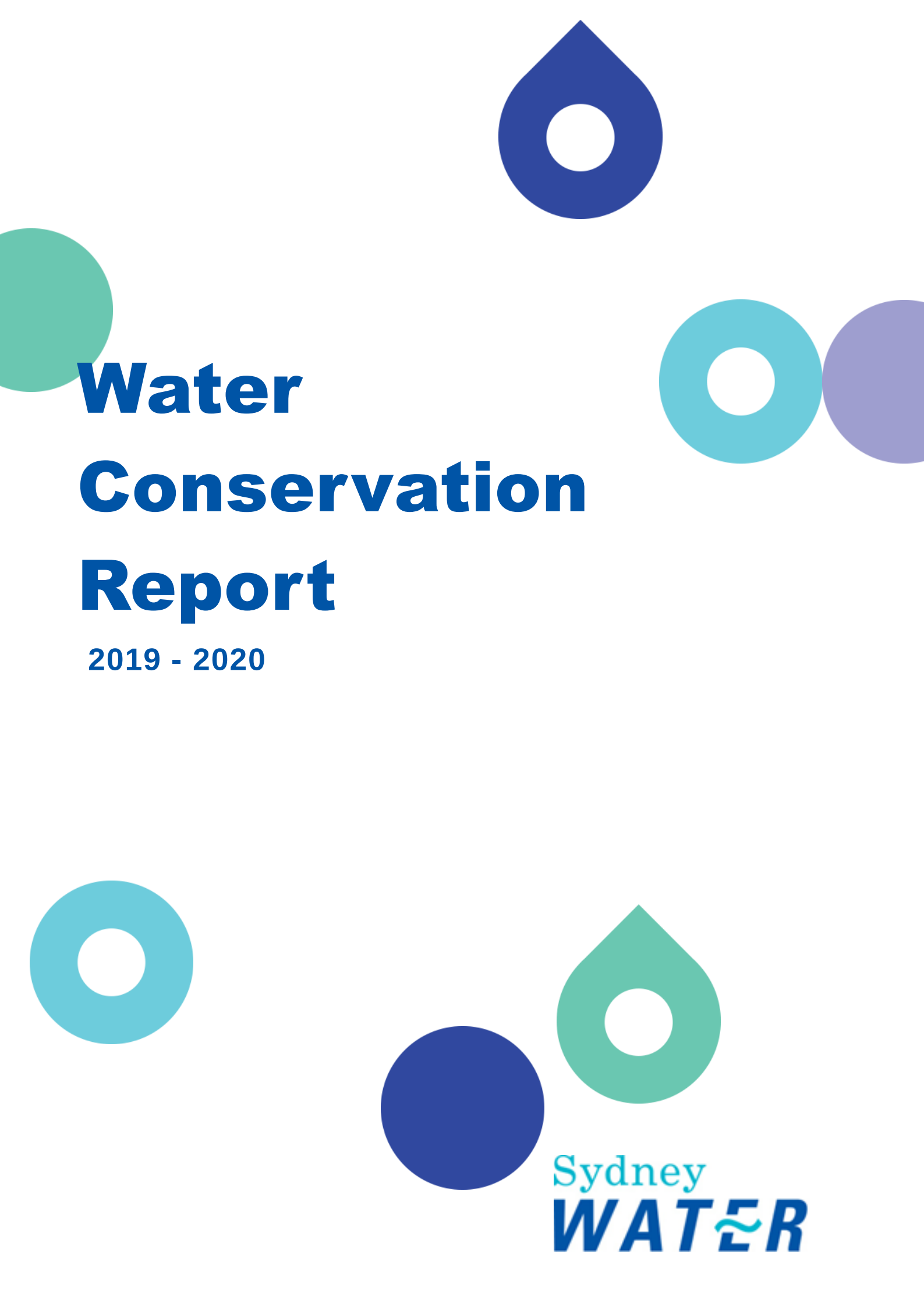




Water Conservation Report

2019 - 2020

Sydney
WATER

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Executive summary

Overview

Readily available access to high quality drinking water is an essential service that Sydney Water provides to enhance the overall liveability for its five million customers across the Greater Sydney region.

We recognise the critical value of our most precious resource and place a high priority on water conservation as part of a range of measures to ensure a resilient and secure water supply for Greater Sydney, and to achieve our vision of *creating a better life with world class water services*.

This report outlines our Water Conservation Plan for the next five years and reports on the costs and water savings from our water conservation programs run in 2019-20. The plan supports the delivery of the NSW Government's Metropolitan Water Plan, which recognises the critical value of water conservation in balancing supply and demand for greater Sydney. It also includes water conservation projects offered to help manage social hardship and build capability.

Our approach to Water Conservation is based on the [Economic Level of Water Conservation \(ELWC\) methodology](#)¹ approved by the Independent Pricing and Regulatory Tribunal (IPART) in December 2016. The ELWC methodology promotes economically efficient water conservation projects that consider social and environmental costs and benefits. Where projects are considered economically efficient at the current value of water, we have included them in our five-year plan.

Sydney Water's plan to improve Water Conservation

The recent drought in 2017-20 highlighted the need for Sydney Water to continue to improve our Water Conservation capability. Our objective for the program is to help customers save water all of the time. We are taking several actions to be better prepared in the future:

- **We have secured baseline funding (\$40M over 2020-24) and drought funding for the next four years**– this means we will be helping customers to save water regardless of dam levels. When the next drought hits, we will quickly ramp up our efforts and spending to respond.
- **We have dedicated teams working on water conservation all the time** – to support our vision '*Delivering a better life with world class water services*' we have realigned our

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http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mtg0/~edisp/dd_184330.pdf

organisation. We have teams focussed on delivering programs to customers, managing climate change and resilience, innovation and product development, strategy and corporate social responsibility and customer and community engagement.

- **We are partnering with key stakeholders** – we are working closely with the Department of Planning Industry and Environment (DPIE) to develop the Greater Sydney Water Strategy including future water conservation initiatives. We are also working closely with several councils to help small and medium businesses become water efficient. We will work closely with DPIE to look improve regulatory programs such as NABERS, BASIX and WELS that help to save water.
- **We will evaluate our flagship programs** – the best way to target and improve programs is to understand their effectiveness. Over the next few years, we will complete evaluations to determine the water savings that programs such as WaterFix® Residential and WaterFix® Strata achieve.
- **Expand existing programs and develop new ones to save at least 1 billion litres of water per year** – we have several tried and tested programs that have helped customers save water for over a decade. We will expand the number of customers that we reach with these programs each year. We will also test new technologies and approaches with customers to save more water or reduce the cost of delivery.

2019-20

We faced many challenges in 2019-20 with a combination of extreme weather events including prolonged drought and devastating bushfires, to flooding rains. We also managed periods of high demand. Despite this, we are proud to have responded through increased investments and improved outcomes in water conservation, which included working with our customers to save water and increasing our proactive pipe leak detection coverage to minimise leaks and breaks.

In the past year available water storage levels reported by WaterNSW reflected the extreme conditions with levels at 52% on July 2019 and 81% in June 2020.

The rate of decline in water storages throughout 2019 was unprecedented and in February 2020 the rate of increase in water storages was the greatest observed in over a decade, resulting in a more than normal complex operating environment.

Total water use for 2019-20 was 534,672 million litres (ML) or 277 litres per person per day, of which 182 litres per person per day was for residential use. Water use was impacted by Water Restrictions being in place for the entire year.

In 2019-20, we:

- invested \$16.6M to achieve 395 million litres in water savings
- invested \$1.9M to maintain baseline leakage levels at 124.7 ML per day

- invested \$29M operating recycled water schemes that produced 47 billion litres of recycled water, offsetting drinking water demand by 13 billion litres
- invested \$18.8M to increase customer awareness of the value of water and encourage water efficiency behaviour.

2020-21

In 2020-21, we will increase investment on water conservation to \$8M plus an additional \$5M to continue our behavioural change campaign, in line with IPART pricing determination of 16 June 2020.

Despite the impacts of COVID-19 restrictions, increasing water conservation initiatives remain key priorities and we will continue to invest (\$40M over four years) into key initiatives including WaterFix®, PlumbAssist® and community awareness and education programs to help our customers continue to conserve water.

Sydney Water's price determination (2020-24) has an allowance for an additional \$50M a year to be spent on water conservation if Greater Sydney enters drought.

We expect to increase water savings by 1,800 ML or 1.8GL (billion litres) per year by:

- Expanding WaterFix® Residential and WaterFix® Strata through subsidies and marketing
- supporting disadvantaged households with high water use through PlumbAssist® and through partnering with the Land and Housing Corporation
- introducing the WaterFix® Business and Government, and WaterFix® Small Business programs
- enhancing our active leakage detection program
- supporting a range of regulatory (BASIX, WELS) and incentive programs (NABERS) which support efficient housing design and development
- piloting and developing new and expanded programs, including investigating new recycled water schemes and innovative solutions to detect and respond to water leakage.

We will also continue to manage baseline leakage to achieve the Economic Level of Leakage and operate existing recycled water schemes.

If dam levels remain above 80% the Economic Level of Water Conservation will be 8.1 ML/day.

1 Introduction

Each year, we report on how we conserve water in accordance with Section 3 of our *Operating Licence 2019–2023*²

Our rolling five-year Water Conservation Plan is outlined across three main programs to reduce demand:

- Water efficiency, which aims to support customers to use water resources wisely. It includes efficient technologies, education, voluntary use reduction, audits and supporting regulatory measures (e.g. [BASIX](#))³
- water leakage improvement aims to reduce water loss in our water network. It includes proactive leak detection and repair, and optimised response times to repair leaks and breaks
- water recycling, which reduces the amount of water we take from our dams. Water recycling ranges from large scale wastewater recycling to sewer mining and stormwater harvesting.

Section 2 outlines our performance for 2019-20.

Section 3 includes our forward plan including deliverables for 2020-21 and our five-year plan, based on the current value of water.

Section 4 provides further details of each of these projects.

Section 5 outlines future water conservation opportunities, including our research and development program.

This Water Conservation Plan is updated regularly throughout each year and published annually. We review the program as the value of water changes, and we improve our understanding of the effectiveness of water saving projects. This allows us to start, stop or adjust the scale of efficiency projects and introduce new projects.

Due to COVID-19 and related restrictions on trade and movement our five-year plan is heavily impacted in 2020-21. We hope that any early delays in program delivery will be made up in the following years. We have provided our plan for 2020-21 in addition to a plan for what we believe will be a typical year thereafter.

² Appendix A outlines how this report meets specific requirements in the Operating License Reporting Manual

³ <https://www.planningportal.nsw.gov.au/basix>

1.1 Context of drought

Our dam levels dropped faster in this drought than they did leading up to the Millennium Drought. Between 2017 and 2020 our dams declined at the fastest rate on record.

Heavy rainfall in February 2020 and a return to average rainfall conditions has provided much-needed relief for residents and businesses.

Prior to the heavy rainfall in February 2020 which lifted storages above 80%, the last major inflow into Sydney's water storages was on 11 April 2017, with total storage then peaking at 96.5%. This has been one of the most severe droughts recorded in NSW. The two years prior to February saw some of the lowest inflows into Greater Sydney's catchment dams since the early 1940s.

Despite Greater Sydney coming out of this most recent drought, we need to continue to be ready for drought conditions and continue to maintain waterwise behaviours in our community.

Sydney Water is working collaboratively with the Department of Planning, Industry and Environment, together with WaterNSW, in developing the Greater Sydney Water Strategy. The Greater Sydney Water Strategy (GSWS), when approved by the Government, will replace the Metropolitan Water Plan and will establish a future vision for water in the Greater Sydney Region and demonstrate how we will manage water to deliver a sustainable, productive and liveable city.

1.2 Water Restrictions

Water restrictions are a tool that can be used to manage demand during prolonged drought and is used to limit how and when water can be used. Level 1 water restrictions were introduced on 1 June 2019. The NSW Government then introduced level 2 water restrictions on 10 December 2019, when Greater Sydney's total dam storage levels were at 45%. Water restrictions were eased back to Level 1 from 1 March 2020 and remain in place.

Water restrictions and the associated campaign activities over the 2019-20 period are estimated to have reduced total water use by 10.4%. This equates to about 61.8 billion litres of water saved – or 24,717 Olympic-sized swimming pools.

2 Our performance in 2019-20

2.1 Water use in 2019-20

	2019-20
Total water use (potable water and unfiltered water ⁴), including	534,672 million litres (or 535 billion litres)
• Residential (metered)	66%
• Non-residential (metered) includes industrial, commercial and government properties	22%
• Non-metered water includes non-revenue water and leaks	12% (including 8.56% from leakage)
Observed average water use per person (including residential, non-residential and non-revenue water use)	277 litres per day (or 101 kL per year)
Observed average residential water use per person	182 litres per day
Weather corrected average per person water demand (including residential, non-residential and non-revenue)	272 litres a day (or 100 kL a year)

⁴ Includes 1,276 ML of unfiltered water provided for industrial use in the Illawarra.

