



Water Conservation Report

2018-2019

Sydney
WATER

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Executive summary

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 2018-19.

This plan supports 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.

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

The plan also includes water conservation projects offered to help manage social hardship and build capability.

2018-19

Sydney continues to experience dry conditions with dam levels of 52.1% (1 July 2019). Despite a 26% increase in population the total demand for drinking water remains lower than it did before mandatory restrictions were introduced in late 2003.

Total water use for 2018-19 was 567,824 million litres (ML) or 300.5 litres per person per day, of which 195 litres per person per day is for residential use.

In 2018-19, we

- spent \$2.3M to increase water savings by 236 million litres per year. We achieved savings higher than forecast for WaterFix Strata, WaterFix Residential and PlumbAssist due to increased program take-up. We achieved savings lower than forecast for the Rainwater Tank Repair Pilot due to low repair take-up and Council Partnerships due to time taken to engage and onboard council partners. More than 14,000 residential customers participated in our water efficiency and education programs.
- spent \$1.6M to maintain baseline leakage levels. Leakage increased from last year to 131 ML per day, exceeding the Economic Level of Leakage of 108±16 ML per day due to a prolonged period of hot and dry weather. The last two years have seen exceptional climatic conditions as we moved into drought. Our leakage of approximately 9% is still within the top band of the International Leakage Index and compares well against other developed countries. Sydney Water rates in the top 10% of water utilities for minimising leaks.

¹

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

- spent \$25.7M operating existing recycled water schemes that produced 44 billion litres of recycled water offsetting drinking water demand by 12 billion litres.

There was an increased customer awareness around the need to save water through our community awareness and water restrictions campaigns which will continue throughout 2019-20 whilst the drought continues. As at July 2019 the campaign has achieved a rolling average of 3.3% in water saving (actual demand vs forecast, weather corrected), with peaks of around 7% reduction in demand.

CASE STUDY – Windsor Plaza, Sussex Street, Sydney CBD

The 154-apartment complex Windsor Plaza in Sussex St Sydney achieved a 34% reduction in total water usage after WaterFix.

Andrew Whittaker, Head of the Windsor Plaza Strata Committee, says this gave Body Corporate a saving of over \$44,000 a year.

“Windsor Plaza had a high number of renters, many of whom were unwilling to raise any problems or repair requests with their property managers.

“There have also been significant reductions in hot water gas bills for apartment owners and tenants because they are now using less hot water. There is also less wear and tear on our pumps to pump water up to the header tanks and water heaters on the roof of the building.

“Our tenants are really, really happy with the way this has gone.”

2019-20

In 2019-20, we will substantially increase spending on water conservation to \$18.6M in response to the drought. This includes a \$5.8M funding boost from the NSW Government to help subsidise the WaterFix Residential program.

We expect to increase water savings by 1,010 ML or 1GL (billion litres) per year by:

- expanding WaterFix Residential and WaterFix Strata through increased subsidies and marketing
- continuing PlumbAssist
- introducing WaterFix Business and Government, and WaterFix Small Business programs
- enhancing our short-term leakage response during drought
- piloting and developing new and expanded programs, including investigating new recycled water schemes.

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

The Economic Level of Water Conservation for the next five years is 8.1 ML/day.

CASE STUDY – Museum Towers, Castlereagh Street, Sydney CBD

Museum Towers in Castlereagh St has achieved a 27% reduction in water use, with water bill savings of approximately \$33,700 per year.

Simon Ruben, Chairman of the Strata Committee at Museum Towers said “the problem that we had as a Strata was that tenants weren’t reporting leaking toilet cisterns or taps and over time that contributed to a significant waste of water.”

“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.”

1 Introduction

Each year, we report on how we conserve water in accordance with Section 3 of our *Operating Licence 2015–2020*²

Our rolling five-year Water Conservation Plan outlines our water conservation program in three main areas to reduce demand:

- water efficiency, which aims to support customers to use water resources wisely. It includes efficient technologies, education, metering, voluntary use reduction, audits and supporting regulatory measures (e.g. [BASIX](#))³
- water leakage, which aims to reduce water loss in our water network. It includes active 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 2018-19.

Section 3 includes our forward plan including deliverables for 2019-20 and our 5-year plan, based on the current value of water.

Section 4 provides further details of each these projects.

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

This Water Conservation Plan is updated annually 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.

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

Greater Sydney is in drought. Our dam levels have dropped faster in the past year than they did leading up to the millennium drought. We're seeing the lowest inflow rate into our catchment dams since the early 1940s and our total dam levels are now close to 50%.

Sydney's water supply is planned and secured through the Metropolitan Water Plan. This is the NSW Government's plan to ensure there is enough water for the needs of the people and environment of the Greater Sydney region.

Sydney Water plays a key role in drought response, working closely with WaterNSW and the government. A dedicated program team has been established to coordinate and deliver drought-related activities. Sydney Water's drought response program includes the following streams:



The drought has a multi-faceted impact on Sydney Water's network. On the one-hand, prolonged dry conditions cause clay soils to contract and place enormous pressure on our 47,000 kilometres of water and wastewater pipes. This causes an increase in leaks and breaks. On the other hand, the drought also causes tree roots to seek out moisture anywhere they can, including our network – leading to an increase in sewer chokes. Both scenarios require trained frontline staff to respond as quickly as possible. The response often includes complex repairs. For example, often our mains are in close proximity to important arterial roads for which clearance to commence work from traffic authorities is required. Often our mains are in close proximity to electricity and gas lines and close cooperation with those authorities is required. Sometimes mains are located under large, significant streets and trees, requiring close liaison with councils. Sometimes it is a combination of these.

