="3">Authorised consumption
488,888</td></tr>
<tr><td>Real losses
48,446</td><td colspan="3">Apparent losses
10,376</td><td>Unbilled authorised
4,639</td><td colspan="2">Billed authorised
484,249</td></tr>
<tr><td>Network Leakage
48,446
(132 ML/d)</td><td>Meter inaccuracy
9,828</td><td>Unauthorised consumption
548</td><td>Unbilled unmetered
4,165</td><td>Unbilled metered
474</td><td>Billed unmetered
2,675</td><td>Billed metered
481,574</td></tr>
<tr><td colspan="5">Non-revenue water
63,460</td><td colspan="2">Revenue water
484,249</td></tr>
</table>

[16] An uncertainty band of ±16 ML/d exists around the forecast ELL, as leakage is determined by deduction, total system supply minus usages, and uncertainties in input figures, including meter read adjustments, result in much larger uncertainty of the final leakage volumes over the year.
[17] Note that numbers have been rounded

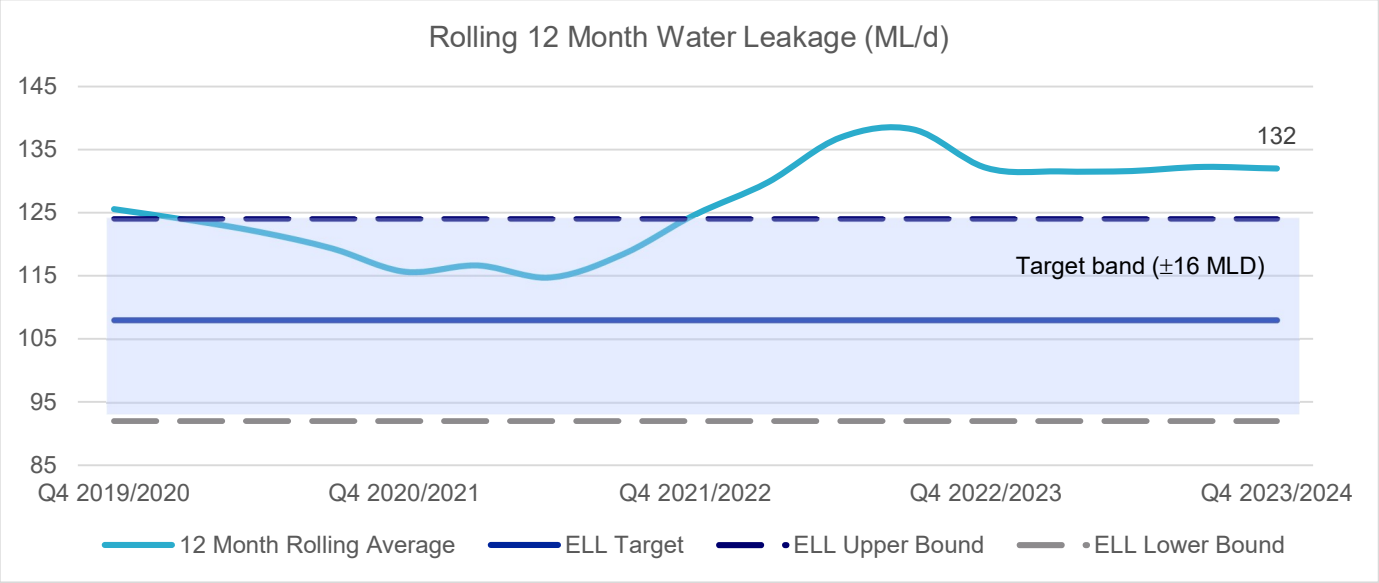


Figure 9: Estimated leakage compared to the Economic Level of Leakage (ELL) in our system

4.3 Forward plan

Our five-year plan aims to return our leakage performance to within the ELL uncertainty band, reaching 114MLD by 2029. The plan includes activities to:

- improve the accuracy and assurance around the water balance calculation and our estimate of leakage,
- improve response time to repair leaks in the network,
- improve our proactive leak detection work through:
    - better system monitoring through district metering and automation of leakage estimates to understand leakage performance by system areas and better target field surveys
    - expanding the use of acoustic sensors and/or other IoT technology to detect hidden leaks
    - ongoing targeted active leak detection field survey, including exploration of tools and methodologies that can improve the reach or efficiency of programs
- explore opportunities to expand our pressure reduction program where feasible,
- support ongoing asset renewals and maintenance programs

Ongoing monitoring of our activities will support our annual review and shape our forward plan. The plan will be supported by digital and technology enablement and its delivery will be targeted and improved through data and analytics and research and innovation.

We acknowledge the following will need to be managed as we deliver, monitor and adapt the program:

- balancing improved response times alongside customer continuity service interruptions and wastewater incident management requirements,
- weather conditions, market conditions, employee safety, the role of third parties and other barriers that may impede our response,
- the uncertainty of the location, size and occurrence of leaks within our aging asset base.

Key improvement areas for 2024-25, include ongoing design of our district metering program, response despatch and prioritisation improvements, investigations of barriers to improved response times, rollout of smart standpipes to our crews, installing digital metering at Water Resource Recovery Facilities (WRRF) and leveraging more detailed and automated analysis of leakage using the Enterprise Data Platform.

Proactive leak detection remains a key activity in our plan. Our target for 2024-25 remains at 16,000 kilometres inspection with a $2.2 million budget. Our plan aims to inspect 16,000-20,000 kilometres of water mains and around 3,500 kilometres of trunk mains a year for five years. Increased metering and data analysis of our network combined with tools such as field acoustic sensors, fixed acoustic sensors, canine leak detection and IICATS flow monitoring will provide opportunities for us to better pinpoint leaks and target our response. This will complement leak notifications we receive from customers.

High pressure and/or surge can cause or exacerbate leaks and breaks within the system. We will continue to investigate opportunities to expand on previous pressure management work and pressure calming initiatives. We will also continue to implement our water main renewal program and complete critical watermain condition assessments at approximately 50 kilometres per year and use asset performance data to target preventative and corrective maintenance activities.

Planning investigation of district metering in 2023-24 looked at opportunities for further flow monitoring in the network to inform the leakage management activities, this is progressing through the asset creation process with concept design anticipated during 2024-25. There are ongoing improvements in the water balance process to better understand how we use water in our operations and maintenance to improve our estimations of leakage.

Recycled water

5. Recycled water performance and forward plan

5.1 Overview

Recycled water is a climate independent source of water that can help improve our resilience to hotter, drier, future climate, with additional benefits including reusing a resource that would otherwise be discharged; conserving our drinking water supplies; and deferring investment in our water and wastewater systems. Sydney Water is committed to the principles of a circular economy, with recycled water playing a vital role in meeting customer and environmental water demand and reducing the use of drinking water for non-drinking purposes, like watering gardens and flushing toilets. We also ensure recycled-water schemes are financially viable, so we continue to deliver value for our customers. Our forward focus areas are illustrated in Figure 10.

Figure 10: Recycled water focus areas

5.2 Performance 2023-24

Maximising the volume of recycled water produced by our Water Resource Recovery Facilities (WRRF) results in conservation of drinking water for drinking. We invested $39 million in the operation of our recycled water schemes. Recycled water production for 2023-24 was 40,068 ML. This was impacted by ongoing work at St Marys Advanced Water Treatment Plant (AWTP). This recycled water production is estimated to have reduced the need for 13,021 ML of drinking water for non-drinking water purposes. Sydney Water's recycled water scheme's performance for the 2023-24 financial year are summarised in Table 9.

We also continued to invest in reviewing opportunities to expand recycled water where financially viable, including development servicing and partnering with customers (e.g. industrial, agricultural and irrigation water users).

5.3 Forward plan

Sydney Water will aim to maximise production from our existing schemes, we will work with customers, government and other key stakeholders to ensure our existing schemes remain viable and can deliver recycled water that is fit for purpose (ie suitable for the end-use, meeting relevant guidelines for water recycling and customer expectations).

Sydney Water's recycled water production target for 2024-25 has been reduced to 33GL across all our schemes. This reflects the impact of St Marys AWTP being offline and key renewals to improve longer term performance to be delivered in 2024-25. These include North Head WRRF recycled water plant renewal work and some targeted work at Rouse Hill WRRF. Some renewals may reduce recycled water production in the short-term during completion of the work but will position us well to continue to supply recycled water in the longer term.

Sydney Water is committed to managing recycled water quality and ensuring protection of public health through all recycled water schemes. This includes ongoing recycled water quality monitoring, performance and risk reviews and engagement with recycled water customers and NSW Health.

Sydney Water will continue to explore a range of new, emerging and existing opportunities to increase the amount of water recycling available to customers where it is economically viable to do so, including but not limited to purified recycled water (PRW) as an option for bulk water supply, new non-drinking recycled water schemes (industry and third-pipe), support healthy waterways by providing recycled water for environmental flows, and reducing excess

urban stormwater flows through stormwater harvesting. Working with others, such as DCCEEW, we will advocate for land use and water policy to support ongoing use of recycled water including recycled wastewater and/or stormwater.