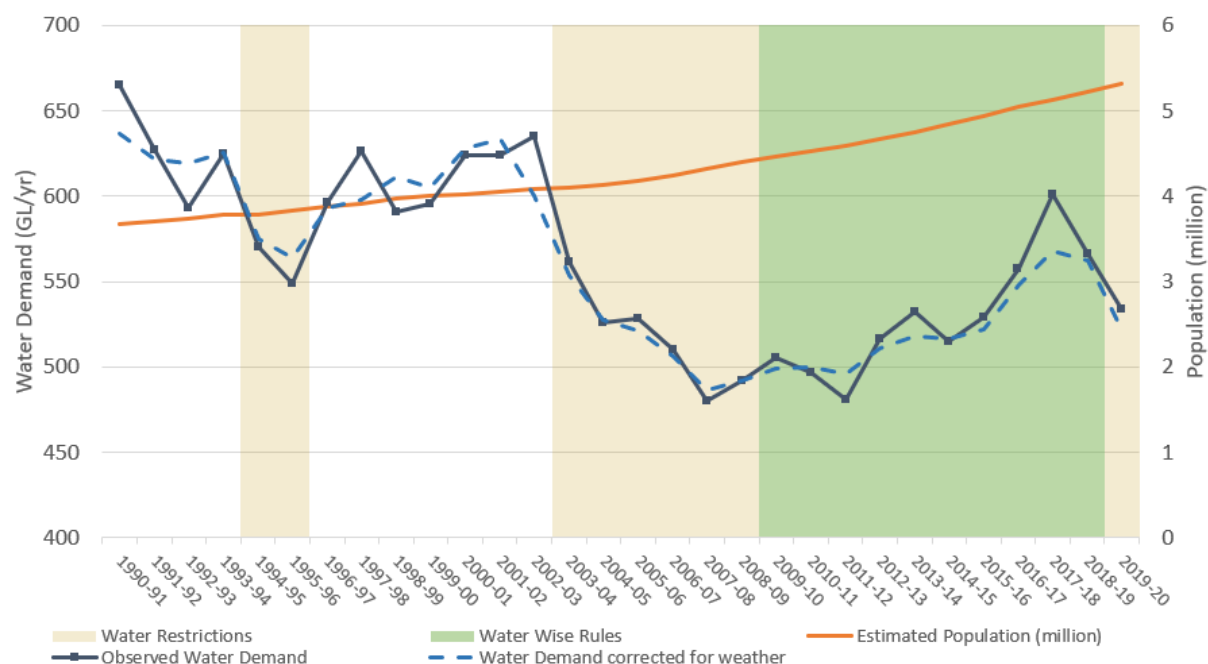


Figure 2-1 Total demand for drinking water continues to remain lower than pre-Millennium Drought (2003 to 2009) levels despite population increasing by around 1.2 million people over the same time period.

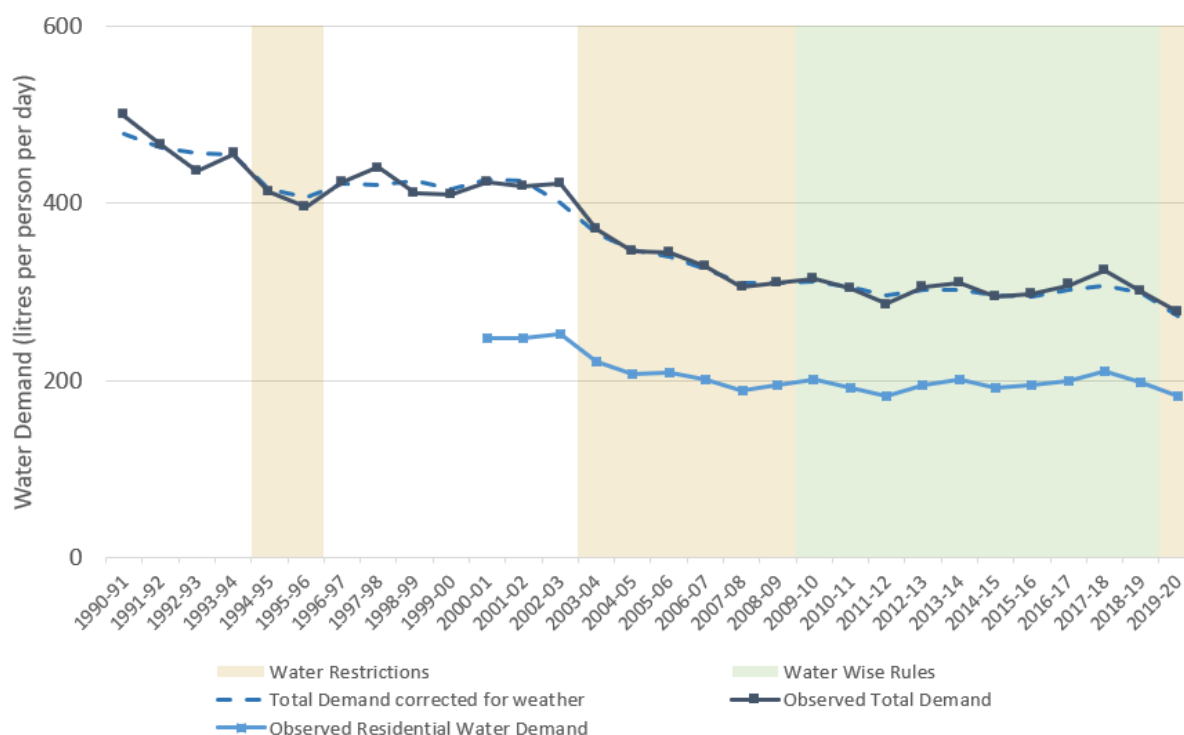


Figure 2-2 Weather corrected total demand (including residential, non-residential and non-revenue) and residential demand per person has remained relatively stable, since the introduction of Water Wise Rules in 2009. The hotter weather in 2019-20 meant that around 5 litres more water was used per person per day than what would be expected in an 'average' year.

The 366-day moving average of total observed demand at 30 June 2020 was 277 litres per person per day (refer to Figure 2-2). This includes residential, non-residential and non-revenue segments of water demand.

To understand the trend in average water use and the impact weather has had on demand we use a model that estimates of what demand would have been if the weather conditions had been 'average'. The result for 2019-20 was a weather corrected demand of 272 litres per person per day. So despite restrictions being in place, the hotter weather conditions meant that around 5 litres more water was used per person per day than if the weather had been 'average'.

Water demand in 2019-20 was lower than forecast, but within the bounds of the typical variation from the 'base case' due to weather. Known short term effects on demand included:

- hotter than average weather conditions throughout the year
- higher than expected leakage, also influenced by the drier weather conditions
- our water efficiency media campaign and restrictions savings.

Water demand will continue to be monitored throughout 2020-21 to better understand how this result may impact longer term trends. Further details on our demand forecasting and weather correction method can be found in Appendix B.

COVID-19 is also expected to have an impact on sectoral and possibly overall demand for water. Changes to demand can be accurately determined from water meter reading which concludes in October 2020, after the date of writing. Therefore, the impacts of COVID-19 on water use trends in Sydney will be detailed in subsequent editions of this report.

2.2 Water conservation in 2019-20

Our water conservation activities continued to reap benefits for our customers. Our highly successful WaterFix® programs, saw more than 15,000 plumbing checks undertaken across Greater Sydney to help reduce leaks, dripping taps and install environmentally friendly shower heads. There were 17,145 repairs and 20,498 replacements completed, which will result in recurring savings of around 347 million litres per year.

About 18,000 km of active leak detection was completed during the year and average response times to fix reactive and corrective leaks is at the lowest levels since 2016.

In 2019-20, we spent \$16.6M to achieve 395ML per year savings (see Table 2-1), achieving:

- A revamped WaterFix® Residential program. COVID-19 forced the temporary suspension of the program consistent with Government health advice. The program was partially funded by government contributions to the Climate Change Fund (CCF).
- Continued investment in identifying new opportunities for recycled water.
- Increased investment in active leak detection and repairs.

Table 2-1 Water conservation activities in 2019-20

Project	Forecast 2019-20	Actual 2019-20		
	Water savings (ML/year)	New water savings (ML/year)	Investment (\$'000, gross)	Participants
PlumbAssist ®	20	5	185	254
WaterFix® residential	320	309	4,442	14,765
WaterFix® strata	260	54	225	450
WaterFix® Business and Government	160	Program delayed – see section 4.2.3		
WaterFix® Small Business	130	Program delayed – see section 4.2.3		
Enhanced short term leakage response	120	Program delayed – see section 4.3.2		
New recycled water planning and development	N/a	N/a	10,900	N/a
Education Program	N/a	Not measured	754	5700 ⁵
Piloting and development				
NSW Land & Housing Corporation	0	12	188	609
WaterFix® Schools Pilot (Dept of Education)	0	3	148	6
Councils Partnership	105	12 ⁶	746	85
TOTAL	1,115	395	16,646	21,869

In addition, Sydney Water spent \$1.9M to maintain baseline leakage at 124.7 ML per day, which is heading towards the Economic Level of Leakage (ELL) range. We also spent \$29 M to operate existing recycled water schemes. We produced 46,919 ML of recycled water, an increase on 2018-19.

⁵ In 2019-20, we engaged directly with over 5,700 people (over 3,400 cancelled due to COVID-19).

⁶ Program delivery impacted by COVID-19

Table 2-2 Investments to maintain past water savings (see Appendix C for more information)

Project	Actual 2019-20 (\$'000, gross)
Leak management	
Active leak detection program to maintain ELL	1,930
Water recycling	
Wollongong Industrial	3,300
Industrial Foundation and Rosehill Racecourse	18,828
Rouse Hill Residential	1,800
Other minor schemes	5,000

3 Our forward plan

The long-term dry weather and drought has had a significant impact on our network assets, with extreme moisture deficit in soil and tree roots searching for water, causing extensive damage to pipes and leading to increased leakage and breaks. We know that the performance of our network needs to improve if we are to meet the challenges of growing cities and climate variability.

Our recent IPART determination reflects the focus we have on building innovation and resilience into our systems to ensure a sustainable and thriving future for Greater Sydney, with \$4.6 billion allocated for capital works over the next four years. Improving our environmental performance and increasing water conservation initiatives are also priorities for us and we will invest \$40M into continuing key initiatives including WaterFix®, PlumbAssist® and community awareness and education programs to help our customers continue to conserve water.

3.1 Water conservation for 2020-21

In 2020-21 we will spend \$8.6M (including \$0.6M provided by Climate Change Fund) to achieve 1,830ML/year of water savings (see Table 3-1) by:

- expanding WaterFix® Residential and WaterFix® Strata and continuing PlumbAssist®
- introducing WaterFix® Business and Government, and WaterFix® Small Business programs
- enhancing our leakage response, including recruiting additional frontline staff.
- piloting and developing new and expanded programs, including investigating new recycled water schemes.

An additional \$5M will be spent on a behavioural change campaign that aims to leverage behaviours heavily promoted during the drought in 2019-2020.

All programs will be targeted to deliver at a levelised cost equal to the current value of water, which is \$1.19 per kL to \$2.35 per kL depending on the period of benefit (refer Appendix B), except for PlumbAssist® which is aimed to support customers in financial hardship.

3.1.1 COVID-19 Impacts in the 2020-2021 Water Conservation Program of work

Restrictions upon work and travel in response to COVID-19 has limited our ability to complete scheduled plumbing services at customers' homes and businesses since March 2020. These types of visits are fundamental to the delivery of most of the water conservation programs listed in Table 3.1. As a result of the ongoing uncertainty of the impact COVID-19 will continue to have, we have scaled down our Water Conservation program of work by approximately 20%. The pre-COVID program of work, based on a recurring \$10M/year Water Conservation budget is provided in Table 3.2. This is more representative of the program of work we expect to achieve post COVID-19.

Production and delivery of the \$5M/year behavioural change campaign hasn't been impacted to the same extent and will continue as originally planned. Similarly, the expansion of our leakage management capability has so far been unaffected by COVID-19.