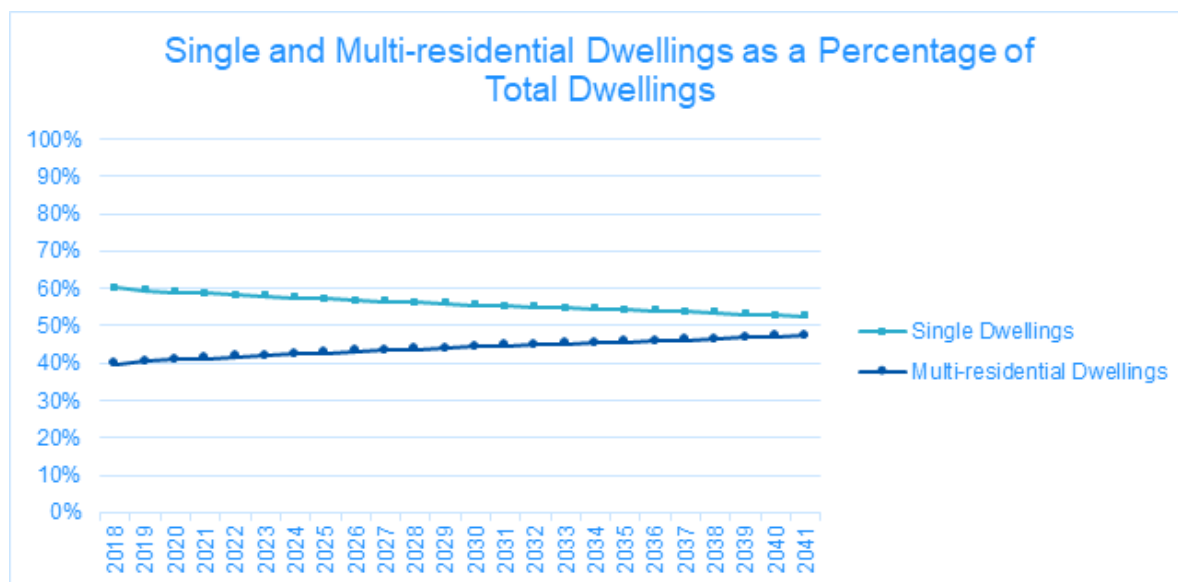
1.2 Water Restrictions

Lessons learned from previous drought

Residents and businesses in Sydney Water's area of operations were subject to water restrictions from 1 October 2003 to 21 June 2009 during what is now known as the Millennium Drought. At the conclusion of the drought a report was produced on the lessons that had been learnt and outlining relevant considerations for future restrictions regimes.

The report found that water restrictions have been and will continue to be an important element of Sydney's drought response because they can deliver large water savings quickly in times of water shortages. In addition, we found that the community generally supports the use of restrictions when there is high community awareness of drought conditions and water issues, including the need for reduced water use.

Projected savings from restrictions will change over time and should be reviewed on a regular basis. For example, it is assumed that as restrictions target outdoor water use, their effectiveness will diminish as the proportion of BASIX compliant houses increases over time. However, we also know that significant savings can be made by people undertaking voluntary actions both indoors and outdoors. In addition, changes to the mix of dwellings with population growth will impact where savings will need to come from and how we will measure those savings. These learnings have strongly influenced the design of current restrictions, which target outdoor behaviours, and our accompanying communications campaign, which encourages people to save water indoors.



Changes to the mix of housing stock over time has an impact on water demand and must therefore be a consideration in how to reduce demand. Source: Primary data sourced from Department of Planning, Industry and Environment

Other learnings that have helped to shape the development and approach to the enforcement of Level 1 restrictions we implemented on 1 June 2019 include: exclusions to restrictions rules, water

saving conditions with exemptions for residential and non-residential, consistent branding and use of exemption stickers, and an enhanced web presence for outlining restrictions rules and tips for saving water.

Further learnings to mitigate the negative impacts of restrictions that have been implemented include greater consultation with affected industries and a period of grace to facilitate education to understand compliance responsibilities. We will also continue to refine our approach to the changing context of this drought if and as it progresses.

Current water restrictions

The NSW Government announced level 1 water restrictions which started from 1 June 2019 to save water as the drought continues. Water restrictions limit how and when water can be used outdoors. They apply to everyone, residential and industry.

Since the announcement, Sydney Water's Community Water Officers have been engaging with community and business, to aid the transition into water restrictions.

Sydney Water understands that outdoor water use is critical for some businesses and industry. To limit this impact, we have exclusions and exemptions for Level 1 restrictions:

- **Exclusions:** A list of water types and uses where restrictions won't apply. These also apply to residential customers. **Customers don't need to apply for a permit for excluded uses.**
- **Exemptions:** Granted to businesses that rely on outdoor water use to minimise the impact of water restrictions on critical activities. **Eligible customers must apply for an exemption permit.**

To read more about water restrictions visit: lovewater.sydney

Consultation with businesses: Earlier this year Sydney Water engaged with a range of industries about how potential restrictions, exclusions and exemptions would impact them. This highly valuable feedback was considered when finalising the restrictions, exemptions and exclusions that are now in place.

2 Our performance in 2018-19

2.1 Water use in 2018-19

2018-19	
Total water use (potable water and unfiltered water) ⁴ , including	567,824 million litres (or 568 billion litres)
Residential sector	65%
Non-residential sector (industrial, commercial and government properties)	23%
Non-revenue water including leaks	12% (including 9% from leakage)
Observed average water use per person	300.5 litres a day (or 110 kL a year)
Weather corrected average per person water demand	298.4 litres a day (or 109 kL a year)