Table 9: Recycled water production and drinking water savings 2023-24

Source	Recycled Water Scheme	Recycled Water Use (ML/year)	Drinking Water Savings ML/year)	Type of Use
All WRRF	On-site usage	17,861	1,849	Reclaimed Effluent
Bingara Gorge	Golf Course	156	117	Recreational irrigation
Bingara Gorge	Residential	83	83	Residential
Bombo	Kiama Golf Club	53	40	Recreational irrigation
Castle Hill	Castle Hill Country Club	89	67	Recreational irrigation
Gerringong	Aorangi Farm, Gerroa	60	0	Irrigation (Agricultural)
Liverpool	Liverpool Golf Club	71	53	Recreational irrigation
Liverpool	Warwick Farm Racecourse	94	71	Recreational irrigation
Penrith	Penrith Council Play Fields	0	0	Recreational irrigation
Picton	Carlton Farm, Picton	415	0	Irrigation (Agricultural)
Quakers Hill	Stonecutters Ridge Golf Club,	110	83	Recreational irrigation
Quakers Hill	Water sharing, agricultural release	365	0	Agriculture River release
Richmond	University of Western Sydney,	251	188	Irrigation (Agricultural)
Richmond	Richmond Golf Club	66	50	Recreational irrigation
Richmond	Taronga Zoo (koala feed plantation)	1	1	Irrigation (Agricultural)
Rosehill	Rosehill Camelia Scheme	1,392	1,392	Industrial
Rouse Hill	Rouse Hill recycled water Scheme	2,303	2,303	Dual Retic (Residential etc)
St Marys	Dunheved Golf Club	51	38	Recreational irrigation
St Marys	Water sharing, agricultural release	2,428	0	Agriculture River release
St Marys AWTP	Environmental Flows	5,642	0	Environmental
West Camden	Glendon Brae Pastoral	6	5	Irrigation (Agricultural)
West Camden	Camden Council	0.5	0	Recreational irrigation
West Camden	Elizabeth Macarthur Agricultural	36	27	Irrigation (Agricultural)
West Camden	Agricultural release	1,830	0	Agriculture River release
West Camden	A Smart Farmer	9	7	Irrigation (Agricultural)
West Camden	Ron Dine Reserve	0.5	0	Recreational irrigation
West Camden	Hayter Reserve	0	0	Recreational irrigation
Wollongong	BlueScope Steel	6,506	6,506	Industrial
Wollongong	Wollongong Golf Course	14	11	Recreational irrigation
Wollongong	Wollongong Council	1	1	Recreational irrigation
Wollongong	Port Kembla Coal Terminal	177	133	Industrial (Recreational)
All Total (ML)		40,068	13,021	

2023-24 Activity overview

6. Water efficiency activity overview

6.1 Deliver customer and community programs

We will deliver programs to increase the effectiveness and efficiency of water use in homes, businesses and the community inside and outside of drought

6.1.1 Established initiatives

6.1.1.1 WaterFix® Residential

Waterfix® Residential is a subsidised water-efficiency service that helps residential homeowners save water by identifying and fixing leaks, and by upgrading water using devices to more water efficient models, like taps, showers, toilets, and fittings. During 2023-24 the service provided customers with a subsidised offer aimed to drive the adoption of water efficiency upgrades. The offer included a walk-through water efficiency assessment, repair of all minor tap and toilet leaks and supply and installation of WELS 4-star rated showerheads, for a call-out fee of $44 or a pensioner rebate of $16.50.

2023-24 achievements

9,645 residential customers participated in the program over 11,064 appointments. The work completed is estimated to save 21 kL of drinking water per household per year, totalling 202 ML. Customer feedback received through surveys showed an 85 per cent satisfaction rate, and an 88 per cent customer advocacy score towards the service.

6.1.1.2 PlumbAssist

PlumbAssist is a subsidised service that provides emergency and essential plumbing repairs and maintenance to customers experiencing hardship. To access the program, customers must be assessed as eligible by a case manager from Sydney Water's Customer Care team where they will receive case management support and be referred to the program. The program ensures that customers have access to basic services, like water, hot water, and drainage, and that their ongoing water usage costs are minimised by improving the water efficiency of their home through installation of efficient devices and leak repairs.

2023-24 achievements

356 customers participated in the program, with 71 customers requiring assistance with concealed leaks repairs during 2023-24. The work completed is estimated to save 140 kL of drinking water per household per year, totalling 50 ML. Customer feedback was positive, receiving an overall customer experience score of 9/10.

6.1.1.3 WaterFix® Strata

The Waterfix Strata program is a water efficiency service that helps residential multi-dwelling properties save water by improving the water efficiency of all dwellings and common areas connected to the property's water meter. The service is available to private strata managed properties, community housing providers, and other mutli-dwelling properties where there is a single owner or manager. To enquire about our service, customers can call our hotline or request a desktop assessment through our website. For each enquiry: our team will assess historical use to benchmark water use against the categories of high, average or efficient use, offer a site assessment to identify water saving opportunities, provide an obligation free quote that will include repairs, water efficiency upgrades for

water using devices, and concealed leak investigations and repairs. If approved, works will be conducted efficiently over consecutive days for all units and common areas.

2023-24 achievements

272 new properties received desktop assessments, 17 had initial site assessments, and 13 had work completed with the service, which accounted for 609 individual dwellings. The work completed is estimated to have achieved on average a 45 per cent reduction in property water use. This is estimated to save 11,696 kL of drinking water per property per year, totalling 152 ML. Customer feedback received through surveys have resulted in an 80 per cent satisfaction rate, and an 85 per cent customer advocacy score towards the service.

6.1.1.4 Waterfix® Concealed Leaks

WaterFix Concealed Leaks is a specialised leak location and repair service for residential and non-residential customers that aims to prevent future water loss. Concealed leaks are problematic for our customers as they are hidden from plain sight and are not easily detected. They typically waste large volumes of water due to a continuous flow delivered under pressure, which results in increased water bills. Concealed leaks are often found within walls, roof cavities, under floors and underground which makes locating these leaks difficult, requiring specialist skill and equipment. The appointment includes a walk-though investigation with specialised equipment to locate the leak, and an obligation-free quote to repair. If a leak cannot be found, customers do not have to pay for the service, and if an obvious leak like a toilet leak is found, a reduced obvious leak fee may be charged instead.

A hidden leak allowance is available once every five years to all Sydney Water customers that have a concealed leak repaired, not exclusive to the service. If they meet the conditions our team will review their bill and may provide a credit.

2023-24 achievements

305 new customers participated in the program and had investigations that located leaks. Of these, 115 customers proceeded with repairs with the service, with others choosing to engage private plumbers. The work completed is estimated to collectively save 1190 kL of drinking water per day and on average approximately 10 kL per property per day. Should these leaks have continued for a year’s period, this would amount to an additional 434 ML per year of water loss.

6.1.2 Early lifecycle initiatives

6.1.2.1 WaterFix® Commercial

Waterfix Commercial is a water efficiency service that helps non-residential properties such as hotels, office buildings, shopping centres and aged care to save water. To enquire about our service, customers can call our hotline or request a desktop assessment through our website. For each enquiry: our team will assess historical use to benchmark water use against the categories of high, average or efficient use, offer a site assessment to identify water saving opportunities, provide an obligation free quote that will include repairs, water efficiency upgrades for water using devices, and concealed leak investigations and repairs. If approved, works will be conducted efficiently over consecutive days to minimise impact to customer operations.

2023-24 achievements

48 new properties were engaged by the service, and 29 customers took action as a result of engagement to investigate notifications of continuous flow, to repair leaks, and implement recommendations made by the program. The work completed is estimated to collectively save 711 kL of drinking water per day, and on approximately 25 kL

per property per day on average. Should these issues have continued for a year's period, this would result in an additional 260 ML per year.

6.1.2.2 Online Monitoring

The Online Monitoring service is a subsidised offering that provides our non-residential customers a water monitoring device called a datalogger and access to an online portal that illustrates consumption readings over time. This offering empowers customers to improve their water management practices by providing visibility of their water use in real-time which helps identify water-use patterns and anomalies, which might otherwise remain undetected, allowing for timely investigation and remediation of issues like leaks and malfunctioning equipment.

2023-24 achievements

55 new properties have installed dataloggers on their main meter, two new properties have installed an additional dataloggers on submeters. 142 properties have renewed their service. Currently a total of 196 dataloggers are subscribed to the service across 157 sites.

During the 2023-24 period a total of 35 baseflows were detected. 35 properties were notified and 24 sites have been reported to have engaged their own provider and repaired the leaks. The repairs have been estimated to collectively save 654 kL of drinking water per day, and on average 27 kL per property per day. Should these leaks have continued for a year's period, there would be an additional 239 ML of water loss.

6.1.3 Pilot initiatives

6.1.3.1 Waterfix® Schools

Waterfix Schools is a pilot water efficiency service tailored to help schools in Greater Sydney to save water and improve their water management practices. To enquire about our service, a school can request a detailed desktop assessment through our website. For each enquiry: our team will assess historical use to benchmark water use against the categories of high, average or efficient use, offer a site assessment to identify water saving opportunities, provide an obligation free quote that will include repairs, water efficiency upgrades for water using devices, and concealed leak investigations and repairs. If approved, works will be conducted efficiently over consecutive days to minimise impact to school operations.

2023-24 achievements

In 2023-34 the Department of Education engaged the service to review 100 schools with the highest water use benchmarks. 100 schools have had smart meters installed, which has identified a few baseflows needing investigation. 14 schools have had site water efficiency assessments and have received reports, with the remaining 86 schools due to be assessed in FY 2024-25. Of the schools that received reports, two had leaks identified, which were repaired by their contractors.

The estimated water saving achieved for 6 schools that completed repairs in 2023-24 is 78 kL of drinking water per day, on average around 12 kL per school per day. Had these leaks have continued for a whole year, a school would save around 4.4 ML per year.

6.1.3.2 Customer Engagement and Non-Residential Analytics (CENRA)

93 per cent of our largest 1,260 non-residential customer properties that represent around 7 per cent of overall consumption, have transitioned to smart meters. These customers have the option to sign up to our Customer Engagement and Non-Residential Analytics (CENRA) service. The service uses analytic tools and algorithms to assess smart metering data to provide insights that help our customers better understand their water use, and to identify anomalies in water use patterns like leaks.

2023-24 achievements

In 2023-24, 282 non-residential customers signed up for the CENRA service. 25 continuous flow alerts were sent to non-residential customers. One customer repaired a leak, saving 7.7 kL of drinking water a year.