Table 3-1 – Water Conservation Program for 2020-21 – with predicted COVID-19 impacts

Project	Status	Net investment (\$,000)	Water savings, ML/year	Period of benefits, years	Levelised cost, \$ per kL
WaterFix® Residential	Ongoing	2,371	209	17	\$2.06
WaterFix® Strata	Ongoing	450	182	17	\$2.06
PlumbAssist®	Ongoing	224	5	17	\$2.36
WaterFix® Business and Government	Proposed	800	57	10	\$1.94
WaterFix® Small Business	Proposed	450	33	10	\$1.94
Enhanced Leakage Response	Proposed	0.8	1241	5	\$1.85
Piloting and development	Proposed	1,010	108	8	\$1.42
TOTAL			1,835		

Table 3-2-Water conservation Program for 2021-2025 – Post COVID-19 expectations

Project	Status	Net investment (\$,000)	Water savings, ML/year	Period of benefits, years	Levelised cost, \$ per kL
WaterFix® Residential	Ongoing	4,867	293	17	\$2.06
WaterFix® Strata	Ongoing	425	182	17	\$2.06
PlumbAssist®	Ongoing	224	6	17	\$2.36
WaterFix® Business and Government	Proposed	800	57	10	\$1.94
WaterFix® Small Business	Proposed	450	33	10	\$1.94
Enhanced Leakage Response	Proposed	0.8	1241	5	\$1.85
Piloting and development	Proposed	1,010	108	8	\$1.42
TOTAL			1,919		

3.2 Water conservation plan: 2020-21 to 2024-25

The Water Conservation Plan is our five-year program of water saving projects that are proposed to be implemented, based on the current value of water (Table 3-3). Our actual level of investment in water conservation, and the amount of water savings that result, will change over time as circumstances evolve, including changes in the value of water.

Our ELWC for the next five years is 8.1 ML/day based on the current value of water. As ELWC is a forward-looking methodology, this does not include ongoing savings from past water conservation activities, maintaining baseline leakage to the Economic Level of Leakage or savings from existing recycled water schemes.

Table 3-3 - Water conservation plan for 2020-21 to 2024-25 based on the current value of water ⁸

	Meets ELWC	Cumulative Savings, year (ML) ⁷					
		2020-21	2021-22	2022-23	2023-24	2024-25	Total
WaterFix® residential	Yes	209	418	627	836	1,045	3,135
WaterFix® strata	Yes	181.5	363	544.5	726	907.5	2,722.5
PlumbAssist®	No	5	10	15	20	25	75
WaterFix® Business and Government	Yes	66.25	132.5	198.75	265	331.25	993.75
WaterFix® Small Business	Yes	85	170	255	340	425	1,275
Enhanced Leakage Response	Yes	1,241	2,482	3,723	4,964	6,205	18,615
Rainwater Tank Repair	No	-	-	-	-	-	-
Love Your Garden	No	-	-	-	-	-	-
		ELWC 15,242 ML over 5 years or 8.1 ML/day					

⁷ Water savings from all programs continue for more than one year

⁸ Forecasts updated from 2018-19 based on value of water and available data

4 Water conservation to date

4.1 Residential water efficiency

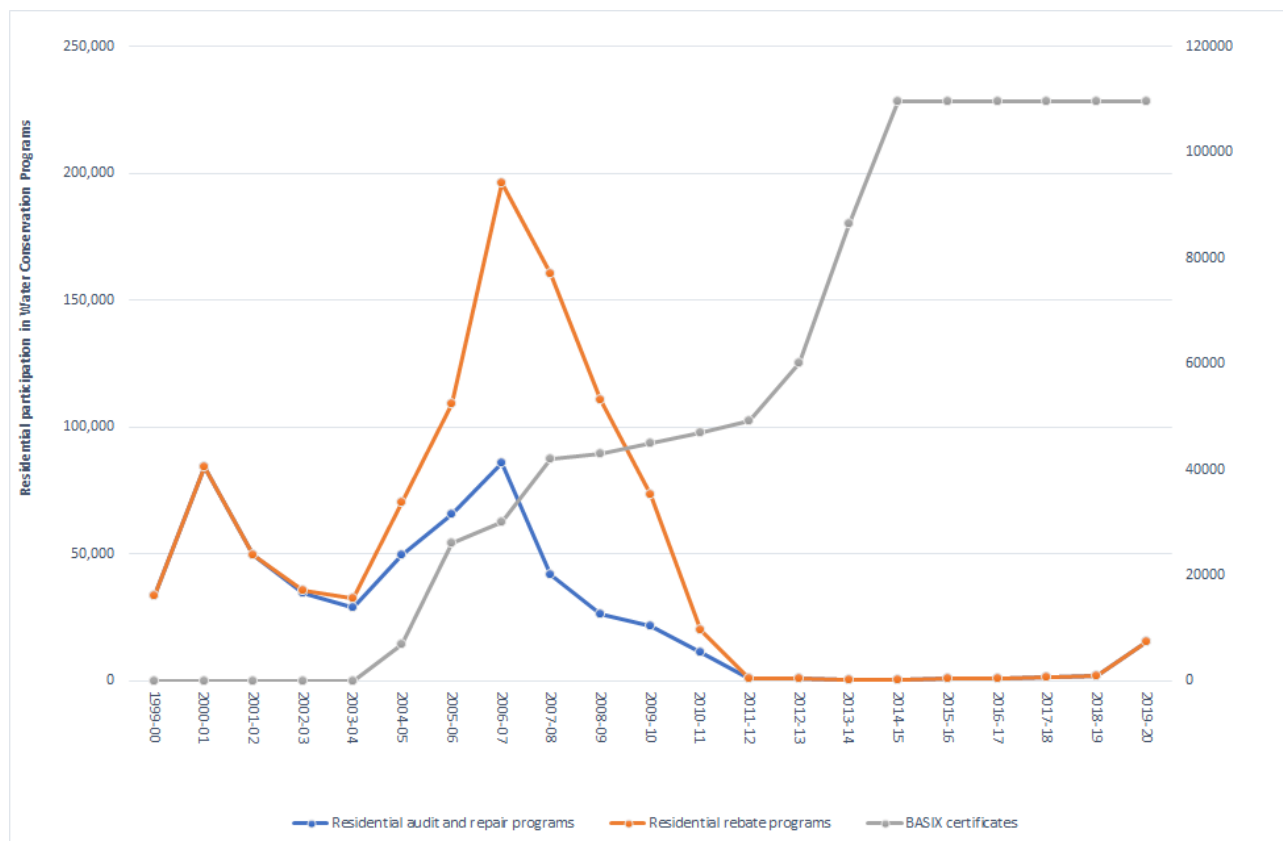


Figure 4-1 Residential participation in Sydney Water conservation programs and BASIX over time⁹

4.1.1 WaterFix® Residential

The WaterFix® Residential service provides a licensed plumber who will:

- check a customer's home for leaks and opportunities to save water
- tell customers about any repair work needed and suggest water efficient devices
- do any repair work and install any devices the customer agrees to.

Initially offered as a subsidised service, from 2011 to 2018 the service was offered commercially to generate unregulated revenue. Under this model, the program serviced up to 400 appointments a year.

⁹ BASIX data for 2009-10, 2010-11 and 2014-15 to 2019-20 is not available: values have been assumed

In May 2019, we began subsidising the program under ELWC (Economic Level of Water Conservation) and increased the program's profile on the Sydney Water website.

In July 2019, the program was further subsidised via funding provided by the NSW Government's Climate Change Fund (about \$5.7M to be used across two years) and we commenced direct marketing.

From July to November 2019, we further amended the promotional offer based on customer feedback. As dam levels continued to fall the subsidy for 4-star showers was increased. These, highest efficiency showers now represent over 95% of all showers we install.

The service continues to be well received by our customers, with word of mouth referrals to family and friends. We completed 14,765 appointments between July 2019 and March 2020 and estimate savings of up to 20,900 litres of water per year for each property serviced or about 308,589 kilolitres saved by this program per year.

Due to COVID-19, WaterFix® was placed on hold in March 2020 to ensure the health and safety of the community and our plumbers. At that time the offer was:

- free minor tap leak repairs
- free minor toilet leak repairs
- free outdoor tap replacement
- free 4-star showerheads and subsidised 3-star showerheads.

Due to the unexpected postponement of the program, we invited customers to register for the offer until mid-May 2020. As a result, about 3,500 customers were contacted for appointments when WaterFix® resumed in July 2020.

4.1.2 WaterFix® Strata

The WaterFix® Strata program was introduced as a commercial product and service program. The service created from the need to service customers in strata buildings where usage charges are not directly charged to individual owners. In this program, strata buildings with high water usage were targeted, implementing a unique benchmarking tool. The tool uses a water efficiency benchmark of 200-300 litres per bedroom per day.

Most Sydney strata buildings do not have individual meters for each apartment, thereby limiting the incentive for individual apartment dwellers to use water efficiently or address leaks.

To incentivise the program, the WaterFix® Strata program offers a performance guarantee to eligible buildings. Under this agreement, the strata body pays no upfront costs, instead repaying costs with the savings achieved by the WaterFix® services. That is, the water bill of the account is held at the same level until the costs of the service are recovered, typically between 2 to 5 years. The average reduction in potable water use from participating building is 30%. In some buildings savings of over 40% have been achieved.

CASE STUDY – Century Towers, 343-357 Pitt St, Sydney 2000

Century Towers in Pitt St has achieved a 36% reduction in water use, with water bill savings of about \$64,700 per year.

Andrew Croucher, Building Manager at Century Towers, said, “the problem that we had at building was that tenants weren’t reporting leaking toilet cisterns or taps and over time that contributed to a significant waste of water,” he said.

“In addition to savings in water there has been an immediate cost saving in gas and electricity bills as collectively the building residents are using less water.

“This means less water needs to be pumped to the tanks, which are all located on the upper floors, and less hot water needs to be heated.”

4.1.3 PlumbAssist®

PlumbAssist® provides emergency and essential plumbing repairs to customers experiencing financial hardship.

Our Customer Care staff offer eligible customers case management and a range of assistance options. This includes assessing customers’ water consumption history to check for high water use or a sudden increase that could indicate a plumbing problem. Customers with identified problems who can’t afford to fix essential plumbing services are then referred to PlumbAssist®.

The range of services offered under PlumbAssist® is broader than for WaterFix® as it includes sewer repairs and hot water services, as well as repairs to faulty fixtures and concealed leaks. This means the potential for savings is greater and costs per appointment are higher. We estimate PlumbAssist® saves about 100,000 litres per year for each property serviced.

PlumbAssist® is run primarily as a social program to help customers in hardship reduce water waste and lower bills. Social benefits of the program include alleviating financial stress and ensuring that vulnerable customers have access to basic amenities.

As PlumbAssist® work is regarded as essential, the program continued to operate during COVID-19. In fact, the program saw a 68% increase in the number of appointments in the March to June quarter compared to the same time the previous year (111 appointments in 2020 compared to 66 appointments in 2019). Whether this is due to an increase in the number of customers suffering financial hardship due to COVID-19, is unknown.

4.1.4 Concealed leak detection

The concealed leak detection program was introduced by Sydney Water in 2016.

Customer contacts come through on our concealed leak 1800-line whenever they find a sign of concealed leaks (e.g. wet patch in/around their house, water meter ticking when no water is being used, or water usage in their recent bill has gone up etc.).

We ask the customer a defined set of questions to confirm the likelihood of a concealed leak. Often, we can solve the customer issue over the phone, for example, identifying a toilet leak or possible leaking irrigation system.

When we are confident it is a concealed leak, we offer the services of our specialist team of plumbers who identify hard to find hidden leaks. We guarantee that if there is a leak and we can't find it, then service is free.

WaterFix concealed leaks service provides a full range of leak detection including:

- pipe location devices
- acoustic listening; and
- inert gas pressure testing.

We also provide quotes and carry out the leak repairs. If a customer has a concealed leak repaired, our plumbing team fills out a Leak Allowance Form on behalf of the customer and lodges it with their invoice.

Our customers value this service as they do not need to pay a plumber straight after. The service charges are added in their next Sydney Water bill. Customers can also choose to defer the payment over four bills.

In total, about 200 properties undertook this service in 2019-2020.

Case Study: Single dwelling on Castle Hill Rd, West Pennant Hills, NSW 2125

The customer had a concealed leak of about 1800 litres per day, which increased usage from 170-200 litres per day to 2063 litres per day. The cost of the concealed leak detection and repair for the customer was \$792.

Following the leak repair, the customer's water bills showed savings of \$341 per quarter. This meant the customer recovered the cost of leak detection and repair through water savings in approximately five months. The customer also received a hidden leak allowance credit of \$216.

4.1.5 NSW Land and Housing Corporation pilot

Sydney Water, in collaboration with NSW Land and Housing Corporation (LAHC), undertook a pilot project to implement water saving measures in social housing properties in Western Sydney. Supported by a co-funding agreement, the works were delivered by LAHC contractors. A total of 646 properties were inspected, of which 609 properties were retrofitted with water efficient devices. Long-term water savings as a result of the upgrades will be assessed for each property. The delivery of the pilot project was completed prior to the COVID-19 restrictions coming into force.