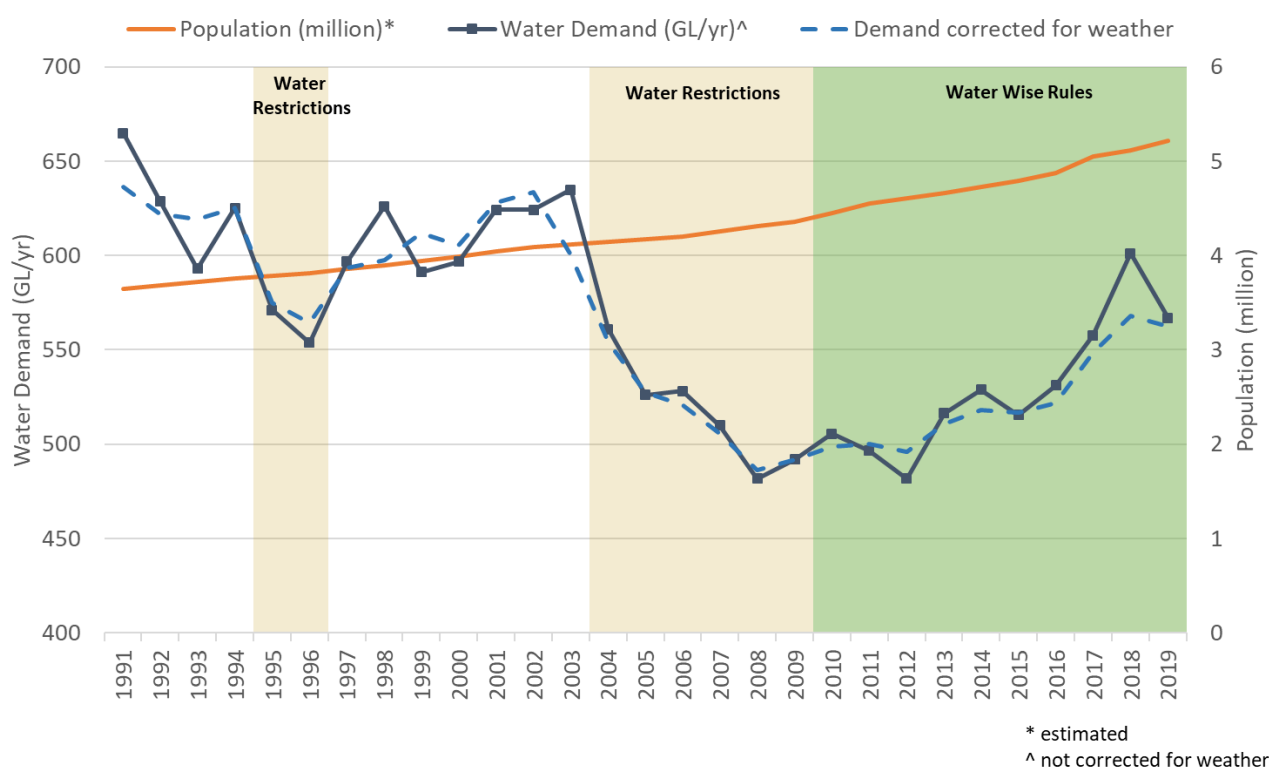


Figure 2-1 Despite a 26% increase in population the total demand for drinking water remains lower than it did before mandatory restrictions were introduced in late 2003.

⁴ Sectoral splits are estimated based on available consumption data for period April 2018 to March 2019.

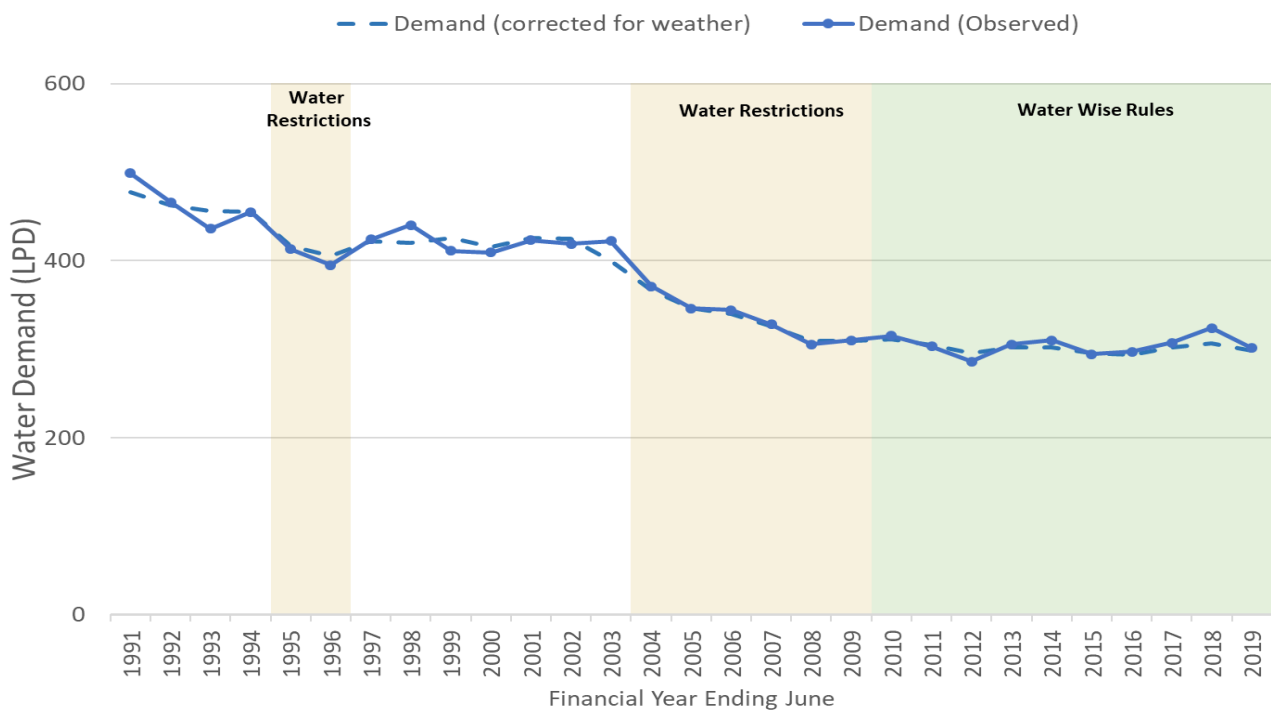


Figure 2-2 Weather corrected demand per person has been relatively stable, at around 300 LPD, since the introduction of Water Wise Rules. The hotter weather in 2018-19 caused around 2 LPD more water to be used than what would be expected in an 'average' year.