6.1.3.3 Water efficiency audit grants

The Water Efficiency Audit Grant pilot commenced in April 2022, concluded in 2023-24 and will be discontinued in its current form next financial year due to poor uptake and will be reviewed for improvement for future iterations. The pilot offered grants to support our non-residential sector in engaging industry specialists for water efficiency audits. These audits provide our customers with comprehensive insight into their site's water use and tailored implementation strategies to optimise their practices for more efficient water and associated energy use which provides triple bottom line benefits. The grant program offered partial funding for a water efficiency audit, which led to an additional grant opportunity to contribute to the implementation of recommendations that result in water savings.

2023-24 achievements

Five audit grant applications were received and approved. Five audits were completed. Two sites were water efficient, and three sites were provided with recommendations which were implemented by the customer. The work completed is estimated to collectively save 9 kL of drinking water per day and on average 1.8 kL per day per property audited. Quantified to a year's period, this would equal a reduction of 3 ML per year.

6.1.3.4 Inefficient Washing Machine rebate

An inefficient washing machine rebate pilot was proposed in the 2022-23 annual water conservation report. This initiative was explored but paused with the view to collaborate with DCCEEW on a state-wide program focused on targeting low-income households from 2024-25. Through this collaboration we will explore opportunities to leverage established processes and procurement relationships for efficiencies of scale to reach broader segments with tiered offerings.

2023-24 achievements

DCCEEW have secured funding for a state-wide washing machine replacement program for low-income households, including $8.15 million for Greater Sydney over the next 5-years.

6.2 Support policy and market change

We will work with government, industry and others to accelerate the adoption of water efficiency in the community.

6.2.1 Review of regulatory instruments

Regulatory instruments set standards and legal expectations. There are a number of Federal and State regulatory instruments that affect water management and the efficiency of water use in homes and businesses across Greater Sydney. There are opportunities to advocate for improvements to these to drive a significant and long-term reduction in drinking water use beyond 2040.

6.2.1.1 Building Sustainability Index (BASIX)

The Building Sustainability Index (BASIX) Water sets minimum water efficiency standards for all new residential developments in NSW. It also applies to renovations valued at more than $50,000. These standards play a crucial role in ensuring water security and resilience during drought. Since BASIX was first introduced in 2004, there have

been changes in how homes use water, community expectations for sustainability, our scientific understanding of climate change, and the government's goals for managing water resources in cities. There is an opportunity to review this regulation to improve the water efficiency of homes and support broader integrated water management outcomes.

2023-24 achievements

DCCEEW completed the first review of BASIX Water since 2006. Findings from the Stage 1 review found strong stakeholder support for retaining and improving BASIX Water. DCCEEW are developing an action plan to address the findings. A summary of the review can be found on their website (https://water.dpie.nsw.gov.au/our-work/projects-and-programs/water-efficiency/basix-water-review). DCCEEW has secured $1.15m of funding to implement its findings over the coming year.

6.2.1.2 Water Efficiency Labelling Standards (WELS) scheme

The Water Efficiency Labelling Standards (WELS) scheme is a national, government-run scheme mandating water efficiency registration, testing and labelling for most water using fixtures and appliances in Australia. The scheme is complemented by NSW legislation, *Water Efficiency Labelling and Standards Act 2005*, which allows for water efficiency minimum standards to be enforced to limit the sale of some inefficient water using products in Australia.

An independent review of the WELS scheme is conducted every 5 years, in line with the requirements of section 76 of the *Water Efficiency Labelling and Standards Act 2005*. Sydney Water and DCCEEW have been advocating to broaden the range of eligible products and greater consideration of the impact of WELS on water managers and product end users to support further improvements in water efficiency in homes and businesses.

2023-24 achievements

WELS has established an annual process to consider the addition of new products to the WELS scheme to increase the coverage of WELS star ratings and minimum performance standards. Sydney Water working with DCCEEW and Water Services Association Australia, nominated a number of new products for consideration into the scheme. Three of these products were prioritised for the first round of preliminary assessments – commercial ice makers, commercial clothes washing machines and thermostatic mixing taps.

6.2.1.3 Advocate for water conservation outcomes in policy

There are opportunities to reduce the barriers to the adoption of waterwise best practice by advocating for water conservation in water, land use and sustainability policies. By increasing the visibility of water and water conservation we aim to make it part of the policy landscape and drive longer term improvements in water efficiency.

National Australian Built Environment Rating System (NABERS)The National Australian Built Environment Rating System (NABERS) is an initiative by the Federal Government to measure and compare the environmental performance of Australian buildings and tenancies.

2023-24 achievements

DCCEEW partnered with NABERS to help eligible building owners measure and manage water through the Water Starters program (https://water.dpie.nsw.gov.au/our-work/projects-and-programs/water-efficiency/nabers-water-starters-offer). The program, which has now concluded, reduced the cost for first time NABERS Water ratings. An additional 95 buildings took up a first-time water rating (Oct 2022 to June 2024). It is estimated that around83 ML of water was saved, and a training package was provided to build water efficiency capability. DCCEEW is reviewing the partnership model with NABERS to determine how best to support and invest over the next 5 years to continuing to drive uptake and improvements.

6.2.1.4 Policy submissions

Sydney Water have reviewed and made submissions to government policy through the past year and will continue to advocate for water conservation as opportunities arise.

DCCEEW, with the support of Sydney Water and other stakeholders, are investigating policy change opportunities to support sustainable water management, including water conservation, as part of the delivery of the GSWS Implementation plan. Further details and progress to date can be found on the DCCEEW website (https://water.dpie.nsw.gov.au/our-work/plans-and-strategies/greater-sydney-water-strategy/priorities-implementation).

2023-24 achievements

Notably Sydney Water made a submission to the National Water Initiative (NWI) review. The NWI is a shared intergovernmental agreement that underpins the sustainable management of Australia's water resources. It was created in 2004 and agreed by all states and territories. The review aims to evolve the existing agreement to meet a changing climate, increasing demand, Aboriginal and Torres Strait Islander Peoples' water interests and global commitments and sustainability. Our submission strongly supported a stand-alone objective focused on efficient use of water and urge greater attention to urban water efficiency. Including strong leadership on urban water efficiency and drought resilience, a baseline level of support for water conservation, harmonisation of water conservation related product standards to accelerate the adoption of technologies into the Australian market, making the most of existing tools, such as NABERS and WELS and an opportunity to provide incentives to businesses to increase their water efficiency and drought resilience.

6.2.2 Research and innovation

The role of research and innovation is to identify gaps in industry knowledge, market failures and new opportunities that deliver to our strategic outcomes. Also, to collaborate with stakeholders to develop relevant research projects to investigate these gaps and to identify and trial potential solutions.

6.2.2.1 Community Sentiment monitoring

Throughout the year customers provide us with feedback on topics that are important to them as well as products and services that Sydney Water offers through our Community Sentiment Monitor. Each quarter customer insights are gained to inform our quarterly water efficiency report, these insights include:

- Our customers have strongly indicated that discounts, cost savings, and other incentives are the most powerful and stable motivators across different community segments for adopting water-saving behaviours, followed by 'easy behaviours to follow' and education. These insights are used by our teams to continuously improve their service offerings to ensure they are customer centric, and that barriers for more efficient water use are minimised.
- With more rainfall, the community is less concerned about water scarcity
- As rainfall reduces over time, fewer people disagree with the earlier introduction of water restrictions. They acknowledged that individual households can make a difference in saving water, and over time, acceptance for ongoing restrictions has increased.
- Males, particularly those aged 18-49 years, continue to acknowledge that they could save more water across a range of household tasks. It is important to continue targeting this segment to sustain and increase their motivation to save water. Timing messages for when rainfall is reducing and using other motivators and enablers are likely to more important with males than other cohorts.

6.2.2.2 End use study

Since 2018, Sydney Water has installed high-resolution dataloggers on 200 residential customer water meters, to gather insights and build a robust evidence base around how our residential customers use water. The data collected has been analysed and used to develop different digital signatures to reflect different types of water using purposes across a home including showering, toilet flushing and clothes washing. This provides insights into our customer's water using behaviours, and the water use distribution across various appliances, devices and fixtures.

Expansion

Sydney Water in collaboration with the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), have secured a grant from the Smart Places Digital Restart fund to expand and extend Sydney Water's current end use meter study to include residential households with recycled water, water tanks and additional residential households to increase the sample size to inform water demand forecasts and a review of BASIX.

The aim of the expansion is to build on the current end use study, to provide insights into:

- Residential water use (to inform water demand forecasting, including evaluating the impact rainwater tanks have on reducing water demand)
- Develop digital technology for potential commercialisation to support water conservation, customer behaviour change
- Trial new grey water technology, like the Hydraloop system which is currently estimated to reduce household water demand by 45 per cent, to assess the impact of alternative water supply technology for household greywater use.

2023-24 achievements

As of 30 June 2024, consumption data has been collected by the project capturing data on end use and rainwater tanks. The analysis of this data will be completed in financial year 2024-25 to provide insights.

6.2.2.3 National Business Benchmark Water Efficiency project

The National Business Benchmark Water Efficiency project is in its initial stages, led by the Water Services Association Australia and a collaboration of its members. This project aims to develop water efficiency benchmarks for non-residential customers, aimed to encourage businesses to develop, understand, and compare their water use against water efficient benchmarks.

6.2.2.4 Smart Irrigation Trial

A smart irrigation package was developed in the water industry in 2017 which brought together irrigation scheduling software, soil moisture probes and smart meters to provide a package of software and hardware that enables greater efficiency in open space irrigation. A new smart irrigation trial is using innovative technology to help councils keep their green spaces green while reducing water consumption. The irrigation software integrates with soil moisture sensors and smart water meters and provides water consumption and nutrient analysis through a secure web-based interface, to inform irrigation practices for more effective water use.

The smart irrigation package will demonstrate to the community and rate payers how local government can improve liveability and demonstrate value by maximising the cooling effect of irrigating green open space.

2023-24 achievements:

One council signed on for a two-year trial, as a commercial service being provided by Sydney Water. Smart irrigation approaches pose an opportunity for councils and other open space managers to efficiently use water to maintain the health of green infrastructure.