4.2 Business water efficiency

4.2.1 Water Savings Partnership pilot

Under the Water Savings Partnership pilot program, Sydney Water and five local councils are working together to help non-residential customers improve their water resilience by identifying water leaks, water loss and water saving opportunities.

We have partnered with Blacktown, Campbelltown, City of Sydney, Northern Beaches and Parramatta councils to co-fund the employment of council officers who deliver the program within their local government area.

The officers promote the importance of water efficiency in the non-residential sector and directly engage with customers to offer a range of services, including:

- providing general industry water efficiency information and access to best practice guidelines for implementing water efficiency measures
- installing a temporary datalogger to enable active online monitoring and assessment services as a desktop study
- arranging onsite walk-through water assessments
- creating summary reports with an overview of the site-specific findings and possible solutions to implement the identified water savings.

Following a period of onboarding and training, the officers commenced customer engagement in September 2019.

However, it was placed on hold in March due to COVID-19 and its impact on program delivery. Staff turnover resulted in a recruitment process which concluded in July.

The COVID-19 lockdown saw Sydney Water, and the two active councils, City of Sydney and Northern Beaches, move online and work remotely. Efforts were focused on customer engagement and providing active online monitoring services. This enabled the council officers to identify multiple significant base flows resulting from concealed leaks and to work closely with the businesses to have these leaks successfully repaired. To date, the partnership has engaged with 85 business who have achieved estimated water savings of 12,097kL/year 2019-20. Current estimates may have been subject to the impact of COVID-19.

The program aims to achieve potential combined water savings of up to 275 million litres across the five council areas over two years. This is likely to be impacted by COVID-19.

4.2.2 WaterFix® Schools pilot

We piloted a WaterFix schools water efficiency program with the NSW Department of Education.

The aim of the pilot was to help schools identified as high-water users to reduce their water use to within the benchmark of nine litres per student per day.

Nine schools identified as having high water use received a professional water audit to help understand their water use and identify upgrades and repairs to save water.

Six out of the nine schools accepted the offer of subsidised upgrades and repairs, including a fit out with data loggers to track and measure savings.

Work completed and next steps

Work has been completed on all nine schools. The next phase is to analyse and report on water savings, continue to monitor use over time and determine a servicing model with the NSW Department of Education.

4.2.3 Programs that did not proceed or were delayed

- **WaterFix® Business and Government, and WaterFix® Small Business** – The development of the program in 2019-20 was focused on building capability and capacity within the organisation to service and support customers. Due to changing conditions including COVID-19 and supplier capacity, the structure of the service offering has been amended to support launch in 2020-21. The initiative has been assessed as economic under ELWC and has been included in 2020-21.
- **Rainwater tank assessment pilot** – A pilot program was completed between April and May 2019. It received a poor response from customers and among the barriers to take-up included low rainfall and long-payback for what were frequently found to be significant and necessary repairs. Capacity constraints within the rainwater tank repair market were also a significant barrier to success. Rainwater tanks remain a focus of attention and Sydney Water is concentrating on capacity building and education in the short term. The initiative does not meet the economic assessment under ELWC hence did not proceed.

4.3 Leakage management

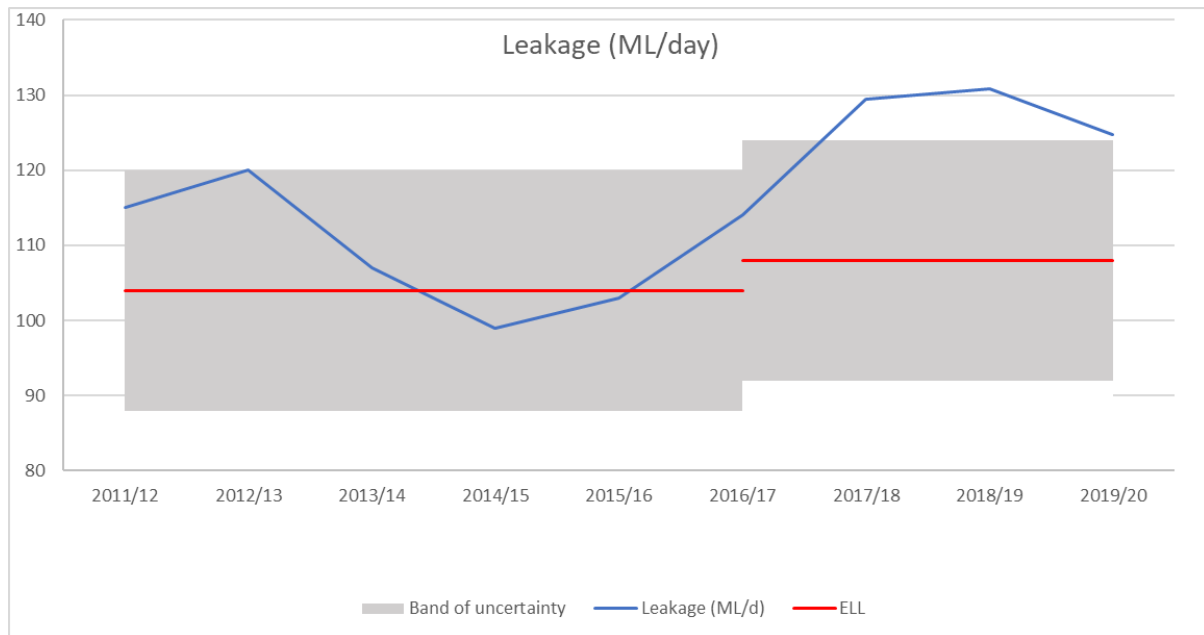


Figure 4-2 Actual leakage vs the Economic Level of Leakage (ELL) in our system.

4.3.1 Leakage performance in 2019-20

Actual leakage in 2019-20 was 124.7¹⁰ ML/day. During 2019-20, Sydney experienced further extreme drought conditions that impacted soil moisture, causing movements in pipes and an increased number of breaks and leaks in our network compared to average conditions. Sydney Water has experienced an increase in leakage since 2017 due to more leaks and breaks in our network, triggered by a prolonged period of hotter and drier weather compared to average conditions.

In 2019-20, we engaged additional resources to respond to the increased workload due to the increase in leakage in 2018-19 and brought a backlog of leak repair jobs back under control. We increased our proactive pipe inspection program - which identifies minor leaks that do not appear on the surface and require detection through specialist equipment - from 15,000 km of the water network to 18,001 km in 2019-20. These substantial efforts reduced the leakage from 131 ML/day the year prior to 124.7 ML/day, heading towards our aimed economic level of leakage of 108¹¹ ML/day.

Our leakage is within the top band of the International Leakage Index (ILI) and compares well against other developed countries. By world standards, Sydney Water rates in the top 10% of water utilities for minimising leaks.

¹⁰ These reported figures are subject to adjustment once final meter readings are collected. The reported numbers include a calculated estimated usage for the period (Accrual) when a final meter reading has not been received. These numbers are updated monthly.

¹¹ An uncertainty band of ± 16 ML/day exists around the forecast ELL, as leakage is determined by total system supply minus usages, and uncertainties in input figures including meter read adjustments

Additionally, we continue to explore new technologies including acoustic sensors (see section 4.5.1), linked with improved minimum night flow analysis, to target areas for our Active Leak Detection program.

See Appendix D for our key leakage statistics for 2019-20.

4.3.2 Programs that did not proceed or were delayed

- **Enhanced Leakage Response** – this initiative did not proceed in 2019-20 as the year was spent getting on top of the backlog and within the Economic Level of Leakage. The scope of the initiative was to increase maintenance crews, increase active leak detection and provide faster response times.¹²

Water recycling

4.3.3 Our water recycling



Figure 4-3 Total recycled water and water savings by Sydney Water projects

In 2019-20, Sydney Water supplied 47 billion litres of recycled water per year across 23 schemes (see Appendix C), saving 13 billion litres of drinking water.

- 11 billion litres of this went to residential, commercial and industrial uses and replaced the need for drinking water
- 17 billion litres went to environmental flows to enhance river water quality and for agriculture
- 17 billion litres was for recycled water use at our wastewater treatment plants
- 2 billion litres was recycled for other purposes including irrigation of parks, sports fields and agriculture

¹² See Appendix D for our key leakage statistics for 2019-20.

Case study

BlueScope Steel is Sydney Water's largest recycled water customer, consuming six billion litres of recycled water in 2019-20. Sydney Water recently renewed its agreement with BlueScope Steel to supply up to 20 million litres of recycled water daily for another 10 years. This represents the equivalent of 20% of the daily demand on Avon Dam, which is the main water supply for Wollongong and the Illawarra.

4.3.4 Third party schemes

Sewer mining

Sewer mining, a specific form of recycling, is the process of tapping into a wastewater system (either before or after the wastewater treatment plant) and extracting wastewater, which is then treated on-site and used as recycled water.

There were nine sewer mining schemes that actively operated in Sydney Water's area of operations in 2019-20. These schemes are owned and operated by organisations including councils, golf clubs and commercial building owners. We support the provision of recycling by sewer mining projects in accordance with our sewer mining policy.

In total, these schemes produced about 1,133 ML recycled water in 2019-20. As external programs, these are not included in our total water savings.

Private onsite reuse schemes

Private onsite reuse schemes produce recycled water by capturing, treating and re-using wastewater from a site's buildings or facilities. This includes Sydney Water's head office building at 1 Smith Street, Parramatta. Sydney Water does not track the number of these schemes in operation or the volumes of recycled water produced from these schemes.

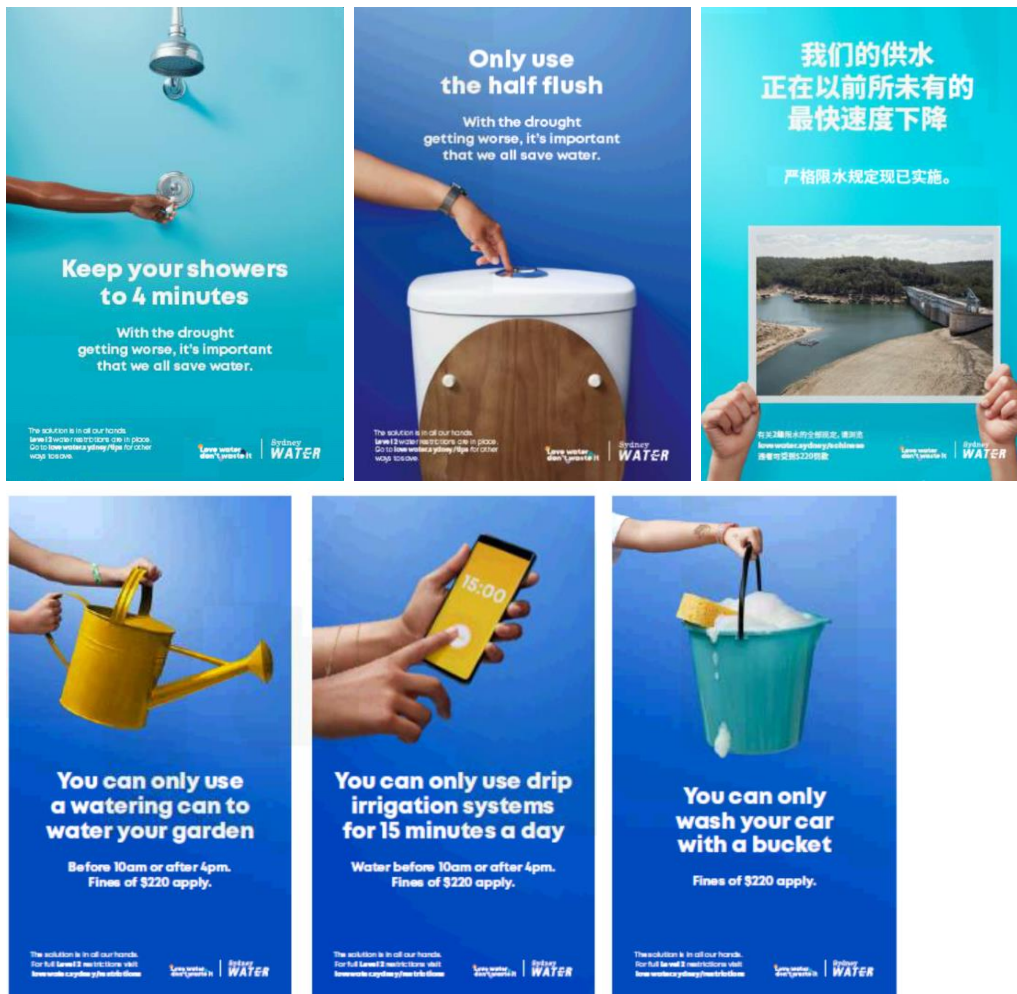
Stormwater harvesting

Stormwater harvesting involves collecting, storing and treating stormwater from urban areas, which can be used as recycled water. Recycled water produced from stormwater harvesting can be used to provide water for public parks, gardens, sports fields, toilet blocks and golf courses.