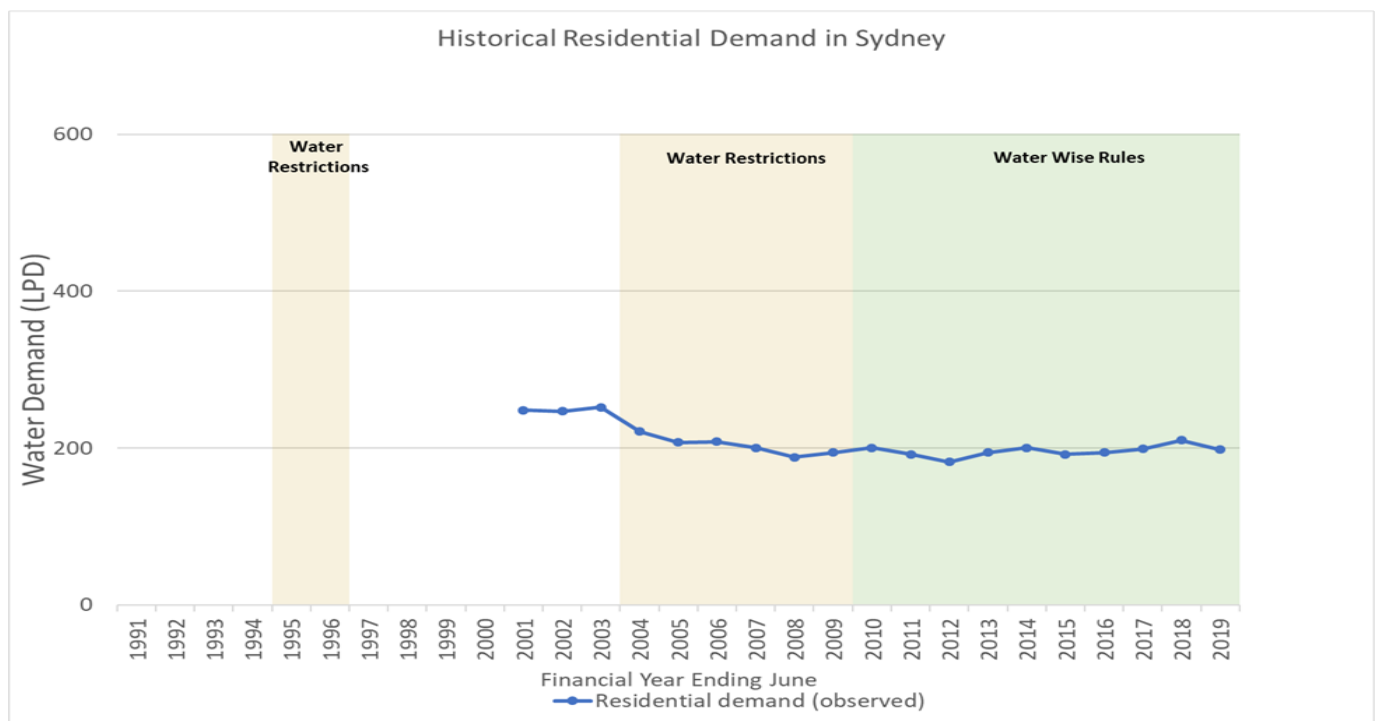


Figure 2-3 Average residential litres per person per day was 198 between April 2018 and March 2019, around 50 litres per person per day lower than before the Millennium Drought.

We use a model that calculates observed demand litres per person per day (LPD) and compares it to an estimate of what demand would have been if the weather conditions had been 'average'. The 365-day moving average of observed demand at 30 June 2019 was 300.5 LPD. The results show that we used around 2.2⁵ LPD (about 4 billion litres) more water than we would have done under 'average' weather conditions. This gives a weather corrected demand of 298.4 LPD for 2018–19. Water demand in 2018-19 was higher 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 2019-20 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.

2.2 Water conservation in 2018-19

In 2018-19, we spent \$2.3M to achieve 236 ML per year savings (see Table 2-1), achieving:

- savings higher than forecast for WaterFix Strata, WaterFix Residential and PlumbAssist.
- savings lower than forecast for the Rainwater Tank Repair Pilot due to low repair take-up and Council Partnerships due to delays in engaging and onboarding council partners.

Table 2-1 New water conservation activities in 2018-19

Project	Forecast 2018-19	Actual 2018-19		
	New water savings (ML/year)	New water savings (ML/year)	Investment (\$'000, gross)	Participants
PlumbAssist	22	31.6	381	316
WaterFix residential	9	16.5	357	689
WaterFix strata	26	188	354	868
Rainwater tank repair pilot	17	0.02	141	311
Council Partnerships	105	0	140	0 ⁶
Education program	N/A	Not measured	Not measured	6213+5841 ⁷
New recycled water planning and development	N/a	N/a	939	N/a
TOTAL	162	236	2,312	14,238

⁵ Difference may not balance due to rounding

⁶ 5 council partners were onboarded into the program in July 2019

⁷ 6,213 people participated in a treatment plant tour and presentation, and about 5,841 people visited the Water Recycling Education Centre.

In addition, Sydney Water spent \$1.6M to maintain baseline leakage at 131 ML per day, which is above the Economic Level of Leakage (ELL), and \$25.7M to operate existing recycled water schemes that produced 44,000 ML of recycled water, a slight increase on 2017-18.

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

Project	Actual 2018-19 (\$'000, gross)
Leak management	
Active leak detection program to maintain ELL	1,600
Water recycling	
Wollongong Industrial	2,779
Industrial Foundation and Rosehill Racecourse	18,459
Rouse Hill Residential	1,864
Other minor schemes	2,594

3 Our forward plan

3.1 Water conservation for 2019-20

In 2019-20, we will spend \$18.6M to achieve 1,010 ML/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 short-term leakage response during drought, including recruiting additional frontline staff to respond to the increase workload resulting from drought conditions
- piloting and developing new and expanded programs, including investigating new recycled water schemes.

All programs will be targeted to deliver at a levelised cost equal to the current value of water, which is \$1.85 per kL to \$2.11 per kL depending on the period of benefit (refer Appendix B), except for PlumbAssist which is run to support customers with financial hardship.

Table 3-1– Water Conservation Program⁸ for 2019-20

Project	Status	Net investment (\$,000)	Water savings, ML/year	Period of benefits, years	Levelised cost, \$ per kL
WaterFix Residential	Ongoing	5,700	320	17	\$2.06
WaterFix Strata	Ongoing	4,500	260	17	\$2.06
PlumbAssist	Ongoing	400	20	17	\$2.36
WaterFix Business and Government	Proposed	2,500	160	10	\$1.94
WaterFix Small Business	Proposed	2,000	130	10	\$1.94
Enhanced Leakage Response	Proposed	1,000	120	5	\$1.85
Piloting and development	Proposed	2,500	0	N/a	N/a
TOTAL		18,600	1,010		

For example, since May 2019, Sydney Water has increased the subsidies for the WaterFix Residential program using funds from the NSW Government which has dramatically increased customer participation. We currently subsidise the \$66 plumber's call-out fee, offer three free repairs for leaks and subsidise water efficient shower-heads. This offering will be continually reviewed over time to ensure we encourage participation and increase water savings.