6.2.2.5 SIMPaCT (Smart irrigation management for parks and cool towns)

Green spaces including trees, gardens and parks help keep our cities cool. However, these green spaces will face future challenges due to our changing climate. We are expected to experience more frequent and intense periods of dry weather and extreme heat. This project is a collaboration between the NSW Department of Climate Change, Environment, Energy and Water (DCCEEW), Sydney Olympic Park Authority (SOPA) Sydney Water, UTS Institute for Sustainability and the University of Western Sydney .

The SIMPaCT (Smart Irrigation Management for Parks and Cool Towns) is a new digital tool which will be used to fine-tune irrigation practices at the Bicentennial Park using several weather stations, smart-soil devices, and artificial intelligence to provide the coolest possible microclimates for residents and visitors during increasingly hot summers.

2023-24 achievements

The SIMPaCT project was extended by 12 months to June 2024 to increase the number of warm summer days the machine learning model has been exposed to. The first two years of SIMPaCT's development saw a high number of cool, rainy days and very few heat wave or drought like conditions. Sydney Water did not contribute to the costs of this extension.

6.2.2.6 Hydraloop trial

The Hydraloop pilot is a proof-of-concept trial aimed at improving regulatory acceptance and planning policy around in-home decentralised recycled water systems. Hydraloop is a new generation greywater recycling system that aims to save water in residential households by collecting and treating water from showers, baths and the laundry, and re-using it for toilet flushing, washing machines and gardens. Sydney Water has installed and commissioned 9 Hydraloop units for this trial. 5 units installed in single dwellings and another 4 are providing recycled greywater to 15 units in a social housing apartment complex in Glebe. The trial aims to facilitate the passage of this new technology through existing regulatory frameworks by capturing data and learnings in real world circumstances.

Planning policy, such as BASIX currently relies heavily on rainwater tank performance for water performance, and Hydraloop presents a potential alternative to rainwater systems. At a single home scale, Sydney Water modelling suggests potential average water savings of between 31 per cent and 48 per cent, which is yet to be formally evaluated.

2023-24 achievements

As a result of this trial the Australian Building and Construction Board (ABCB) have reviewed a risk assessment of Hydraloop and via national consultation have agreed that it can proceed to develop a Product Specification by following the formal WaterMark Protocol.

In the coming months we expect to see Hydraloop published as an Excluded WaterMark product and will thus be regulated at a local Government level. An expert panel has been established to process the Product Specification and national consultation will progress through 2024-25. Sydney Water is supporting these activities.

6.2.2.7 Smart shower timer Phase 3

Showers account for 26 per cent of residential water use in Sydney. A comprehensive Sydney Water study revealed average showers to be six minutes. Sydney Water is exploring a range of smart shower technologies, and this project represents a simple, low-cost approach to reducing time spent in the shower.

The smart shower timer aims to provide a superior alterative to the traditional sand timer that has been distributed to many customers in recent years. The smart shower timer is fastened to the shower arm or hose and is triggered by water flow. Shower time feedback is provided via LED lights and sounds, prompting shower times of four minutes or less. The benefit of developing a 'smart shower timer' device will be to provide Sydney Water with a more effective

tool in promoting behaviour change within Sydney residents to reduce their shower times to a nominal four minutes, aiming to achieve a 15 per cent reduction in shower use from this device. It is prudent to research, develop and perfect this tool now, to be prepared for the next inevitable drought.

2023-24 achievements

We've started planning mass production of stage three timers to determine detailed requirements for mass production of the final prototype. The new timer is better than the old sand timer as it automatically detects water flow through the shower arm, giving a more precise time measure of water. A small pre-production batch has been manufactured and packaged, ready for a staff trial to be conducted in late 2024.

6.2.2.8 Smart thermostatic mixing valves in hospitals

This project is a collaboration between Enware, an Australian commercial plumbing products manufacturer and NSW Health's South-Western Sydney Health District, and Sydney Water.

The project aims to provide insight around the effectiveness of smart thermostatic mixing valves (TMVs) in hospitals as a means of optimising warm water tap flushing compliance practices in hospitals. Warm water taps in hospitals have a high potential to harbour Legionella bacteria, which presents an unacceptable health risk in this context. To mitigate this risk, each warm water tap must be used or flushed every couple of days. Previously, it wasn't possible to detect which warm water taps had been used, so all taps were manually flushed every few days as part of a mandatory compliance program.

This new technology removes the need for hospitals to routinely manually flush thousands of taps multiple times a week. Instead, the smart TMVs optimise processes by self-reporting taps that haven't been used enabling targeted compliance flushing for the dozen or so taps that haven't been used each week. In a large hospital like Campbelltown Hospital, this technology has the potential to reduce over 5,500 taps being manually flushed with water three times every week.

2023-24 achievements

Sydney Water has provided monitoring equipment including smart meters to Campbelltown Hospital, to demonstrate the benefits and support the justification of this technology in many smaller hospitals throughout Sydney and Australia. Consultants will prepare a report on the trial indicating the potential water savings to provide evidence to support the investment of this technology at smaller hospitals and health care sites.

6.3 Encourage water wise behaviour

We will build water literacy in the community and provide information to help the community make water wise choices.

6.3.1 Promotion of waterwise guidelines and customer engagement

6.3.1.1 Water Conservation Field Team

The Water Conservation Field Team also have the critical role of maintaining Sydney Water's capability to effectively mobilise, support our community, and where required enforce elevated water restrictions when legislated by the Minister, in response to drought. Outside periods of water scarcity, the Water Conservation Field Team have an important role to play in providing an ongoing field-based presence that engages and educates our community on

Water Wise Guidelines, the importance of water efficient behaviours and reducing water waste, both inside and outside of drought conditions.

Water Wise Guidelines are the current rules legislated by NSW Government (Gazette No 349, 2020) on the appropriate use of drinking water for non-drinking purposes for all residents and businesses in Greater Sydney. Although enforceable, the Water Conservation Field Team strives to respond to breach reports and engage the community with the view to build relationships, encourage and educate customers around correct water wise practices. The team also supports our broader water conservation program streams by investigating water theft, zero consumption meters and unmetered connections, activities that help reduce non-metered water consumption, which in turn improves the accuracy of our water balance and estimations of leakage.

2023-24 achievements

During 2023-24, the Water Conservation Field Team:

- attended two community expos to speak with customers around Water Wise Guidelines and promoting customer programs that can support them in making their homes and businesses more water efficient
- responded to 171 reported breaches of Water Wise Guidelines, with a focus on education and awareness
- investigated 3,609 instances of water theft, installed 879 meters to non-metered connections, which will improve our understanding of water usage in the system (eg improving leakage estimates)
- identified and replaced 792 failed meters at properties recording zero water consumption, which will improve our understanding of water usage in the system (eg improving leakage estimates)

6.3.2 Customer water use insights

6.3.2.1 Smart metering expansion

At the start of 2022, Sydney Water began rolling out smart metering to residential and non-residential customers under our Customer Metering Program. Smart meters are a rolled out through this program are a combination of integrated smart meters, and mechanical meters with retrofit dataloggers. The advancements in digital capability provide many benefits to our customers. Smart meters provide the opportunity to notify customers of continuous water flows, allowing customers to repair leaks on their property in a timely manner. They also enable Sydney Water to significantly improve the accuracy and timeliness of demand and system performance analysis, guide activities to identify network-side leaks, and plan for delivery of upgrades to ensure that our customers continue to receive a high level of service.

2023-24 achievements

In 2023-24 1,011 new smart meters were rolled out to non-residential properties and 8,767 new smart meters were rolled out to residential properties. During 2024-25 we will continue the rollout of smart meters to our broader customer base installing around 130,000 residential and 10,000 non-residential additional smart meters into new zones. Installed devices to date have enabled 566 continuous flow notifications being sent to customers.

65 continuous flow notifications were sent to non-residential customers with smart meters, 6 had these leaks repaired. For those that resolved the leak, they are estimated to have saved on average 973 kL per property per year. Had these leaks have not been repaired and continued for a year, this would equate to 5.8 ML of water savings.

427 continuous flow notifications were sent to residential customers, 400 had these leaks repaired. The work completed is estimated to have saved around 142 kL of drinking water per property per year. Had these leaks not been repaired and continued for a year, this would equate to around 57 ML of water savings.

6.3.3 Behavioural change campaign

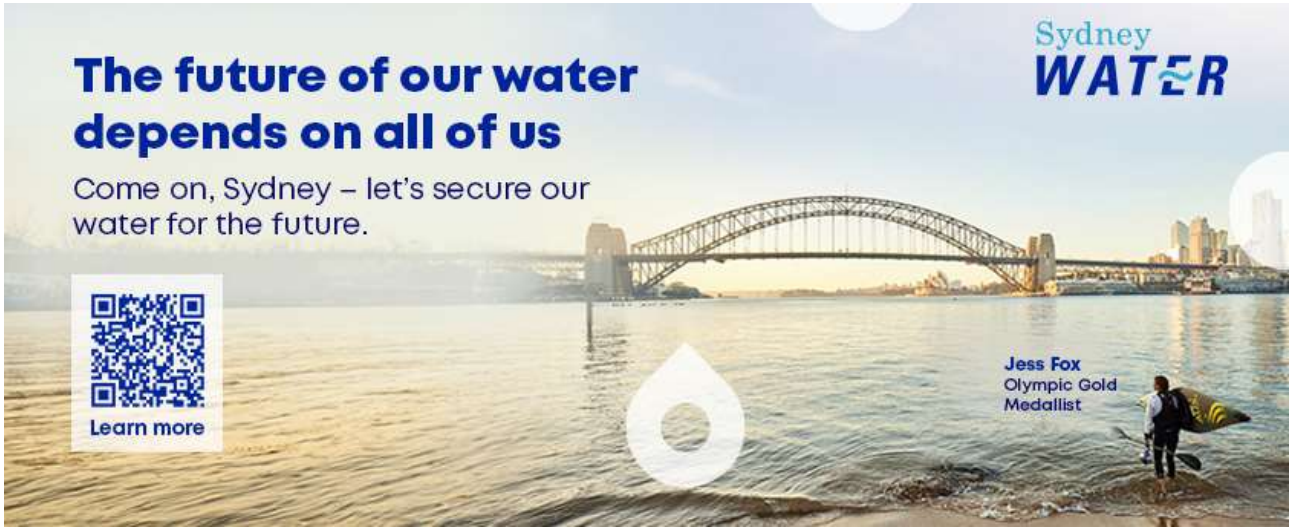
The objective of behavior change campaigns are to maintain and build upon the water wise behaviours adopted by our community during periods of elevated restrictions. Consumers' attitudes and behaviors regarding water usage, both indoors and outdoors, are closely tied to their level of water literacy, which refers to their knowledge of water sources and management.