Typically, stormwater is managed by local councils. However, we may work with them to improve the health of our waterways, provide opportunities for stormwater re-use and/or protect people and properties from flooding. There are currently seven schemes in place that harvest stormwater from Sydney Water's stormwater system, saving approximately 215 ML/year.

4.4 Education and awareness

4.4.1 Community awareness campaign



4.4.2 Water Savings (Campaigns)

Combined with restrictions, our campaign delivered overall water savings of 10.4%, exceeding our 7.8% target. Our highest water savings, since tracking commenced in August 2018, occurred in January 2020, where savings peaked at 16.6%.

Community awareness campaigns

Water restrictions were brought forward and were stricter than outlined those included in the Metropolitan Water Plan 2017. It was Sydney Water's role was to implement the water restrictions and manage the customer interface. This included public messaging around water restrictions and water conservation, to encourage widespread community behaviour change.

In 2019-20 we continued phase 2 of our campaign with Level 1 restrictions, moving into phase 3 of the campaign from November 2019 to March 2020. This followed successful campaigns from August 2018 that progressively delivered increased water savings and awareness of drought and water restrictions.

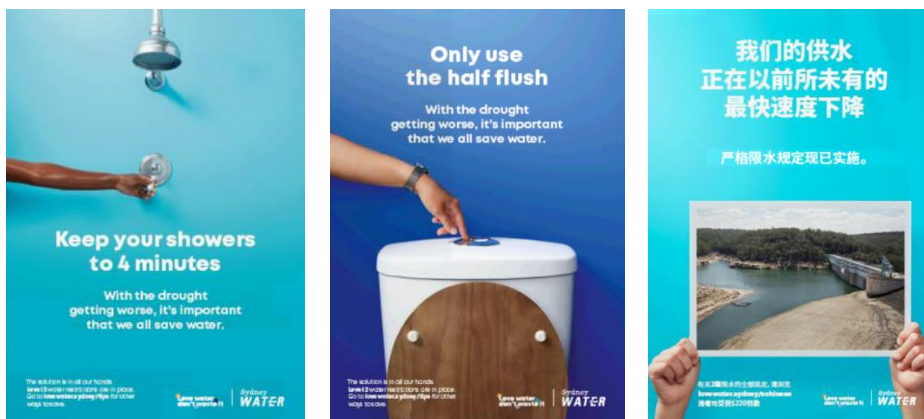
The community awareness campaign for phase 3 was a firmer conversation. This was due to the rapid increase in the severity of the drought across Greater Sydney and our customer insights tracking identifying that the community was ready for a shift in tone and firmer message. In December 2019 we launched our Level 2 water restrictions campaign bringing together the enforced (restrictions) and voluntary (water wise behaviours) campaign messaging. The campaign included indoor water saving behaviours, which represent about three quarters of all residential water use.

The campaign launched with a multi-media channel approach including Digital, Press, Radio, TV, Out of home (OOH), Play back TV and social media to March 2020, and coincided with the start of the highest water using months in the year.

In February 2020 a significant rain event resulted in and our dam levels going back up to 80% capacity and in March 2020 we paused the level 2 restrictions campaign and reinstated level 1 restrictions. We took the opportunity to thank the people of Greater Sydney for the great work they had done to achieve these savings.



To maximise our reach to all of Greater Sydney, our communication plan used paid media (including TV, online, video, radio, out of home, social media and digital advertising), community engagement and earned media, which resulted in large numbers of online, print and social media stories.





Activations & Public Relations

The Small Change Shop offered unique flavoured cones of popcorn in exchange for individual water saving pledges. We asked visitors to the activation to commit to making a behaviour change, like having four-minute showers or committing to doing full loads of washing in exchange for their popcorn.

From Westfield shopping centres, to grass roots community events, *The Small Change Shop* visited 37 events over 98 days, reaching over 4,500,000 people. There were 52,441 pledges made, which equated to 1,949,322 litres per day saved.



Our Drought Proof Garden in October 2019 included an activation in Martin Place over three days and was amplified through earned and paid social media. We reached saw us reach over 5 million customers through a multi-channel approach, with an onsite activation exposure of 135,000 people and direct engagement of 15,000 people over three days. The garden promoted water restrictions and water saving tips in the garden while providing advice on how the use of plants are key to gardens surviving a drought.



Online Hub

The Love Water Hub provided a variety of water saving tips from Sydney Water and the Sydney community, showcasing the 'many ways to save water. Over the 2019-20 period the site achieved 1,339,308-page views, with an average time spent on page of 1:58 minutes It showcases our water restrictions campaign for residents and business, with important links to applying for exemptions for businesses and further information.

Digital and social media

During 2019 -20, our digital and social media campaigns aligned with our broader communications campaign to cover Level 1 and level 2 water restrictions, our Drought Proof Garden activation, and partnership with Aquabumps photography series. We also launched our Water Wise Coach chatbot tool, to help individuals better understand their water usage at home.

We used our digital and social media channels to share stories of how our customers use their water wisely and created an online community to share their own tips and tricks with each other.

Overall, our social media accounts saw a total of 114.6m impressions (on average 4m impressions per month) and 3.9m engagements during this period. Sentiment across the channels has been extremely positive and increased by 18% in the last 6 months.

Online Hub & Water Wise Coach

visit sydneywater.com.au

Events Subscribe Contact

Sydney WATER Love water, don't waste it

Water restrictions Reduce your impact Education Our water Get involved

We are now in Level 1 restrictions

Due to increased dam levels, we've eased restrictions back to Level 1.

The restrictions apply to everyone in Sydney, the Blue Mountains and the Illawarra. This includes all residents and businesses.

We all need to do our bit to be water wise, water is our most precious resource.



Be a part of the solution or face a \$220 fine

Level 1 water restrictions apply to everyone in Greater Sydney, Blue Mountains and the Illawarra. Learn how you can play your part to save water.

Gardens
You can only water your garden with a hand-held hose fitted with a trigger nozzle, a watering can or a bucket before 10 am and after 4 pm.

Sprinklers
You can't use standard sprinklers or watering systems.

Sydney Water
Published by One Green Bean [?] · 20 May ·

Did you know 🙌 using the dishwasher actually uses less water than hand washing! @sara_why has been using her dishwasher a whole lot more while at home, and ensuring that it is full before starting the wash!

An average dishwasher uses around 12L per load - can you guess how much a load of hand washed dishes uses?



Sydney Water
Water utility company

Learn More

47,953 People reached 1,720 Engagements

Boost Post

8:34

Sydney Water
Tap for details

Replying will allow Sydney Water to see info you've made public.

Hi, Jess! 🙌 Before we begin would you like to learn more about your water usage with our Water Wise Coach or talk to a human?

Water Wise Coach

Live chat has ended. Scroll up to the last interaction to return to the chatbot.

Hi Jess! 🙌

I'm your Water Wise Coach.

So here's the thing, water is a precious resource and it does some pretty amazing things. Yet so many of us just use it without realising.

So I'm here to help you work out

Sydney Water
Published by One Green Bean [?] · 26 March ·

There's no better feeling than achieving a goal! storyandco and her kids have been making small changes to their routines to save water while they spend more time at home. By swapping baths for 4 minute showers every second day they saved hundreds of litres!

What do you do to save water in your home?



LOVEWATER.SYDNEY

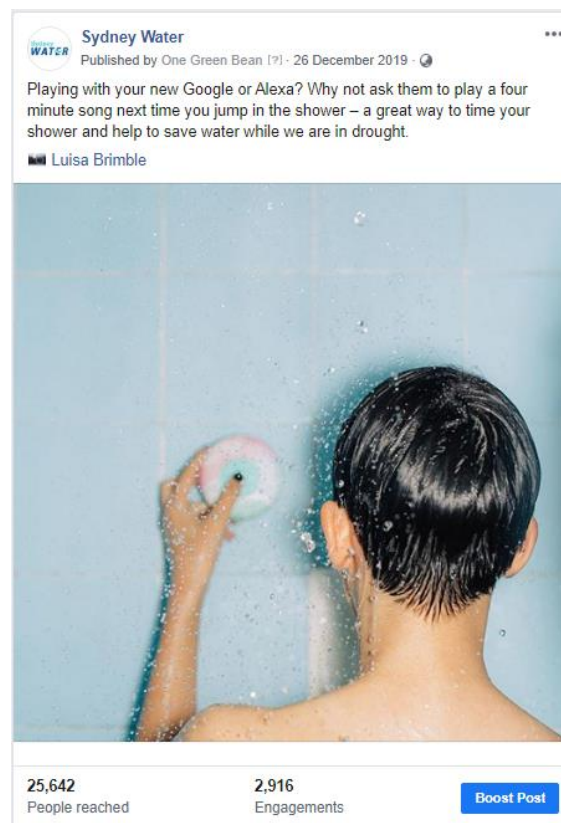
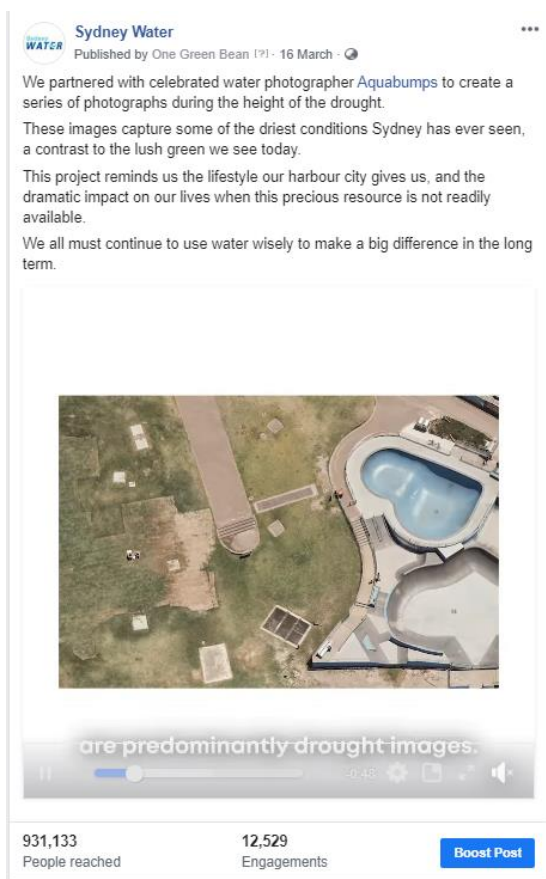
Love water, don't waste it.

Love water, don't waste it. Our water is the most precious...

Learn More

19,889 People reached 1,243 Engagements

Boost Post



4.4.3 Formal education and community tours

Sydney Water plays an essential role in educating our community and providing a deeper understanding of the role water plays in our lives.

We invest in and support formal education programs and onsite tours that promote and integrate water efficiency within the broader context of the urban water cycle. We help build our community's understanding of our water and wastewater systems, including their shared responsibilities through sustainable behaviour to support these systems.

In 2019-20, we engaged directly with over 5,700 people (over 3,400 cancelled due to COVID-19). Over 97% of respondents reported learning practical ways to help the environment and save water.

We partnered with the Catholic Schools (Western Sydney) Dioceses delivering teacher professional development workshops and student leadership forums on drought and water conservation.

We engaged with the NSW Department of Education, Catholic Schools Diocese and Independent Schools to promote water restrictions and encourage water saving asset management.

We delivered on a semester-long project-based learning initiative with 200 Western Sydney University Design Communications students on water conservation campaign communications.

We developed new online learning resources and revised existing resources to build understanding and water saving behaviours in schools, including a school water audit aimed to build students' investigative skills in water use and management.

We have commissioned and are currently in production for early primary school digital resources, videos on how to conduct a home water audit, water cycle experiments, and resource packs with games and books with a focus on building value for water and saving water.



4.5 Research and Innovation

4.5.1 Advanced pipe sensing for leaks and breaks

Sydney Water is continuously innovating to determine new and improved ways of detecting leaks from our system. This helps to improve water conservation activities to support the long-term sustainability of water supplies and enhance the delivery of services to our customers.

Sydney Water partnered with NSW Smart Sensing Network, to bring together smart sensing expertise in academia, industry and government to develop a strong, collaborative and innovative network that will deliver economic and social benefits for the people of Sydney.

Sydney Water is trialing a collaborative initiative with NSSN, Australian National University (ANU) and UC a new ground-breaking technology, "Quantum sensing", to predict leaks before breaks and target leak repairs by assessing the presence of water plumes around leaky pipes and measuring their gravitational pull.