⁸ Levelised costs and water savings have been reviewed from 2017-18 report, as per the method outlined in Appendix B.

Table 3-2 details projects that are not economic and will not be delivered in 2019-20. The Rainwater Tank Repair pilot was unsuccessful due to low take-up and will not be rolled out in 2019. Love Your Garden remains uneconomic and will not be delivered in 2019-20. We will continue to investigate opportunities as part of our piloting and development program.

Table 3-2 –Projects that are not economic and will not be run in 2019-20

Project	Status	Net investment	Water savings, ML/year	Period of benefits, years	Levelised cost, \$ per kL
Rainwater Tank Repair	Not currently economic.	\$0	0	10	More than \$10
Love Your Garden	Not currently economic.	\$0	0	10	More than \$10

3.2 Water conservation plan: 2019-20 to 2023-24

The Water Conservation Plan is our 5-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 efficiency activities, maintaining baseline leakage to the Economic Level of Leakage or savings from existing recycled water schemes.

Table 3-3 - Water conservation plan for 2019-20 to 2023-24 based on the current value of water⁹

Project	Meets ELWC	Cumulative Savings, year (ML) ¹⁰					
		2019-20	2020-21	2021-22	2022-23	2023-24	Total
WaterFix residential	Yes	320	640	960	1,280	1,600	4,800
WaterFix strata	Yes	260	520	780	1,040	1,300	3,900
PlumbAssist	No	20	40	60	80	100	300
WaterFix Business and Government	Yes	160	320	480	640	800	2,400
WaterFix Small Business	Yes	130	260	390	520	650	1,950
Enhanced Leakage Response	Yes	120	240	360	480	600	1,800
Rainwater Tank Repair	No	-	-	-	-	-	-
Love Your Garden	No	-	-	-	-	-	-
		ELWC 14,850 ML over 5 years or 8.1 ML/day					

⁹ Forecasts updated from 2018-19 based on value of water and available data

¹⁰ Water savings from all programs continue for more than one year

Table 3-4 - Cumulative water savings to 2017-18, from projects with reported water savings completed 2011-12 to 2018-19.

Program	Cumulative water savings for projects from 2011-12 to 2018-19 (ML)
Water Efficiency	
PlumbAssist	668
WaterFix Residential	377
WaterFix Strata	74
Business Customer Service	3,456
Council Partnership	9,864
Leak management	
Active Leak Detection	110,374
Pressure management	47,635
Water recycling	
BlueScope Steel	39,006
Port Kembla Coal Terminal	2,2217
Wollongong Golf Club	297
Wollongong City Council	27
Industrial Foundation and Rosehill Racecourse	14,304
Rouse Hill residential	16,111
Other minor schemes	14,066
Hoxton Park recycled Water Scheme (under construction)	
Total	258,477

Note some projects will continue to save water due to length of water saving benefits.

4 Water conservation to date

4.1 Residential water efficiency

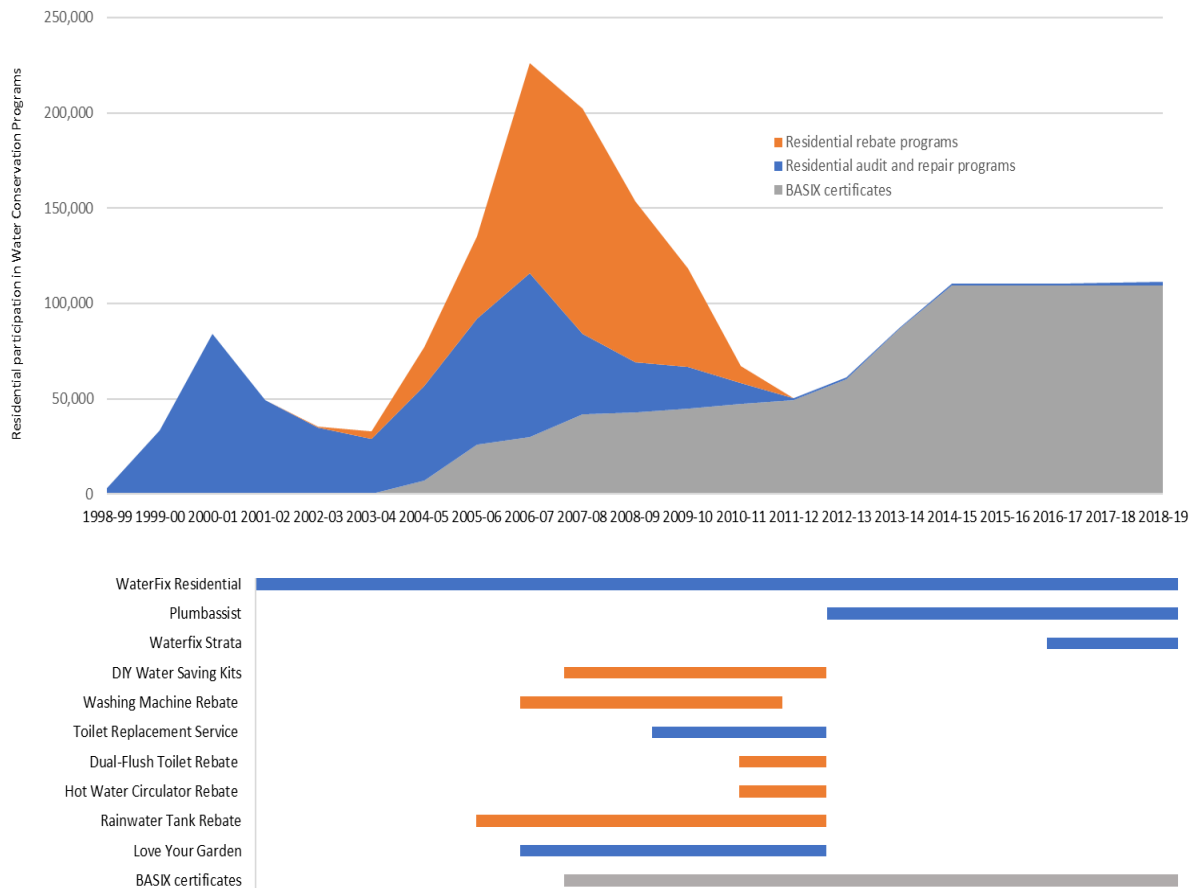


Figure 4-1 Residential participation in Sydney Water conservation programs and BASIX over time¹¹

4.1.1 WaterFix Residential

The residential WaterFix program allows customers to choose the type of plumbing service they need to improve water efficiency in the home, providing customers with a choice of services to suit their individual needs.