To address water literacy, education and awareness-building efforts are vital for fostering trust, engagement, and encouraging behavioural change. Our water conservation campaigns are designed to engage and educate the public, aiming to raise awareness of individual water consumption and its long-term impact.
Sydney Water's research indicates a correlation between climatic events, like bushfires and floods, and customers' attitudes toward water use. Consistent messaging across various platforms, including TV, digital, out-of-home, social media, traditional media, public relations, and radio, is essential for sustaining awareness effectively. Decisions regarding campaign mediums are made thoughtfully to maximize impact and engagement.

6.3.3.1 Future of our Water (October – November 2023)

The Jess Fox – Future of our Water campaign has ignited crucial conversations about water conservation and the exploration of alternative water sources. With an emotionally compelling video featuring Jess Fox on Sydney Harbour, we've succeeded in engaging audiences to contemplate water usage more thoughtfully, particularly with an eye toward the future. Highlights include:

- our campaign has achieved significant visibility, with our ads viewed by customers 24 million times
- Digitally, we've seen 79 per cent more impressions compared to 2022, reaching 3.4 million individuals
- despite 39 per cent reduction in budget compared to 2022, the impact of the campaign has been profound, sparking vital discussions regarding the future of Sydney's water resources.



6.3.3.2 Turn if Off Bob – behaviour change campaign (December 2023 – January 2024)

The 'Turn it Off Bob' campaign was our most successful campaign on record. With a keen focus on curbing water-wasting behaviors, this initiative has seen remarkable results, showcasing substantial improvements from the previous campaign. Highlights include:

- television viewership metrics have surged twofold from the prior year, with 4.15 million Sydney Water customers tuning into our Bob ad, effectively doubling the engagement levels
- across digital platforms, our message has resonated deeply, with 53 per cent of viewers watching the ad in its entirety, demonstrating a significant impact
- our campaign landing page ranked among the top 10 visited web pages for Sydney Water over six consecutive weeks, confirming the widespread attention the campaign received
- outperforming every tracked campaign to date, 'Turn it Off Bob' has left an impression on public consciousness, with 70 per cent of individuals recalling at least one campaign element when prompted. The ad was seen over 119 million times.
- our efforts have translated into tangible behavioral shifts, as shown by a significant reduction in negative water-wasting behaviors compared to the previous year.

6.3.4 Partnerships, community outreach and engagement

6.3.4.1 McGrath Foundation partnership (ongoing throughout 2023-24)

Sydney Water has partnered with the McGrath Foundation to combine breast-cancer awareness with water conservation efforts. As part of the partnership, custom shower timers were offered at Sydney Water activations, in conjunction with Cricket NSW sponsorship, including at the Sydney Cricket Ground 'Pink Test'. The campaign was designed to encourage customers to take shorter showers to support a worthy cause, not just to support Sydney Water's objectives around water efficiency.

6.3.4.2 World Pride (February - March 2024)

In addition to brand exposure through placement of water filling stations, Sydney Water engaged directly with the public and distributed branded water bottles at Live & Proud: Sydney World Pride Opening Concert (20,000 attendees – allocation exhausted), Pride March (50,000 attendees) and Fair Day (40,000 attendees).

Sydney Water volunteers distributed water conservation show bags branded with the rainbow Sydney Water logo, filled with a shower timer and water conservation fact sheet with a QR code linked to the Waterwise website. World Pride issued a social media post and e-news article which included water conservation messaging.

6.3.4.3 Royal Easter Show (April 2024)

Each year Sydney Water attends the Royal Easter Show to engage and educate our community. This year, our Easter Show campaign centred around water literacy. Our exhibition stand:

- displayed televised educational content, about the natural water cycle and the future of the urban water cycle including purified recycled drinking water, and our behavior campaigns “Turn it Off Bob”, and the Jess Fox purified recycled drinking water campaign
- included an interactive water literacy quiz, where participants could test their water knowledge. The quiz saw significant engagement with 8,107 completions. Participants who completed the quiz were rewarded with either a Jila keyring or a water bottle
- featured a photo booth where attendees could take pictures among the clouds, symbolising the water cycle. This interactive feature resulted in 2,676 photos sent via SMS, although some issues with the service provider affected the experience
- distributed nearly 14,000 shower timers, 1,000 water bottles and 7,500 Jila keyrings.

6.3.4.4 Nedd Brockmann social media campaign – ‘Dob in a Water Waster (June 2024)

In 2022, Nedd Brockmann gained social media fame by running across Australia to raise money to combat homelessness. We’ve partnered with Ned as his official Hydration Partner for his World Record attempt run in October 2024. Leveraging his popularity and dynamic presence on social media, we launched a short social media campaign in June 2024, aimed at addressing water wastage among male 18-32 year olds. This awareness campaign specifically targets this demographic, with a particular focus on encouraging shorter showers during the winter months. So far, the campaign has successfully reached over 474,614 people, with more than 462 individuals dobbing in their friends and families for their wasteful behaviours.

6.3.5 Community education and Corporate Social Responsibility

6.3.5.1 Community Education

Our Community Education program promotes key messages within the broader context of the urban water cycle, circular economy, and water conservation. Programs focus overall on building water literacy such that our community can make informed choices around positive water and wastewater behaviours. Sydney Water has continued to engage with the broader community, at diverse events and locations. Programs are designed for both formal education settings and general community settings.

6.3.5.2 School incursion program

In 2023-24, the Community Education team delivered 58 direct educational learning experiences to over 4,100 children. Our program currently offers incursions to early learning centres, aligned to the Early Learning Framework, and primary schools aligned to NSW Syllabus (Geography and Science outcomes). Three concept streams underpin these programs: water literacy, water conservation, and water future.

6.3.5.3 Digital educational materials

Sydney Water’s education webpage attracted more than 208,000 page views throughout 2023-24. The education pages that were accessed most pertained to purified recycled water (89,189 views) wastewater treatment and recycling (14,101 views) and water use and conservation (12,204 views).

6.3.5.4 Purified Recycled Water Discovery Centre

In October 2023, Sydney Water opened the Purified Recycled Water (PRW) Discovery Centre as part of National Water Week. The centre provides tours and education for a wide array of audiences including schools, universities,

stakeholders and the community. As at 30 June 2024, over 1,750 people have toured the facility. Educational tour topics include the impact of population growth and a changing climate on Greater Sydney's water supplies, our reliance on dams and rivers and why this is a problem, the importance of water conservation and Sydney Water's plans for the future including increasing rainfall independent supplies like desalination and PRW to build a resilient and reliable water supply.

6.3.5.5 Wonders of Water Discovery Van

The Wonders of Water Discovery Van is a mobile education vehicle that has been built to help engage the community about where their drinking water comes from, how it is treated, and to start a conversation about the importance of a resilient and reliable water supply including purified recycled water (PRW).

Since May 2022, the WoW Discovery Van has delivered education across the Sydney Water area of operations. In the 2023-24 financial year the Discovery Team attended over 92 events directly engaging with over 45,000 community members. Since its launch, the van and Sydney Water educators have attended community locations/events, with over 84,000 interactions. As we continue to strengthen water literacy across the community, our key messages relate to securing a resilient and reliable future water supply, the urban water cycle and water conservation and the role of rainfall independent water supplies like PRW.

6.3.5.6 Community Grants

Our annual Community Grants Program is a Corporate Social Responsibility (CSR) initiative that supports community awareness and water efficiency outcomes. The program seeks community projects around "Driving a Sustainable Water Future" with the focus areas of water education, healthy waterways and/or water conservation. Applications are sought from grassroots community groups, volunteer organisations, education institutions, local government with community partners, sporting groups, and other community-minded organisations that share Sydney Water's vision of creating a better life for today and generations to come.

In 2023-24, seven recipients received grants totalling $60,300, which included projects like smart irrigation system utilising rainwater, waterwise community education and water sensitive landscaping.

6.3.6 Data Drop

DCCEEW explored several options for a NSW online smart water metering tool and approach that delivers water use insights to the non-residential sector.

Confident that a portal could be developed using existing capabilities within other NSW Government platforms, DCCEEW will develop a high-level proof of concept prototype to test the solution and inform the development of a purpose-built NSW portal.

2023-24 achievements

DCCEEW collaborated with Department of Education to design and deliver water efficiency education in 19 schools in Greater Sydney that builds knowledge and skills through practical learning experiences for teachers and students and fosters critical thinking about water. The content will be expanded to align with the NSW smart metering portal and support student learning and campus water sustainability initiatives.

6.4 Leading by example

We will demonstrate our commitment to water conservation, effectively manage our water use, and support the capability and capacity building of the industry and stakeholders to enable water conservation.

Customers see water as a precious, valuable resource. Customers expect us to show leadership, do what we say, and demonstrate our commitment to water conservation by improving the effective and efficient use of water at our own sites and in our operations.

We will improve our understanding of where and how much water is used as part of our operations and adopt water wise practices where they make sense to do so. This will require better metering of water use at our sites and flows within our network, innovation in exploring ways to substitute drinking water for environmental clean-up, capturing data and enabling analytics to better target our water conservation efforts. We also aim to help to build the capability and capacity of stakeholders, industry, and change agents, supporting directions from the NSW Water Strategy, to enable water conservation at scale.