- Sydney Water has deployed 204 acoustic sensors on water mains to date in five CBD areas to proactively detect more than 50 leaks. Once technologies are proven and results validated, the smart sensors will be rolled out to more areas for proactive preventive maintenance.

- Sydney Water is introducing “Lift and shift “loggers in our pipe network to improve our Active Leak Detection program into real time and automatic detection of hidden leaks. Small leaks on large buried pipes in remote areas may not be visible and could potentially develop into a large leak or a failure, causing loss of supply to customers and damage to properties. Preliminary results are successful, and Sydney Water is aiming to develop a long-term program on proactive leak monitoring of large pipes using a platform of innovative real-time technologies suitable for large pipes.
- Sydney Water completed a Failure Prediction Model for small pipes that is able to predict 70% of leaks and breaks within 200 metres on pipes. Testing the model in 20% of the pipe cohort, it predicts 80% of probability of leaks and breaks in small pipes. This is a significant achievement and is unique around the world.
- LiDar on a drone measurement has been validated on non-bitumen and non-concrete space where the pipes are within the nature strip. These measurements are picking up the initial few centimeters of the soil moisture on the top of a pipe. With hydrological interpretation, this soil moisture will be translated around the pipes. All these innovative techniques being developed have the potential to be adapted for wider water monitoring and control, thus increasing water conservation.
- Sydney Water is expanding its wastewater canine leak detection program to find leaks on the water network, using the smell of chlorine used to disinfect drinking water, which will be a first in NSW.



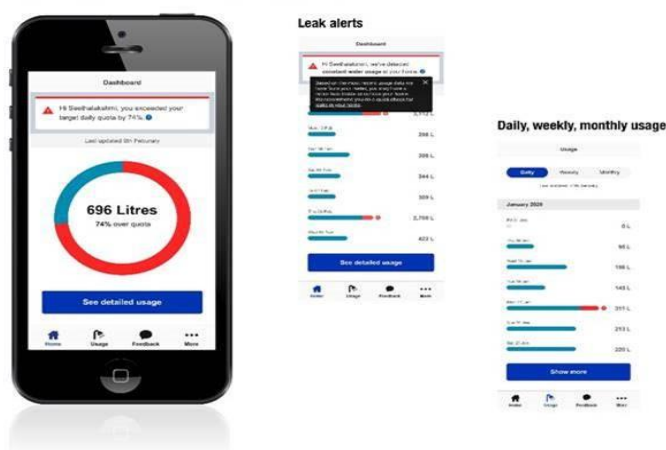
Leak detection dogs in training

4.5.2 Trial – Digital meters

We progressed our three-year digital metering trial, which is part of Sydney Water's Internet of Things (IoT) initiative. During the already completed phase one of the trial, we installed 580 digital meters and 50 retrofit meters at residential and commercial properties in Liverpool. Additionally, we provided 190 employees with a digital meter and access to a mobile app which enables them to monitor their water usage. The trial helps us to understand functional capability and reliability of different metering solutions, communication network coverage and required refinements of installation processes.

Looking forward, we have just commenced the planning of the second phase of digital metering in Liverpool with around 2,200 meters, some with pressure sensors. Our goal for phase two and later phase three of the project is to explore potential benefits and opportunities for demand management, leakage management and customer service.

Sydney Water usage app Beta 1.0



4.6 Filter Assessment and Improvements at Water Filtration Plants (WFP)

Sydney Water commenced a filter assessment initiative across all five western water hub plants in 2019-20 with two main objectives:

1. To optimise filter backwash performance
2. To prioritise filters for complete overhaul.

Ongoing optimisation of our water treatment plants is estimated to save approx. 1600kL/day.

Water Filtration Plant (WFP)	
Cascade WFP	Extend time between backwashes from 18hr to 48hr, saving approximately 670 kL/day
North Richmond WFP	Reduced backwash duration from 15min to 7min, saving approximately 400kL/day

Nepean WFP	No significant water savings
Orchard Hills WFP	Reduced backwash duration from 10min to 8min, saving approximately 300kL/day
Warragamba WFP	Proposed to reduce backwash duration from 7min to 4min to save approximately 240kL/day

4.7 Regulatory measures

Two external regulatory measures remain in place: The Water Efficient Labelling and Standards (WELS) scheme and the Building Sustainability Index (BASIX). Both measures continue to improve the water efficiency of homes.

BASIX is a state-wide planning policy that sets water use and greenhouse emission targets for residential dwellings. BASIX aims to reduce the volume of drinking water used and greenhouse gas emissions produced by new dwellings and existing dwellings with extensions and alterations.

WELS is a national scheme that involves mandatory water efficiency rating and labelling for a range of appliances and fittings. It also sets minimum water efficiency standards for some appliances, such as washing machines. Sydney Water worked closely with regulatory bodies during the millennium drought (2003-2009) to implement this legislation. We remain closely involved today as the Australian Standards which underpin WELS have been adopted as the template for a new ISO316 rating and labelling standard which is currently being developed.

4.8 Discontinued programs prior to 2019-20

Previous initiatives have been extremely successful in reducing water use. We expect savings from these initiatives to continue, despite the completion of many of the programs. Water efficient fixtures and behaviours established under these programs should continue to reduce water use.

Analysis showed that many of our efficiency programs in their current format have reached maturity. To achieve significant additional savings from these programs alternative implementation mechanisms are needed.

A full list of these programs and their outcomes can be found in Appendix E.

5 Future water conservation

5.1.1 COVID-19 impacts

Outbreaks of COVID-19 continue to have the potential to disrupt movement and trade for extended periods with little warning. Impacts in the commercial and industrial sector are potentially significant as despite a willingness to reduce costs through saving water and related expenses, the need to invest will be a major deterrent in such a volatile business environment.

5.1.2 WaterFix Business and Government and WaterFix Small Business

The WaterFix portfolio will be further expanded to offer water efficiency services to businesses of all sizes.

We are developing new water efficiency offerings for business and government customers that are likely to include online water use monitoring, specialised water audits, updated benchmarks and retrofit services. The rollout of these programs will help our business customers achieve best practice water and wastewater management. Due to COVID-19 related uncertainty in this market, the early focus will be customer leak detection and repair and identifying future investment opportunities for further water savings.

5.1.3 Enhanced Leakage Response

Several new initiatives are planned to increase our capability and capacity to identify and reduce leakage as early as possible. Projects including detailed analysis of minimum night flows that will make significant contributions in the coming years.

5.1.4 Community Awareness Campaigns

The campaign has been planned with a staged approach and will continue to work in line with the NSW Government's Department of Planning, Infrastructure and Environment strategy.

5.1.5 Recycled Water from Fill Stations (Possible New Service)

One of the small-scale recycled water schemes that enables supplying recycled water for target customers without needing a huge investment is the construction of Tanker Filling Stations (TFS). The recycled water TFS service was identified as an alternative fit-for-purpose water supply by Sydney Water's drought response team. This project is in line with the community expectations to provide a sustainable supply method for the necessary water demand. This project has been paused while customer demand out of drought is identified and secured.

5.2 Research and development activities

5.2.1 New recycled water opportunities

Sydney Water is planning for innovative ways to provide water, wastewater and stormwater services to our growing population. Recycled water is one part of our integrated water cycle

management strategy. In planning and delivering new recycled water solutions, Sydney Water has the following considerations:

- The solution is cost effective for all customers
- The solution is efficient and scalable to cater for growth
- The solution results in better environmental and liveability outcomes.

In 2019-20, Sydney Water continued to plan for the delivery of recycled water in Colebee, Oran Park, Ropes Crossing and Hoxton Park. We are also planning to deliver recycled water to Western Sydney for construction purposes, to save water in the dams for drinking. As part of our integrated water servicing approach. We are also assessing the potential role of recycled water for non-drinking purposes, including cooling, in new growth areas such as Greater Parramatta and Olympic Peninsula, Western Sydney Aerotropolis Growth Area and the South West Growth Area.

5.2.2 Smart Devices and Smart Homes of the Future Program

Sydney Water and the Institute of Sustainable Futures will explore the potential of smart technologies for monitoring and controlling water, and related resources to transform our management of water and wastewater within commercial buildings and in the home. The project will investigate how a new 'digital everything' and internet of things (IoT) could enable a new circular economy of the home that promotes sustainability while enhancing householders' experiences. It will also explore what integrated water (and other utility) servicing looks like after digital disruption.

The project will include an onsite trial in a commercial building in Rhodes to install Caroma's state-of-the-art Smart Command bathroom and amenities technology to measure water savings.

The benefits to Sydney Water for investing in this 18-month program include an improved understanding of these emerging 'smart' technologies and quantification of potential water savings for residential and commercial applications. It will also inform new water efficiency measures for future development, with a focus on Western Sydney growth areas.

5.2.3 End use study: Understanding how customers use water at home

Our end use study is developing and monitoring Sydney-specific detailed estimates of how customers use water for specific purposes, such as showering, toilet flushing and clothes washing. We are using this data to make effective decisions about our water conservation projects, future drought responses, and water demand forecasting.

Initiated in 2017, the study has been extended for 2020-21 so that we have a clear picture of our customers' water use both in and out of drought.

Through a combination of customer surveys and special high-resolution smart meters, Sydney Water is creating a robust evidence base for making data-led decisions around how our customers use water. Figure 5-1 below depicts how Sydneysiders use water in their homes when not in restrictions.

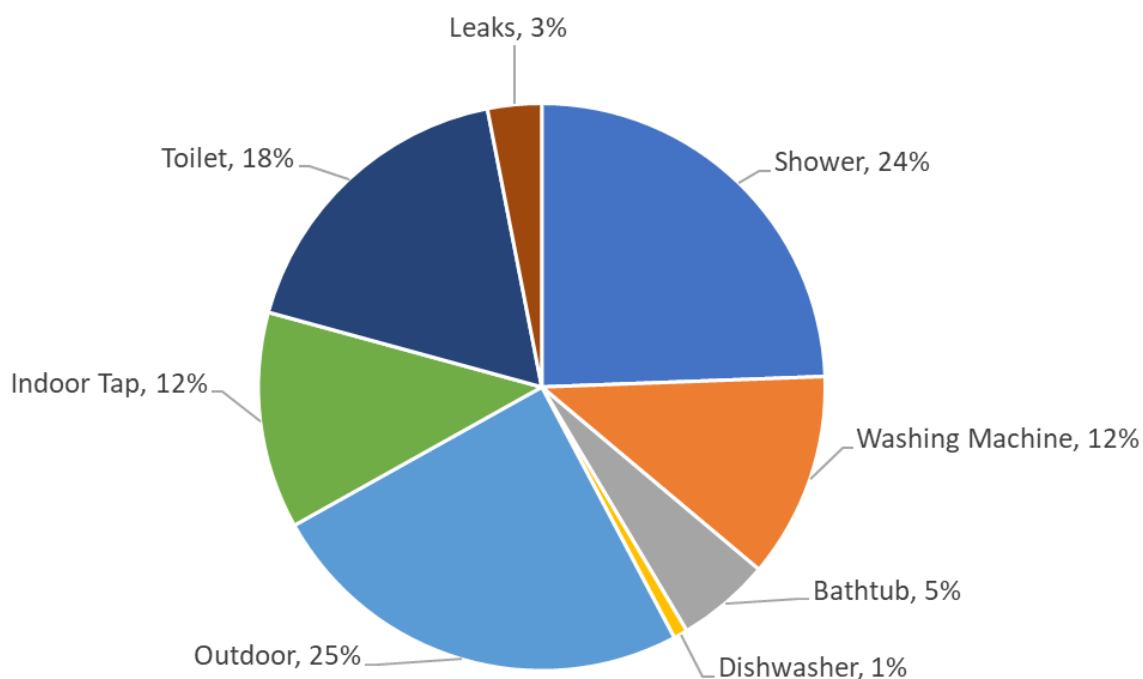


Figure 5-1 Usage split results from Sydney Water's end use analysis (July 2018-July 2019)

Appendix A

Reporting Requirements

Reporting guide for auditors

Summary of requirement	Located in the report
Clause 2.1 - Water Conservation Report	
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):	Section 2.2 Section 3 Section 5
- Sydney Water's strategies, programs and projects relating (at a minimum) to water leakage, recycled water and water efficiency (Water Conservation Measures); - Whether the Water Conservation Measures are economic; - How and when the Water Conservation Measures will be implemented; - The targeted water users; - The expected water savings; - Cost of the measure per kilolitre of water saved; and - The method to assess the effectiveness of the Water Conservation Measures; and - The extent to which these Water Conservation Measures accord with the economic level of water conservation (ELWC) and the Current Economic Method.	
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. Clearly identify those Water Conservation Measures that:	Section 3
- Are economic when assessed by the Current Economic Method; - May become economically efficient at a later date; - Sydney Water is required to implement under licence clause 3.1.2; - Sydney Water has implemented; - Sydney Water is proposing to implement at a later date (or under specific circumstances); and - Sydney Water is proposing not to implement and the reasons for not implementing;	
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 2 Section 4
Describe and explain any changes to Sydney Water's water conservation program relative to the previous annual Water Conservation Report (where applicable);	Section 2 Section 4
Outline how Sydney Water's water conservation program relates to the Metropolitan Water Plan and its progress against the Metropolitan Water Plan;	Appendix B
Include information on any Water Conservation Measures researched, piloted or developed for the previous financial year (including the funds spent on these activities);	Section 2.2 Section 4.1 Appendix D Section 4.2
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 (WC1) and weather corrected (WC2))	Section 2.1
Quantity of Drinking Water drawn by Sydney Water from all sources, expressed in gigalitres per year (aggregate);	Section 2.1
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); and	Section 4.3 Appendix D
Volume of water sourced from Recycled Water (in megalitres).	Appendix C

Appendix B

Method Overview

Demand forecasting and monitoring

Sydney Water forecasts water demand to inform financial and water supply-demand planning by Sydney Water, WaterNSW and the NSW Government. The forecasts consider observed historical trends in demand and the potential impact changes in major water demand drivers may have on future demand for water. The latest update of the forecasts occurred in 2019–20. The long-term demand forecasting model and demand projections are currently under review as part of the development of the Greater Sydney Water Strategy.