Initially offered as a subsidised service, from 2011 to 2018 we offered the service to residential customers as a commercial service generating unregulated revenue. In May 2019, we began subsidising the program with ELWC funding and increased the program's profile on the [Sydney Water website](#).

¹¹ BASIX data for 2009-10, 2010-11 and 2014-15 to 2017-18 is not available: values have been assumed

Costs to the customer vary, depending on the type of service selected. In 2018–19, the WaterFix service offered:

- all types of tap and toilet leak repairs
- installation of WELS (Water Efficiency Labelling Scheme) 3-star showerheads
- installation of WELS 4-star dual flush toilets
- installation of WELS 3-star flow regulating aerators or WELS 4-star in-body flow regulators.

We estimate WaterFix saves about 24,000 litres of water per year for each property serviced. In 2019-20 we have further subsidised the program using funding provided by the NSW Government's Climate Change Fund and will be conducting a full review of the offering to ensure it is as appealing to customers as possible and achieves the maximum water saving potential. We are targeting more than 15,000 participants in 2018-19.

4.1.2 WaterFix Strata

The WaterFix Strata program was introduced to service customers in strata buildings where usage charges are not charged directly to individual owners. In this program we target strata buildings with high water usage using a unique benchmarking tool. The tool uses a water efficiency benchmark of 200-300 litres per bedroom per day as its base qualifier.

Most of 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 is based on a performance guarantee. 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 preservice level until the costs of the service are recovered, typically between 2 to 4 years. The average reduction in potable water use from participating building is 30%. In some building savings of over 35% have been achieved.

WaterFix Strata General Background

Nine high rise apartment buildings have undertaken the WaterFix Strata service over the past two years, with a combined yearly saving on water bills of over \$387,000 and water savings totalling 187 million litres a year.

Project Manager Tony Robinson says this is just one of the many ways Sydney Water is working to help customers save water during the drought.

“The WaterFix Strata program helps reduce strata customers’ water bills through the repair and replacement of leaking taps and toilets. We also replace old single flush toilets with modern dual flush models and replace old shower heads with more water efficient fittings,” said Mr Robinson.

“Customers pay nothing up-front and do not see an increased bill. The water efficiency upgrades are paid for over time in line with the value of the water they save.

“After this time, which normally takes around 2-3 years, the Body Corporate will see significant reductions in their water bills.”

Sydney Water works with strata managers and evaluates each strata building to assess the possible water savings through the building’s water use history and water efficiency benchmark tools.

Only eligible buildings with potential for good water savings are selected, with every apartment in a building then fitted with devices and leaks fixed

4.1.3 PlumbAssist

PlumbAssist provides emergency and essential plumbing repairs to customers experiencing financial hardship and is offered through our Customer Care team.

Customer Care staff offer customers case management and a range of assistance options. As part of the assistance package, staff do an initial consumption assessment which includes a check for high water use or a sudden increase in use. Eligible customers with high water use or who cannot afford to fix essential plumbing services are then referred to PlumbAssist.

PlumbAssist aims to rectify problems customers may have with high water use, wastewater systems and hot water systems to reduce the impact on the customer’s bill. The range of services offered is broader than WaterFix as it includes sewer repairs and hot water services, meaning 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.

This program is run primarily as a social program to help customers in hardship. Social benefits of the program include alleviating financial stress and ensuring that vulnerable customers have access to basic amenities. PlumbAssist reduces water waste and the cost of future water bills and alleviates financial stress for vulnerable customer groups.

4.1.4 Concealed leak detection

Since 1 April 2016, we have been running an algorithm that identifies properties who have an increase in usage compared to their long-term average.

Residential customer meter readings are compared with an average of their last eight quarters; and where the increase is greater than 300% a letter is issued. This letter advises them how to check for leaks at their property, both using their meter and without.

In 2018-19, 4,053 letters were issued to customers with increases in their long-term average. Of these, 436 went on to receive a hidden leak allowance. The allowance is only granted when a leak is hidden and a licenced plumber repairs it, meaning these customers were prompted to identify and then repair the leak at their property.

4.1.5 Rainwater tank repair pilot

During the millennium drought customers were incentivised to install rainwater tanks, first through both a rebate scheme to subsidise purchase costs; and through BASIX regulations. The pilot

tested whether people with rainwater tanks were using rain water, or if the tanks were damaged or using potable water from Sydney Water's system instead.

The rainwater tank service pilot was rolled out to selected customers across three suburbs in March 2019 for a period of three months. Customers were invited to participate in a free assessment offer which included a professional audit and quotation (if required). This was supported by a self-service assessment checklist that provided customers with a step by step process to check their rainwater tanks. Key findings indicate a general lack of awareness on functioning and use of rainwater tanks and the requirement for a robust assurance program. Some of the common issues identified through the audit ranged from simple preventative maintenance checks of filters to full cleaning of tanks and pump replacement.

Sydney Water website now includes a self-check assessment guide and videos that enable customers to undertake easy maintenance tasks to help keep their rainwater tank clean and reliable. If further assistance is required, customers can use our WaterFix service to ask for audits and fixes.

The recommendations from the pilot indicate further research is required around cost-effective repair and replacement options due to the low take up of repairs after quotation.

4.2 Business water efficiency

Businesses use about a quarter of the volume of water we supply to customers each day. Business owners who reduce water use often find they also save money in reduced wastewater, energy and chemical treatment costs.