Customers also expect us to be effective in leakage management. We can reduce water waste by enhancing our approach to managing leaks through how we find and fix and prevent leaks through reactive response and proactive leak detection programs, asset management, pressure management, supported by data analytics and ongoing research and innovation to improve our tools and processes.

6.4.1 Operational water use and better estimation of leakage

Sydney Water uses water in the operation and maintenance of our systems. This includes water use in treatment facilities and management of networks. We endeavour to minimise the water used, for example using reclaimed effluent and/or recycled water to reduce drinking water demand at our treatment facilities. In addition, clean up/flushing and management of network assets requires water use as well. This is included in the estimation of leakage (effectively all water supplied minus metered consumption and best estimates of other uses) but being able to move from estimation to metering of these uses means we have a much more accurate estimate of leakage.

6.4.1.1 SmartPipe™ trial (smart standpipes)

This trial aims to build and test the capability to accurately capture and report on the volume of water used by crews in operations, to improve the accuracy of our water balance calculations and estimations of leakage. SmartPipe™ is

a unique digital standpipe management solution, with patent IOT technology is built into a standpipe during manufacturing. The SmartPipe™ records accurate real-time data for flow, volume, and GPS (Global Positioning System) location. The data is transmitted to an associated digital platform that tracks consolidates and presents this information across several unique customised dashboards.

2023-24 achievements

A feasibility trial was conducted with 35 SmartPipe™ distributed to wastewater clean-up crews, which concluded in September 2023. The trial was successful in confirming that the SmartPipe™ hardware and digital solution was viable in its ability to provide an accurate measure of Smart Standpipe operational water use, and supported the theory that this solution, once expanded to all current standpipe users, would improve the accuracy of our water balance and estimations of leakage, and enabling improved targeting for active leak detection.

The successful completion of the pilot program has led to approval to progress the trial to an early lifecycle pilot, and a business case for deployment of Smart Standpipes to Sydney Water's maintenance crews in 2024-25. Sydney Water also continues to discuss broader use of Smart Standpipes by customers and Fire and Rescue NSW. The fire brigades have longstanding concerns with traditional metering technologies that have the potential to disrupt the flow of water. New technology in the form of compact, ultrasonic meters present no impediment to flow, and we have good reason to expect the brigades' testing to prove successful.

6.4.1.2 Smart meters at Water Resource Recovery Facilities

This initiative aims to improve the accuracy of reported water use by Water Resource Recovery Facilities (WRRF), to improve the accuracy of our water balance calculations and estimations of leakage. Treatment processes at Sydney Water's WRRFs can use a substantial amount of water. There are opportunities to increase the use of reclaimed effluent to reduce drinking water demands (see Section 5.2 for onsite reuse during 2023-24). Smart meters provide fast and precise access to water consumption data improving accuracy of the water balance and providing granular data on drinking water consumption at each facility, giving each facility the opportunity to understand their usage in detail, and generate insights to ensure onsite water use is efficient, and to assist the WRRFs with leak detection.

6.4.1.3 Metering unmetered property connections

There is renewed focus on metering unmetered property connections as a means to improve the accuracy of the volume of use attributed to customer use and reduce the volume of unmetered customer water use included in our water balance calculations and estimations of leakage. In addition to the rollout of smart meters to our customers, Sydney Water's water conservation field team is leading efforts to proactively improve metering coverage.

2023-24 achievements

1,671 new meter fits were completed in 2023-24 for previously non-metered connections and failed meters. This is estimated to contribute 1,002 kL per year to metered use, both improving our estimation of actual leakage and ensuring that users pay for the water they use (ie without being subsidised by the rest of our customers).

7. Leakage activity overview

7.1 Respond to leaks

7.1.1.1 Speed and quality of repairs for customer-reported leaks

Customers, plumbers, and members of the public are encouraged to report water and wastewater leaks or breaks through our 24-hour emergency line and website. We prioritise work on our water networks based on size of the leak and level of impact as we monitor indicators like response time, to ensure we maintain good performance.

In 2023-24, we repaired approximately 4,789 breaks and leaks, prioritising response to minimise community disruption and water loss. Sydney Water is improving our response time and repair methods by:

- deploying teams to smaller geographical areas, especially in locations where higher levels of leaks occur, to minimise water loss and improve response times to visible leaks
- delivery of improved despatch tools and processes with optimised scheduling of resources so leaks with higher water loss are prioritised
- use of innovative tools to allow repair of watermains and installation of new valves under pressure, which can avoid the need for network shutdowns and reduce the volume of water lost in draining pipework for repair.

7.2 Proactively detect leaks

Proactive leak-detection activities are targeted to areas with higher water loss, based on a review of system performance. Our ability to determine network areas with higher levels of water loss depends on network monitoring and the location of flow meters. The objective of proactive leak detection is to find and repair hidden leaks before they are reported by our customers. This saves water and reduces the likelihood the leak will result in a main break, disruption to water supply and damage to footpaths and roads.

Sydney Water's proactive leak detection programs identify concealed leaks using a range of technology and devices. A total of 3,795 hidden leaks were detected during 2023-24 through the survey of 16,081 kilometres of watermains. Most of the work is completed by specialist field surveyors who scan watermains using acoustic leak-detection equipment and identify hidden leaks. Sydney Water also uses leak detection dogs, embedded lift and shift sensors, and internal resources to survey mains and find leaks before they reach the surface. Field survey work is targeted based on desktop analytics including assessments of minimum night flows and unmetered consumption.

7.2.1.1 Specialist Field Survey Contractors

The Active Leak Detection (ALD) program identifies concealed leaks using a range of technology and devices where specialist field surveyors scan watermains using acoustic leak-detection equipment and identify hidden leaks. During 2023-24, we surveyed 14,313 kilometres of watermains and identified 3,508 hidden leaks using Specialist Field Survey Contractors. The bulk of Sydney Water's proactive leak detection work is done by these teams.

7.2.1.2 Leak detection dogs program

The leak detection dogs are working Springer Spaniels trained to detect drinking water leaks throughout Sydney Water's network. As a light, agile alternative to more traditional leak detection approaches, specialised trained dogs can detect leaks quickly in difficult conditions, like bushland or challenging terrain. During 2023-24, the program covered 341 kilometres of watermains over the year and detected more than 156 water leaks that have since been

repaired. The dogs have also been part of Sydney Water's reactive response when required. They are particularly efficient in locating difficult-to-find leaks and are great water conservation ambassadors.

In addition to finding leaks on Sydney Water's system, the dog team conducted the first pilot program to gain unregulated income for Sydney water. The water dog team covered 74.25 kilometres throughout Parkes, Orange and the Central Coast Council areas and found an additional 19 leaks.

7.2.1.3 Lift and shift acoustic sensors

Sydney Water has installed semi-permanent and lift and shift acoustic sensors in six high-density urban areas including Sydney Central Business District (CBD), and other prioritised zones. When combined with machine learning, over time the soundwave-based signature of a leak can be identified. In this way, acoustic sensors embedded in the system raise alarms when leaks are detected rather than relying on field surveys.

Research trials indicated that acoustic sensors could detect leaks as low as 0.01 L/s. This technology builds on proven techniques used in field surveys of networks. In 2023-24, Sydney Water continued to transition acoustic sensors from a pilot to an established component of the ALD program, building machine learning capability within Sydney Water. As part of that, Sydney Water has monitored 742 kilometres of its water mains using these sensors and detected 60 leaks in FY 2023-24.

7.2.1.4 Active Leak Detection by Sydney Water Internal Resources

To maintain skill level of leak detection within our internal crew, Network Technicians were engaged to carry out ALD in 2023-24. During this period, our Network Technicians surveyed 685 kilometres of water mains and identified 72 leaks.

7.2.1.5 Monitoring network performance – IICATS statistical analysis

Sydney Water uses real-time monitoring of system flows and data analytics to detect unusual flow patterns. Business rules are used to review this data and target field inspections to find hidden leaks. Trials are in progress to utilise lift and shift acoustic sensors to confirm and locate leaks detected by statistical analysis.

In 2023-24, the statistical analysis techniques led to 56 identifications of 12 hidden leaks, avoiding leakage volume of 994 million litres and avoiding costs of $2.65 million.

7.3 Avoid leaks

7.3.1.1 Pressure management program

Pressure management can significantly reduce the risk or scale of leaks and breaks. With lower average pressures, the volume of water lost can be reduced. Sydney Water has continued to identify opportunities for reduced pressure across our network, including refinement of pressure settings within existing pressure management schemes. Further opportunities for pressure management will be explored and progressed, subject to cost-benefit analysis, following detailed planning.

7.3.1.2 Pressure calming

Sydney Water's Customer Hub identifies pressure spikes and directs operational intervention to minimise the impact of pressure surges. This is called pressure calming.

Pressure calming can increase asset life and reduce leaks and breaks by reducing the cyclical loading on watermains due to the normal fluctuation in pressures associated with system operation (e.g., pumps switching on and off) and/or surge incidents (e.g., pump failures or rapid valve closure).

In 2023-24, 17 pressure alarms raised, 11 faults investigated and resolved, two were under investigation with five false alarms. These can sometimes be resolved through operational adjustments, but some require larger investments and system upgrades. The cost / benefit associated with work is considered to ensure that we deliver value for our customers.

7.3.1.3 Watermain renewals

The primary drivers for watermain renewals relate to asset management (i.e., balancing maintenance with renewal costs) and maintaining continuity of supply to customers (i.e. minimising disruption). They also have some benefit in reducing water leakage and ongoing breaks.

In 2023-24, Sydney Water invested approximately $80 million in renewing mains. This allows renewal of roughly 0.1 per cent of our network spanning 22,864 kilometres while targeting the most critical mains.

7.4 Research and Innovation

Sydney Water is exploring multiple emerging technologies to support our efforts to reduce water leakage, including dark fibre, Interferometric Synthetic Aperture Radar (InSAR) and satellite imagery. We're piloting several options to determine which technologies are the most appropriate for water leaks and water conservation.