Forecasts assume average weather conditions and are aligned to the Department of Planning, Industry and Environment's (DPIE) dwelling and population projections. The observed demand will differ from forecast as drivers of demand deviate from average, expected or assumed values. For example, the expected deviation from the demand forecast due to normal weather variations is illustrated by the grey shading in Figure 5-1.

To enable adaptive planning and assist in making decisions for an uncertain future, Sydney Water has developed a range of futures with an associated combination of demand drivers and their impacts. Three of these futures and associated projections (higher use, lower use and 'base case') were adopted for use in Metropolitan Water Planning in 2015 (depicted in Figure 5-1). These demand projections are currently being updated as part of the development of the Greater Sydney Water Strategy.

Adopting a range of futures provides insights into the potential longer-term level of demand under a range of assumed drivers and responses. The true future may not be explained solely by any of these individual futures, but they can be used to help consider futures that are different from our current or past experience. These forecasts should be used to understand the impact of demand drivers, and to think about what levers may be used to avoid an undesired future. They should not be used to address short term fluctuations in demand.

Monitoring

Figure 5-2 illustrates observed demand against historical forecasts used financial and water supply-demand planning. The 'Base case' average use forecast was prepared in 2018 using the latest information available at the time. This is compared to the observed demand, 'higher use' and 'lower use' demand scenarios approved for use in the 2017 Metropolitan Water Plan. Observed demand is adjusted for known short-term impacts such as annual fluctuations in weather, unfiltered water demand, leakage and the implementation of water restrictions. The adjusted demand provides an insight into the long term demand trend as a result of structural changes in key demand drivers.

The observed demand in 2019-20 was significantly lower than the 'Base case'. This is due to the implementation of Level 1 and Level 2 restrictions. There may be some additional impact due to COVID-19 in the later part of 2019-20 not yet captured in the Figure below.

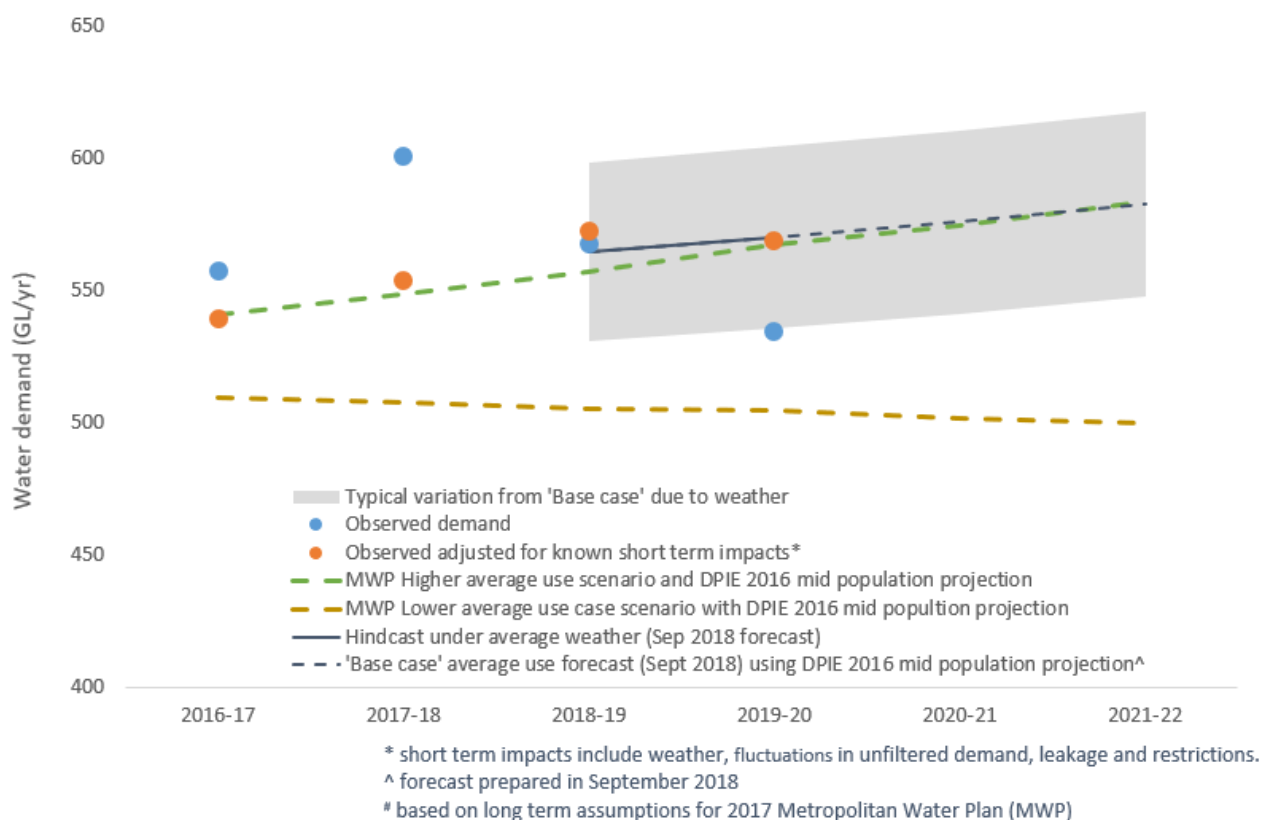


Figure 5-2 – Monitoring water demand against projections demand for drinking water. See Water Use in 2019-20 for known short term effects on demand.

The demand scenarios and projections are currently review, as part of the Greater Sydney Water Strategy process. This will include incorporating the latest available information including:

- observed water use information
- latest population and dwelling projections. ie DPIE, December 2019 release.
- information from Sydney Water's end use study, stock surveys and market trends e.g. presence of more BASIX dwellings due to higher growth of development
- water prices for residential customers, and price elasticities for the non-residential sector, as set in the Independent Pricing and Regulatory Tribunal (IPART) Determination in 2020
- mid and long-term demand assumptions, aligned to the Greater Sydney Water Strategy
- leakage projections based on estimates of actual leakage and the economic level of leakage.

Weather correction

Weather has significant impact on demand. Deviations from average weather conditions can increase or decrease annual water consumption by up to 6% compared to consumption under average weather conditions.

Economic Level of Water Conservation

The method

The ELWC methodology was by approved by IPART in December 2016. It can be found [on our website](#)

The ELWC methodology is designed to promote economically efficient investment in water conservation, including water efficiency, leakage and recycling. It evaluates whether the cost to society of a water conservation project is less than the value of water that it saves. If so, it is considered economically efficient.

This methodology determines if the cost of the project is less than the value of the water saved. When the levelised cost (in dollars per kilolitre of water saved) of a project is lower than the value of water, we will implement it, subject to business case or funding approval.

The levelised cost of each project has been assessed where we have reliable information to estimate the costs, water savings and benefits (where they can be quantified) of individual projects.

Our ELWC methodology is based on a marginal value framework, where investment in water conservation could increase until the cost of saving an extra volume of water is just equal to the cost of supplying an extra volume of water.

The value of water

For this report, the short-run value of water was estimated based on dam levels at the start of July 2020, which was 80.9% on 1 July 2020. The value of water is dependent on its scarcity, so a high dam level results in a lower short run value of water.

The long run value of water, which is intended to reflect long term investment in infrastructure and supply, is not directly affected by dam storage levels. The long run value of water used for this report reflects the regulated retail price of water that will apply during the 2020 - 21 financial year.

Consistent with previous years, we plan assuming that dam levels could fall during the coming 12 months. In a typical year, dams fall about 10 per cent a year. For this plan, and assuming dam levels of around 71% by June 2021, the values of water we have adopted are:

- Short-run value of water was \$1.19 per kL
- Long-run value of water was \$2.35 per kL

The period of time over which water savings are assumed to occur for a particular project determines the value of water against which the project will be evaluated. Projects which fall into

the Intermediate category will be assessed against a linear interpolation of the short and long-run values of water.

Table B-1 Duration of water savings benefits vs the value of water

Duration of water saving benefits	Value of water
5 years or less	Short-run
6-19 years	Intermediate (interpolated between long and short run values)
20 years or more	Long-run

Quantifying the ELWC

Once we have determined if our projects are economically efficient (i.e. the levelised cost is less than the value of water), we calculate the ELWC. This is an estimate of the amount of water that could be conserved each day by viable projects, based on our economic assessment of costs and benefits across individual water conservation projects. We calculate the ELWC by adding the total amount of water that could be saved during the five-year program across all the economically viable and available projects and converting to an average ML/day basis.

Appendix C

Recycled water

Table C-1 Summary of total recycled water supplied, and volume of drinking water replaced by recycled water initiatives in 2019-20.

Recycled water scheme	Water recycling plant	2018-19		2019-20		Type of use
		Recycled water (ML/year)	Water savings (ML/year)	Recycled water (ML/year)	Water savings (ML/year)	
Kiama Golf Course	Bombo	42	-	62	-	Irrigation, golf course
BlueScope Steel	Wollongong	5,609	5,609	6,352	6,352	Industrial
Port Kembla Coal Terminal	Wollongong	235	235	220	220	Industrial
Wollongong Golf Club	Wollongong	45	45	54	54	Irrigation, golf course
Wollongong City Council	Wollongong	5	5	5	5	Irrigation, parks, sports fields
Warwick Farm Racecourse	Liverpool	62	-	129	-	Irrigation, racecourse
Liverpool Golf Club	Liverpool	72	54	83	63	Irrigation, golf course
Industrial Foundation and Rosehill Racecourse	Rosehill	1,279	1,279	1,321	1,321	Industrial, racecourse
Hickeys Lane	Penrith	23	-	3	-	Irrigation, parks, sports fields
Penrith Council parks	Penrith	22	22	9	9	Irrigation, parks, sports fields
Stonecutters Ridge Golf Club	Quakers Hill	-	-	-	-	Irrigation, golf course
Agricultural release	Quakers Hill	365	-	365	-	Agricultural release
Rouse Hill residential	Rouse Hill	2,748	2,748	3,063	3,063	Residential, commercial
Castle Hill Golf Course	Castle Hill	86	-	103	-	Irrigation, golf course
Dunheved Golf Course	St Marys	102	5	87	4	Irrigation, golf course
St Marys Agricultural Release	St Marys	2,428	-	2,428	-	Agricultural release
Hawkesbury-Nepean replacement flows ¹³	St Marys	10,591	-	11,951	-	Environmental flows
Elizabeth Macarthur Agricultural Institute	West Camden	37	-	335	-	Irrigation, farm
Agricultural release	West Camden	1,830	-	1,830	-	Agricultural release

¹³ The St Marys Water recycling project (replacement flows) means that there is up to 18 billion litres more drinking water supply in Warragamba dam. However, the project does not reduce the demand for drinking water, so the number is not included in the total water saved.