While we did not develop any new business customer water efficiency offerings in 2018-19, we currently publish a range of information on our website to help business customers be water efficient, including:

- Case studies
- Water efficiency benchmarks for different type of businesses
- A do-it-yourself tool to save water in your business
- Best practice guidelines to achieve water efficiency in:
 - Aquatic leisure centres
 - Clubs
 - Commercial kitchens
 - Commercial laundries
 - Commercial office buildings and shopping centres
 - Hotels
 - Turf irrigation

We continue to manage our major business customers through one on one relationships and provide a holistic service to these customers. Over recent years, we have brought together trade waste, backflow prevention, general compliance, alternative water source agreements (e.g. sewer mining, recycled water and stormwater harvesting) and water efficiency into one service area so that we can look at a business' water use as a whole.

4.2.1 Council partnerships

Sydney Water has partnered with Blacktown, Campbelltown, City of Sydney, Northern Beaches and Parramatta councils to deliver a water efficiency program to business customers and residential strata. Councils and Sydney Water are co-funding the employment of project officers who will work with customers to help them save water.

The program did not commence until July 2019 due to delays in engaging and onboarding council partners. Project officers are now being trained and embedded into local councils with a key focus on engaging local business where highest water savings can be delivered through auditing and fixes. From 2019-20, the Council Partnerships program will be integrated into the WaterFix Small Business Program.

4.2.2 Water efficiency in Schools

As part of the NSW Government's plan to ensure there is enough water to meet the needs of the people and environment of the Greater Sydney region, we piloted a water efficiency program with the Department of Education. Nine schools identified as having high water use participated in the pilot. The aim of the pilot was to help the participating schools to increase their water efficiency and develop water-responsible citizens through the school curriculum.

Each school received a professional water audit to help better understand their school's water use and strategies for effective management. The schools were also offered educational incursions and excursions. We worked with Department of Education primary school teachers to develop water efficiency learning resources which will be available online for all Greater Sydney schools in 2019-20. Water efficiency in schools will form part of our new WaterFix Business and Government program.

4.3 Leakage management

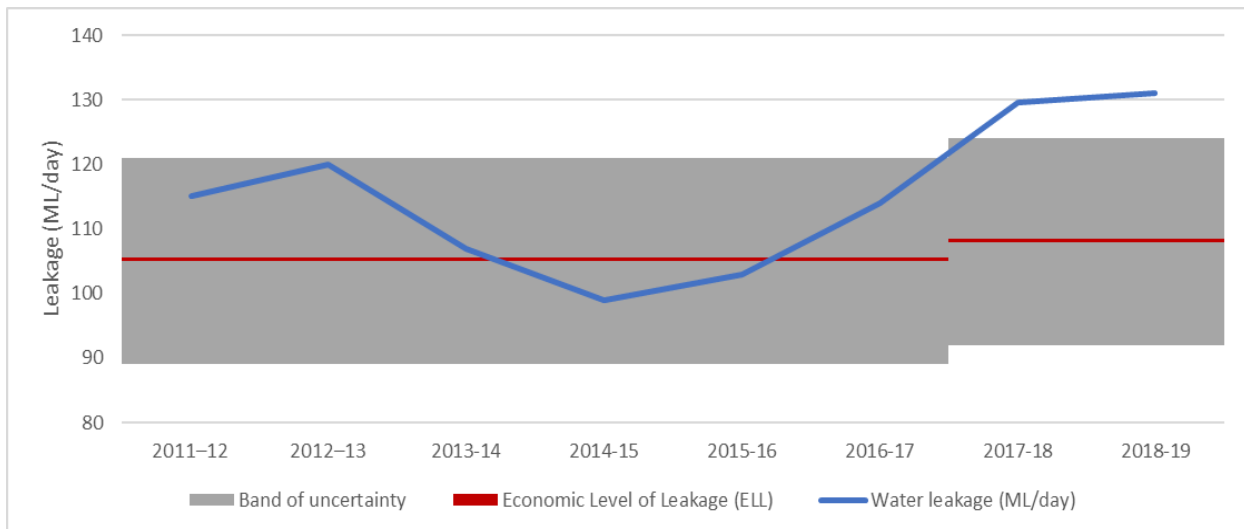


Figure 4-2 Actual leakage vs the Economic Level of Leakage (ELL) in our system. Leakage has been increasing due to a prolonged period of hot and dry weather conditions.

Sydney Water has experienced a substantial increase in leakage since 2017 due to the increased number of leaks and breaks in our network, triggered by a prolonged period of hotter and drier weather compared to average conditions. These factors led to a higher backlog of repair jobs and an increase in the time leaks are running before repair. In 2018-19, our leakage was 131 ML per day which exceeds the upper bound of the Economic Level of Leakage, which is 108 ± 16 ML per day.

In response to the increase in leakage we have:

- Engaged additional resources to respond to the increased workload to bring back the backlog of repair jobs under control.
- Increased our proactive inspection program that identifies minor leaks that do not appear on surface and require detection through specialist equipment from 9,000 km to 15,000 km in 2018-19.