7.4.1.1 Dark Fibre leak detection

The Dark Fibre pilot explores the use of disused optic fibre to detect pipe or soil movements that can indicate a leak or break in a watermain. The Dark Fibre leak detection trial was operational for 12 months from February 2023 to 2024. A total of 37 acoustic loggers were deployed as part of this trial, most of them at hydrant locations. Insights from the trial identified that the optic fibres need to be within close proximity to pipes to reliably detect leaks, and retrofitting these fibres to the existing network is unviable. These insights have highlighted the opportunity to collaborate with Western Sydney Development team to explore the value of laying new fibre optics near/inside new pipe construction.

7.4.1.2 Quantum sensing leak detection

Quantum sensing leak detection is a proof-of-concept trial that utilises a quantum sensor to assess gravity measurements to identify hidden leaks i.e., where soil moisture impacts these measurements. Quantum sensing measures the change in gravity caused by a subsurface leak patch caused from a leaking pipe. Sydney Water is collaborating with the Australian National University and industry partners to assess the usefulness of the technology in detecting leak patches associated with subsurface leaks. The Australian National University and quantum-sensor start-up Nomad Atomics has validated the possibility of detecting a subsurface created leak patch. The proof-of-concept trial will continue into 2024-25 where it will be reviewed.

7.4.1.3 InSAR (satellite ground movement sensing trial)

Studies have shown that ground movements from interactions between the soil, weather conditions and the urban environment can cause pipe stress which leads to pipe breaks. Measurement of direct ground movement which causes pipes to break are difficult to obtain and have so far not been incorporated in Sydney Water's decision-making processes. For the operationalisation of a predictive model, we need consistent, continuous, and large-scale data covering our entire area of operations. This project evaluated whether millimetric precise satellite ground movement data can help improve predictions of pipe leaks and breaks.

Our project partner, SatSense, derives accurate data on ground movements from radar satellites using algorithms they have developed. SatSense is already providing ground movement data to Severn Trent and Northumbrian Water to identify hotspots where pipes are more likely to burst. Phase 1 of the project has demonstrated that there

are positive signs of leakage predictability. In 2023-24 a report was produced to inform opportunities for Phase 2 which will continue to explore implementation pathways.

8. Water recycling activity overview

8.1 Existing recycled water schemes

Existing recycled water schemes produced 40 gigalitres of recycled water and saved 13 gigalitres (GL) of drinking water in 2023-24.

Table 10 Recycled Water use in 2022-23 and 2023-24

Supplied to	2022-23 annual production (GL)	2023-24 annual production (GL)
Residential, commercial, and industrial use	9.5	10.3
Environmental flows	7.7	5.6
Use at Water Resource Recovery Facilities	17.0	17.9
Irrigation of parks, sports fields (ie recreational land)	0.8	0.9
Irrigation use for agriculture	5.1	5.4
Total Recycled Water	39.8	40.1
Total drinking water savings	11.9	13.0

8.2 Recycled water in servicing growth

Sydney Water continues to consider the role of recycled wastewater and stormwater as part of developing servicing solutions to support growth, greening of public spaces, water supply resilience and waterways health outcomes. The aim is to provide essential services while protecting the environment (e.g., waterway health) and enabling development of high value urban spaces for improved liveability. The use of alternative water sources, like recycled wastewater and stormwater, enables urban greening and cooling without using our limited drinking water supplies.

There are substantial greenfield and infill development areas throughout Sydney that present challenges and opportunities to leverage limited system capability and use water differently. For example, a new WRRF at Upper South Creek is being built to service the Western Sydney Aerotropolis, which provides an opportunity to supply recycled water within the Western Sydney Aerotropolis Growth Area and to the new Western Sydney International Airport.

8.3 Exploring new opportunities

Sydney Water continues to explore opportunities for recycled water to offset drinking water use for non-drinking uses. This includes existing industrial, agricultural or irrigation customers to reduce their drinking water use, within Sydney Water's operations, such as Water Resource Recovery Facilities (WRRFs), as part of broader precinct-scale, development-servicing opportunities, continued growth within existing recycled water supply areas (e.g., Rouse Hill) and with industries with high water usage (e.g., data centre, hydrogen projects).

Sydney Water has a pipeline of work investigating opportunities for recycled water supply to new and existing customers, as well as in our own operations and maintenance work. These assessments progress through gateways from initiation to delivery aimed at ensuring value to customers and their communities. There are more than 40 studies underway at various stages of the pipeline process. We are working closely with key regulators the NSW Environmental Protection Authority (EPA) and NSW Health, as well as developers, customers and other stakeholders to ensure that we have a more holistic sense of the value proposition of recycled water for customers and their communities.

8.4 Research and Innovation

8.4.1.1 Recycled water and soil interaction Stage 2

Currently, drinking water is predominately used for urban greening and cooling, and open space irrigation. In the future, recycled water, harvested stormwater and stormwater retained on site will play an important role in providing an alternate supply source for parkland landscapes, contributing to the management of water demand impacts of urbanisation.

Stage 2 of this research project will improve our understanding of different types of soil interactions and soil types in Western Sydney using recycled water and stormwater. The project explores how to improve the water holding capacity of soils, especially in degraded areas, to enhance the water retention in irrigated locations to reduce water use. The project will also review the potential of soil improvements using advanced biosolids produced by Sydney Water, and how stormwater can be better used to prevent runoff during storm events. This will provide guidance on soil management to achieve optimum irrigation, storm water retention and can be effectively used by trees for urban greening and cooling. Project objectives include:

- to inform how to improve soils and build drought resilience through the use of alternative water sources like stormwater and recycled water
- to improve the understanding of recycled water quality and its impact on soil water storage capacity
- to support best practice irrigation guidelines.

2023-24 achievements

The project has informed our understanding of the specific interactions between recycled water produced by Sydney Water, and soils in Western Sydney. It has provided insights into how we can manage the use of recycled water to enhance nutrient retention in soils and build soil structure, while balancing challenges of solidity, soil dispersion and contaminants. The final steps of the project will inform our understanding of the interactions between biosolids and Western Sydney soils. This will help us understand how high value recovered resources can contribute to soil repair and optimal nutrient levels in these soils. This will enable Western Sydney landscapes to support our aspirations for cool, green landscapes. Research findings will help inform Sydney Water's asset planning and product specification, support planning of a water sensitive Western Sydney, and our role as the regional stormwater authority for the Aerotropolis It will be of use to other large land managers, like developers and parkland managers.

This research will continue into 2024-25 with the final report expected in the end of 2024.

8.4.1.2 Arboretum and recycled water project

Increasing temperature, prolonged heat waves, and water availability are key challenges facing Sydney and are impacting on the ability to maintain existing tree canopy cover and develop new urban forests. Urban forests provide a range of social, economic and environmental benefits that drastically improve the liveability of urban areas and human wellbeing. The NSW Government is aiming to increase Greater Sydney's tree canopy by planting five million trees in streets, parks, bushland areas and yards by 2030. For trees to survive and thrive, they need access to readily available water. Recycled water provides a sustainable option for future irrigation, including a means to supply the nutrients required to promote plant growth while also reducing the nutrients discharged to our waterways.

This research project is a collaboration between Sydney Water, the Australian Botanic Gardens Mount Annan, Macquarie University and the NSW Department of Climate Change, the Environment, Energy and Water (DCCEEW) to develop a 'living lab' through a geo-specific site trial to test and showcase how recycled water, smart irrigation, effective soil amendments and tree selection can enhance the urban canopy.

Investing in this research enables Sydney Water to provide the best available knowledge to councils, developers and other stakeholders to help achieve a greener, cooler and more liveable Western Sydney. Sydney Water will be better placed to advise on and implement the most effective recycled water options for irrigation, reducing reliance on drinking water and contributing to better outcomes for customers.

2023-24 achievements

600 trees and 15 tree species have been planted at the research site and the irrigation system has been installed and online remote access set up. Project progress has been delayed and will continue into FY 2024-25 due to unexpected heavy rainfall which has impacted assessment of effectiveness.

Appendix

9. Reporting Requirements

Table 11 Annual Water Conservation Report requirements

Clause 2.1 Water Conservation Report	Location
Include information of Sydney Water's water conservation program for the previous financial year and for at least the next five financial years, including where relevant (but not limited to):	
• Sydney Water's strategies, programs and projects relating (at a minimum) to water leakage, recycled water and water efficiency (Water Conservation Measures)	Section 3 Section 4 Section 5 Section 6
• Whether the Water Conservation Measures are economic	Section 3.2 – Table 4 Section 3.3 – Table 5 Section 3.3 – Table 6 Section 4.2 – Table 7
• How and when the Water Conservation Measures will be implemented	Section 3 Section 4 Section 5 Section 6
• The targeted water users	Section 3.3
• The expected water savings	Section 3.2 – Table 4 Section 3.3 – Table 5 Section 3.3 – Table 6
• Cost of the measure per kilolitre of water saved	Section 3.2 – Table 4 Section 3.3 – Table 5
• The method to assess the effectiveness of the Water Conservation Measures	Section 10
• The extent to which these Water Conservation Measures accord with the with the economic level of water conservation (ELWC) and the Current Economic Method	Section 3.2 – Table 4 Section 3.3 – Table 5 Section 4.2 – Table 7
Include details of all of the Water Conservation Measures relating (at a minimum) to water leakage, recycled water and water efficiency that were considered by Sydney Water in developing its water conservation program, and clearly identify those Water Conservation Measures that:	
• Are economic when assessed by the Current Economic Method	Section 3.2 – Table 4 Section 3.3 – Table 5 Section 4.2 – Table 7
• May become economically efficient at a later date	Section 3.2 – Table 4 Section 6.1.2 – Early lifecycle Section 6.1.3 - Pilot Section 6.2.2 – Research