Recycled water scheme	Water recycling plant	2018-19		2019-20		Type of use
Richmond Golf Course	Richmond	93	-	92	-	Irrigation, golf course
University of Western Sydney, Hawkesbury	Richmond	433	-	341	-	Irrigation, farms, parks, sports fields
Picton Farm	Picton	615	-	558	-	Irrigation, farm
Aorangi Farm	Gerroa	125	-	145	-	Irrigation, farm
Sydney Water reuse	Various	17,159	1,995	17,383	1,995	Industrial
Total for recycled water projects		44,021	11,997	46,919	13,086	

Appendix D

Leakage management

Key leak management statistics

Table D-1 details our key statistics for leak management in 2019-20. Our 2019-20 leakage level of 124.7 ML/day significantly reduced by 6.3 ML/day from 2018-19 regardless of the extreme drought conditions contributing to significant increase in main breaks and leaks.

Table D-1 Key leak management statistics 2019-20

Key statistics	2017-18	2018-19	2019-20
Actual Leakage (refer Water balance)	129.5ML/day	131 ML/day	124.7 ML/day ¹⁴
Economic Level of Leakage (ELL) ¹⁵	108 ML/day	108 ML/day	108 ML/day
Number of bursts, breaks and leaks (low priority)	2,550	2,045	1,542
Average time to repair water main breaks (low priority)	375 hours	265 hours	211 hours
Number of bursts, breaks and leaks (high priority)	12,129	12,088	13,784
Average time to repair water main breaks (high priority)	98 hours	67 hours	43 hours
Length of mains inspected in 2019-20	9,019 km	15,000 km	18,001 km
Infrastructure Leakage Index ¹⁶ (ILI)	1.63	1.63	1.50

¹⁴ These reported figures are subject to adjustment once final meter readings are collected. The reported numbers include a calculated estimated usage for the period (Accrual) when a final meter reading has not been received. These numbers are updated monthly.

¹⁵ An uncertainty band of ± 16 ML/day 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.

¹⁶ The ILI is a standard introduced by World Bank includes bands from A (reflecting best practice) to D, with recommendations for both developed and developing countries. Sydney Water's ILI of 1.50 is in the top band (Band A [less than 2]) and compares well against other developed countries. By world standards Sydney Water rates in the top 10% of water utilities for minimising leaks.

Economic Level of Leakage

The economic level of leakage (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.

This approach is based on International Water Association best practice customised for Australian National Performance Reporting and uses a range of forecasted variables to determine the level including but not limited to current cost of water.

The chart below is a simplified presentation of an economic level of leakage analysis. Higher rates of expenditure result in lower levels of leakage and lower rates of expenditure result in higher levels of leakage. Sydney Water aims to implement a mix of leak management and pressure management programs to achieve the economic level of expenditure, in order to provide value for customers.

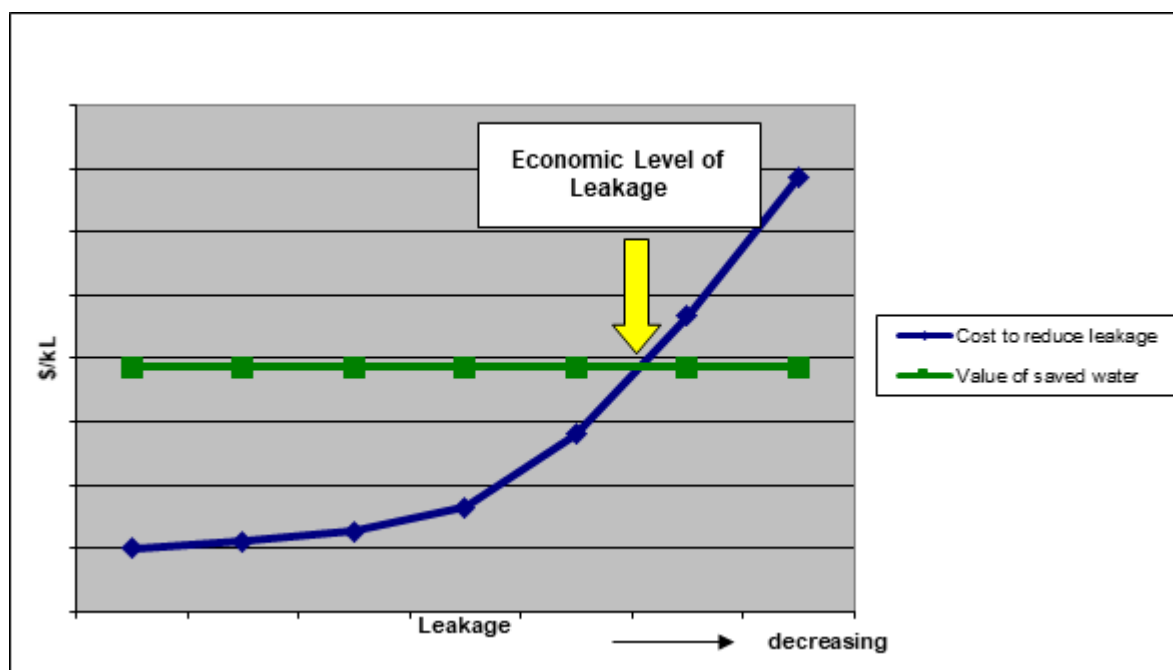


Figure D-1 The economic level of leakage

Water balance

Sydney Water uses the water balance method to estimate average losses (leakage) from our water supply systems. The water balance is a reconciliation of the volume of water we produce with all known and estimated end uses subtracted. The remaining volume is estimated to be leakage.

Sydney Water follows the methods, definition and terminology recommended by the International Water Association (IWA). The Water Services Association of Australia (WSAA) also supports this approach.

D-2 Water Balance results for year ending in quarter 2019-20 Q4 (Figures in ML)

Water Supplied 533,396	Authorised consumption 477,640	Billed authorised consumption 472,912	Revenue water 472,912	Billed metered consumption 469,828
				Billed unmetered consumption 3,084
		Unbilled authorised consumption 4,728	Non-revenue water 60,484	Unbilled metered consumption 274
				Unbilled unmetered consumption 4,454
	Water losses 55,755	Apparent losses 10,122		Unauthorised consumption 533
				Customer meter under-registration 9,588
		Real losses 45,634	Real losses from distribution system 45,634 – 8.66% (124.7 ML/D) ¹⁷	

¹⁷ Percentage in relation to base year of 2005/06 water supplied

Appendix E

Past programs

We have always reviewed and adapted our water efficiency programs to ensure they are cost effective and targeting the largest users of water. Table E-1 below details of our past programs.

Table E-1 - Past program investment, participation and water savings

Project	Description	Year started	Year on hold	Total participation	Unit	Total savings, ML/year	Total investment (uncorrected) ('1000s, to 2019/20)	Commentary
Residential								
WaterFix® Residential	Plumbing service to install efficient fittings and fix minor leaks	1998	Ongoing	504,109	Households	10,536	79286	Funding increase through Climate Change Fund for FY19-20
WaterFix® Strata	WaterFix service in strata buildings	2016	Ongoing	2,270	Units	150	1131	Ongoing
PlumbAssist®	WaterFix service for customers in financial hardship	2011	Ongoing	2,248	Households in financial hardship	225	4645	Ongoing
DIY Water saving kits	Simple devices customers could install to make existing showerheads and taps more water efficient	2004	2011	211,600	Kits distributed	785	7137	Funding shift in 2011
Washing machine rebate	Rebate for purchasing a water efficient washing machine	2003	2010	186,600	Rebates	3558	31,960	Water efficient washing machines dominant in the market
Toilet replacement Service	Replace an existing single-flush toilet with a new 4 star dual-flush toilet	2008	2011	28,200	Toilets replaced	553	15,502	Dual flush toilets dominant in the market
Dual-flush Toilet Rebate	Rebate offered to replace a single flush toilet with an efficient dual flush toilet	2010	2011	7,000	Rebates	177	1576	Dual flush toilets dominant in the market
Hot Water Circulator Rebate	Rebate for installing a hot water circulator with instantaneous gas hot water systems	2010	2011	11	Rebates	0	57	Low uptake

Project	Description	Year started	Year on hold	Total participation	Unit	Total savings, ML/year	Total investment (uncorrected) ('1000s, to 2019/20)	Commentary
Rainwater Tank Rebate	Rebate for installing and connecting a new rainwater tank to existing homes	2002	2011	59,000	Rebates	2,154	26,735	Funding shift in 2011
Love Your Garden	A qualified horticulturalist reviewed the water needs of customers' gardens	2004	2011	23,531	Households	174	12,269	High cost
Education, water saving measures and pricing	Education, water saving measures and pricing	1999	Ongoing	Not measured		Not measured	7,642	Ongoing
Business								
Business programs	One to- One Relationships, applying industry best practice and continual improvement in everyday operations	1999	2016			23,216	85,463	Program restarting in 2020
Top 100 Online Monitoring	Monitoring of water use to high use customers to better manage their use and identify leaks	2009	2011	162	High water users	296	1,090	Incorporated into one-to-one partnerships
SmartRinse	Replacing low-efficiency spray rinse nozzles	2006	2011	4,707	Restaurants	1,189	3,009	Market saturated.
BizFix	Retro-fitted businesses with water efficient fittings	2009	2011	327	Small businesses	373	1,608	Market saturated.
Council Partnerships	Work with local councils to engage small and medium water using businesses to achieve sustainable water savings	2009	2014	500	Small-to medium businesses	1,683	3,035	Project transferred to City of Sydney Council
Schools								
Every Drop Counts in Schools	Educational material and professional development for teachers, installation of water monitoring and alarm systems, and materials to help schools identify leaks	2005	2011	121	Schools	218	1,375	Funding shift in 2011
School Amenities Replacement	Fitting public schools with water efficient toilets, urinals, taps and showers	2010	2011	26	Schools	237	88	Funding shift in 2011
Rainwater tanks in schools	Rebate to buy, install and connect a rainwater tank to toilets or a fixed irrigation system, and an education program	2005	2011	320	Schools	47	1,297	Funding shift in 2011

Project	Description	Year started	Year on hold	Total participation	Unit	Total savings, ML/year	Total investment (uncorrected) ('1000s, to 2019/20)	Commentary
Leak reduction								
Active leak detection	Acoustically scanning for concealed leaks in buried pipes and repairing pipes identified	1999	Ongoing	250,637	km pipe surveyed	20,550	56,484	Ongoing
Pressure management	Installing pressure reducing valves in high pressure systems to reduce water pressure in the system and main breaks and leaks	2005	2013	179	pressure reduction schemes	10,000	71,479	A quarter of Sydney Water's network is now pressure managed, and additional investment in pressure management is unlikely to be efficient
Improved leak/break response times	Improving Sydney Water's response time to repair leaks and reduce water loss	2006	2011	N/A		730	24,000	All reported leaks by the size and risk of the leak, integrated into standard practice
Recycled Water								
Recycled water schemes	Water recycling schemes	2001	Ongoing			25,095	423,122	Economic efficiency
Regulatory measures								
WELS	National scheme that involves mandatory rating and labelling for a range of appliances and fittings	2005	Ongoing					Ongoing
BASIX	State-wide planning policy that sets energy and water reduction targets for new residential dwellings	2006	Ongoing					Ongoing
Water Wise Rules	Long-term water saving rules such as such as watering in the cool parts of the day, and no hosing of hard surfaces	2009	Ongoing					Ongoing
TOTAL						89,247	826,005	

Appendix F

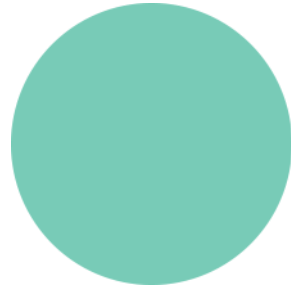
Glossary

Building and Sustainability Index (BASIX)	State-wide planning policy that 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 alternations 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.
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 <i>Australian Recycled Water Guidelines</i> 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 Rules	Long-term water saving rules introduced by the NSW government in June 2009. The rule focus on simple, common sense behaviours, such as watering in the cool parts of the day, no hosing of hard surfaces and fitting hand-held hoses with trigger nozzles.
Weather Correction	The removal of year to year variation in water use relating to changes in weather conditions.
2017 Metropolitan Water Plan (NSW)	The 2017 Metropolitan Water Plan overarching goal is to secure water for a liveable, growing and resilient Greater Sydney. It establishes key strategies to be implemented over the life of the plan which includes, optimising the way we manage the water supply system, investing in water conservation, preparing for drought, delivering WaterSmart cities and improving river health.

Appendix G

List of acronyms and units

BASIX	Building Sustainability Index
ELWC	Economic level of water conservation
ELL	Economic level of leakage
ILI	Infrastructure Leakage Index
IPART	Independent Pricing and Regulatory Tribunal
LPD	Litres per person per day
NSW	New South Wales
WELS	Water Efficiency Labelling and Standards
WRP	Water Recycling Plant
WSAA	Water Services Association of Australia
m	metres
L	litres
kL	kilolitres
km	kilometres
ML	megalitres



SW50 08/20

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