• Sydney Water is required to implement under Licence clause 3.1.2	Section 3.2 – Table 4 Section 3.3 – Table 5 Section 3.3 – Table 6
• Sydney Water has implemented	Section 3.2 – Table 4 Section 4.2 Section 5 – Table 9 Section 6 Section 7 Section 8
• Sydney Water is proposing to implement at a later date (or under specific circumstances)	Section 3.2 – Table 4 Section 6.1.2 – Early lifecycle Section 6.1.3 - Pilot
Sydney Water is proposing not to implement and the reasons for not implementing	Section 3.2 Section 6.1.3.4
Describe and explain Sydney Water's progress against each of the Water Conservation Measures of its water conservation program for the previous financial year, including any deviations from the program	Section 3.2 Section 4.2 Section 5.2
Describe and explain any changes to Sydney Waters water conservation program relative to the previous annual Water Conservation Report (where applicable)	Section 3.2
Outline how Sydney Water's water conservation program relates to the Metropolitan Water Plan and its progress against the Metropolitan Water Plan	Section 1.4 Section 3
Include information on any Water Conservation Measures researched, piloted or developed for the previous financial year (including the funds spent on these activities)	Section 3.2 – Table 4 Section 6.1.2 – Early lifecycle Section 6.1.3 - Pilot Section 6.2.2 – Research
Include information on the water conservation performance indicators (in Appendix C) for the previous financial year;	
• Quantity of Drinking Water drawn by the water utility from all sources during the financial year, expressed in litres per person per day (observed)	Section 2 – Table 3
• Quantity of Drinking Water drawn by the water utility from all sources during the financial year, expressed in litres per person per day (weather corrected)	Section 2 – Table 3
Include the following water conservation information for the previous financial year:	
• Quantity of Drinking Water drawn by Sydney Water from all sources, expressed in gigalitres per year (aggregate)	Section 2 – Table 3
• Level of water leakage from Sydney Water's Drinking Water supply system against the economic level of leakage for that financial year (in megalitres per day)	Section 2 – Table 3
• Volume of water sourced from Recycled Water (in megalitres)	Section 2 – Table 3

10. Method Overview

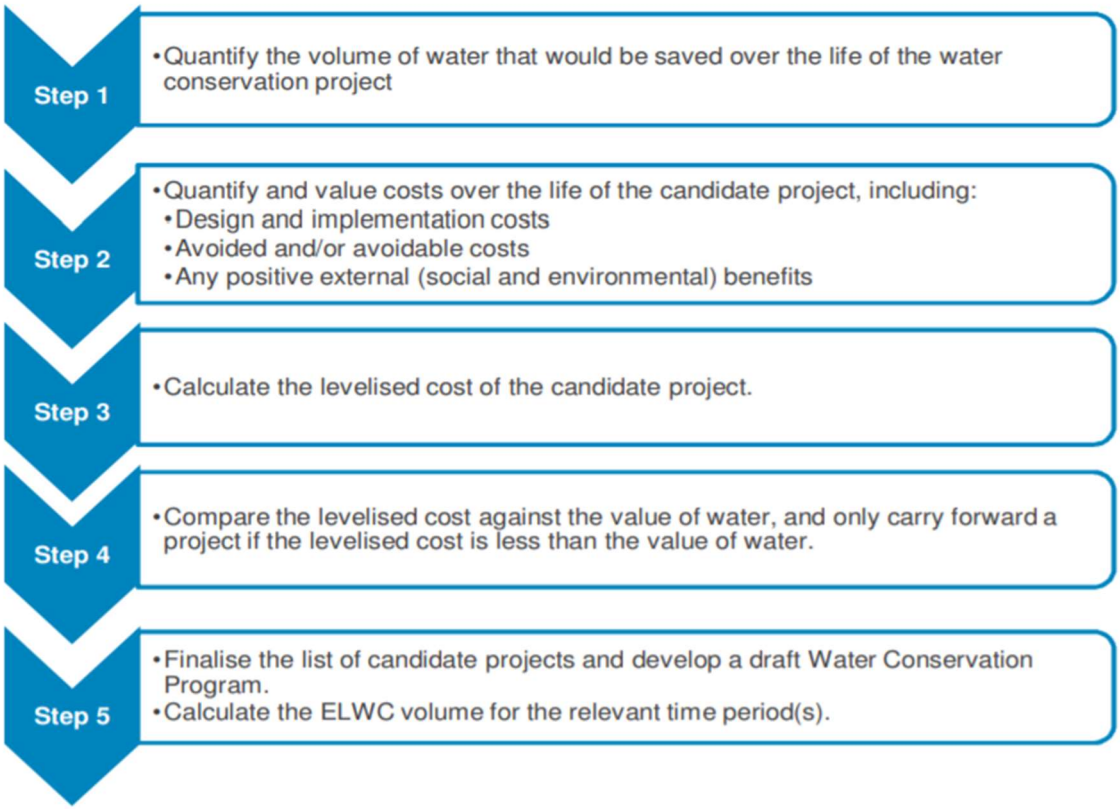
10.1 Estimating Economic Level of Water Conservation

Under our Operating Licence 2019-23, Sydney Water is required to maintain a water conservation program consistent with the Current Economic Method and to implement water conservation measures that have been assessed as economic as determined by the Current Economic Method.

The Economic Level of Water Conservation (ELWC) methodology is our Current Economic Method for assessing whether our water conservation measures are economic. The ELWC methodology should be conducted on any of the following types of water conservation activities:

- water leakage
- water recycling
- water efficiency (including demand management).

Essentially, a water conservation project is assessed as economically viable under ELWC where the cost is less than or equal to the value of water. The process for applying the ELWC methodology is summarised in the diagram below. Levelised cost estimates for several customer programs have been reduced because of incorporating additional social and environmental benefits. These include a reduction in energy, carbon and wastewater treatment demands.



10.2 Estimating Economic Level of Leakage

Sydney Water aims to achieve an economic level of leakage (ELL) that balances the cost of water, system performance, customer expectations and programs. Ultimately, the approach is designed to identify and repair leaks while providing value for customers.

The ELL is the point where the cost of reducing leaks equals the value of the water saved. It is based on a least-cost model to determine the best rate of expenditure to manage leaks and this approach is based on International Water Association best practice, customised for Australian use.

The ELL target is established at the start of each year based on a mix of default values derived from statistical analysis across international water agencies, as well as current and historical asset and performance data including length of main, increasing number of connections, water pressure, response times, leak detection costs, and the marginal cost of water.

Where possible, the forecasted prevailing climate conditions are considered in the determination of the ELL Target to gauge the changes in soil moisture and impacts on asset movement that may increase or reduce weeping joints and emerging cracks. For example, the number of forecasted breaks would be lower outside of drought.

11. Glossary and acronyms

Glossary

Building and Sustainability Index (BASIX)	State-wide planning policy ensures new residential dwellings are designed to use less drinking water and produce fewer greenhouse gas emissions by setting energy and waste reduction targets. BASIX also applies to extensions and alterations of existing residential properties.
Economic Level of Leakage	Represents the total level of leakage from the system at the point where the cost of leak reduction activities equals the savings from reduced water demand.
Greater Sydney Water Strategy	The Greater Sydney Water Strategy replaces the existing Metropolitan Water Plan 2017 and provides confidence in the security of Greater Sydney's water supply to 2040 to support economic growth, environmental protection and community wellbeing.
Levelised cost	The present value of net project costs divided by the present value of water saved, measured over the life of the project
Recycled water	Recycled water is water that has been used before and is then cleaned to remove impurities. Recycled water (sometimes called reclaimed water) comes from wastewater, which includes greywater and stormwater. Sydney Water treats recycled water to Australian Recycled Water Guidelines and NSW Health standards so that it is suitable and safe for its intended use.
Sewer mining	The extraction of wastewater upstream and/or downstream of a wastewater treatment plant for treatment and reuse as recycled water.
Stormwater harvesting	The collection, treatment, storage and use of stormwater runoff.
Water Efficiency Labelling Scheme (WELS)	National scheme that involves mandatory water efficiency rating and labelling for a range of appliances and fittings.
Water Wise Guidelines	The NSW Government has announced that Water Wise Guidelines have replaced level 1 water restrictions and apply to everyone in Sydney, the Blue Mountains and the Illawarra. This includes all residents and businesses. Water Wise Guidelines came into effect at 12:01AM on 1 December 2020 and, as of publication of this report, remain in place.The rules focus on common-sense behaviours like watering lawns and gardens before 10 am and after 4pm using a hand-held hose fitted with a trigger nozzle, sprinklers or standard watering systems. Customers cannot allow water to run onto hard surfaces like paths or roads.
Weather correction	The removal of year-to-year variation in water use relating to changes in weather conditions.

Acronyms

ALD	**Active Leak Detection**
AWA	Australian Water Association
AWRC	Advanced Water Recycling Centre
AWTP	Advanced Water Treatment Plant
BASIX	Building Sustainability Index
CENRA	Customer Engagement and Non-Residential Analytics
DCCEEW	The NSW Department of Climate Change, Energy, the Environment and Water
ELWC	Economic level of water conservation
ELL	Economic Level of Leakage
GSWS	Greater Sydney Water Strategy
GPS	Global positioning system
IICATS	Integrated Instrumentation Control Automation and Telemetry System
ILI	Infrastructure Leakage Index
InSAR	Interferometric Synthetic Aperture Radar
IPART	Independent Pricing and Regulatory Tribunal NSW
ISF	Institute of Sustainable Futures
IWA	International Water Association
LGA	Local Government Area
LPD	Litres per person per day
NABERs	National Australian Built Environment Rating System
NSW	New South Wales
PRW	Purified Recycled Water
RRWS	Resilient and Reliable Water Supply
SIMPaCT	Smart irrigation for parks and cool towns
WCFT	Water Conservation Field Team
WCPCB	Water Conservation Portfolio Control Board
WELS	Water Efficiency Labelling and Standards
WRP	Water Recycling Plant

WRRF	Water Resource Recovery Facility
WSAA	Water Services Association of Australia
m	metres
l	litres
kL	kilolitres
km	kilometres
ML	megalitres
GL	gigalitres