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

See Appendix D for our key leakage statistics for 2018-19

4.4 Water recycling

4.4.1 Our water recycling

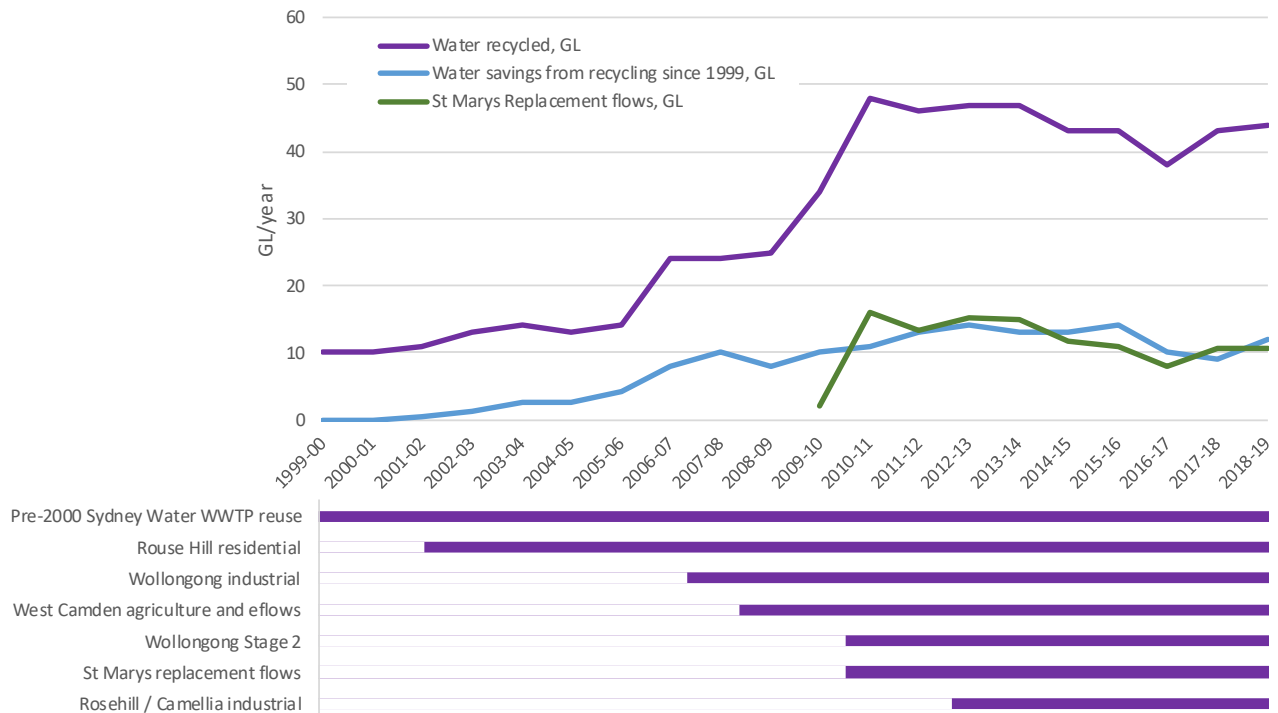


Figure 4-3 Total recycled water and water savings by Sydney Water projects

In 2018-2019, Sydney Water supplied 44 billion litres of recycled water per year across 23 schemes (see Appendix C) saving 12 billion litres of drinking water.

- 10 billion litres of this went to residential, commercial and industrial uses and replaced the need for drinking water
- 15 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 include irrigation of parks, sports fields and agriculture

4.4.2 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 are currently ten sewer mining schemes operating in Sydney Water's area of operations. 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 over 1.2 billion litres of recycled water in 2018-19. 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 under the domain of 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 265 ML/year.

4.5 Education and awareness

4.5.1 Community awareness campaign

Greater Sydney is in drought and dam levels continue to drop. Sydney Water plays a key role in drought response, which includes responsibility for managing demand. One of the key elements of Sydney Water's drought response is a community awareness campaign to drive behaviour change, both voluntary (indoors) and as part of enforced water restrictions (outdoors).

Since August 2018 Sydney Water has been raising awareness of drought in Greater Sydney and calling for Sydneysiders to change their behaviour around water use to conserve the water supply. The focus has been on demonstrating simple everyday ways to save water.

We know that many Sydneysiders rely on news reporting, including the nightly news bulletins. We have been providing news media with regular updates on our drought response and timely data for ongoing reporting about our drought response.

Our campaign efforts are outlined in the case studies below:

Love Water Don't Waste It



The first phase of the campaign targeted all 5 million of Greater Sydney's residents and encouraged people to 'Love water, don't waste it'. It ran across multiple media channels including; social, digital, TV, radio and press as well as experiential activations in the community, and leveraging of partnerships



Activations

Our experiential activations give us an opportunity to engage with the community and have longer conversations about the drought and different ways to save water. In 2018 we launched our Tiny House activation, which enabled us to educate the community about the drought as well as show the community easy ways to save in and around their home. Using the Tiny House, we engaged with the community at many events across the year including Customs House, Carols in the Domain, The Easter Show, Australia Day, Chinese New Year and the Youth Eco Summit. We also created a smaller version of the Tiny House, which was seen at the Newtown Festival and in Bunnings stores to show the many ways to save. Through these activations we were able to have direct engagement with more than 55,000 people.



Culturally and linguistically diverse



Through our campaign we also communicate with our culturally diverse communities by translating our campaign content, media stories and water saving information. This translated content is used through paid and earned multicultural media channels including social, digital, radio and print and dispensed through our activations.

Drought Education

The second phase of the campaign started in May 2019 and was informed by the success of phase one and additional research carried out in market. In late April 2019, a survey of 1000 Sydney residents showed that nearly two thirds (62%) of Sydneysiders were unaware that Greater Sydney is in drought. Survey data also showed that almost one in five (18%) didn't feel their water-saving efforts would make a difference, despite almost two thirds (60%) of people knowing they could reduce their water usage.

Under the platform 'Love water, don't waste it', the campaign focused on drought awareness and understanding, delivering the message that we're all in this together and 'we all win if everyone saves a little'.

Drought education included print, radio, social and online advertising through various channels.



The research also showed that rainfall affects whether people believe there is a drought, even if the rain is coastal or inconsequential to bolstering dam levels. This is why Sydney Water created interactive assets for social media and online that ran shortly after rainfall, showing where it went and whether it helped ease the drought.

Online Hub

The Love Water Hub on the microsite showcases a variety of water saving tips from Sydney Water and the Sydney community to showcase the 'many ways to save water' in line with our community awareness campaign.



Social Media

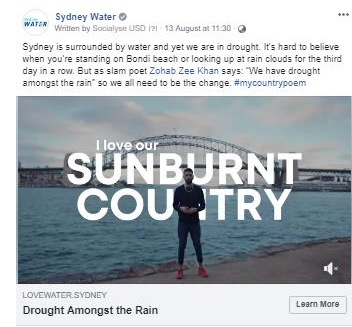
On social media consumers are being absolutely flooded with an endless supply of brand messages, meaning everyone is fighting for relevance in an already crowded newsfeed.

Partnering with co-makers allows us to not only leverage the skills of talented creators but also means we can talk directly to specific audiences that we would not usually reach with traditional communications.

Partnering with artist Furry Little Peach and slam poet Zohab Zee Kahn are examples of commissioning talent for both their content creation skills and also their engaged following.



Given that people are impacted most by other people, naturally integrating our brand communicators with influencers can achieve cut-through within our target audiences, by presenting our message through a voice that is relevant to specific communities. Harnessing the power of influential voices provides an opportunity to reach targeted, engaged audiences in a hyper-authentic way.



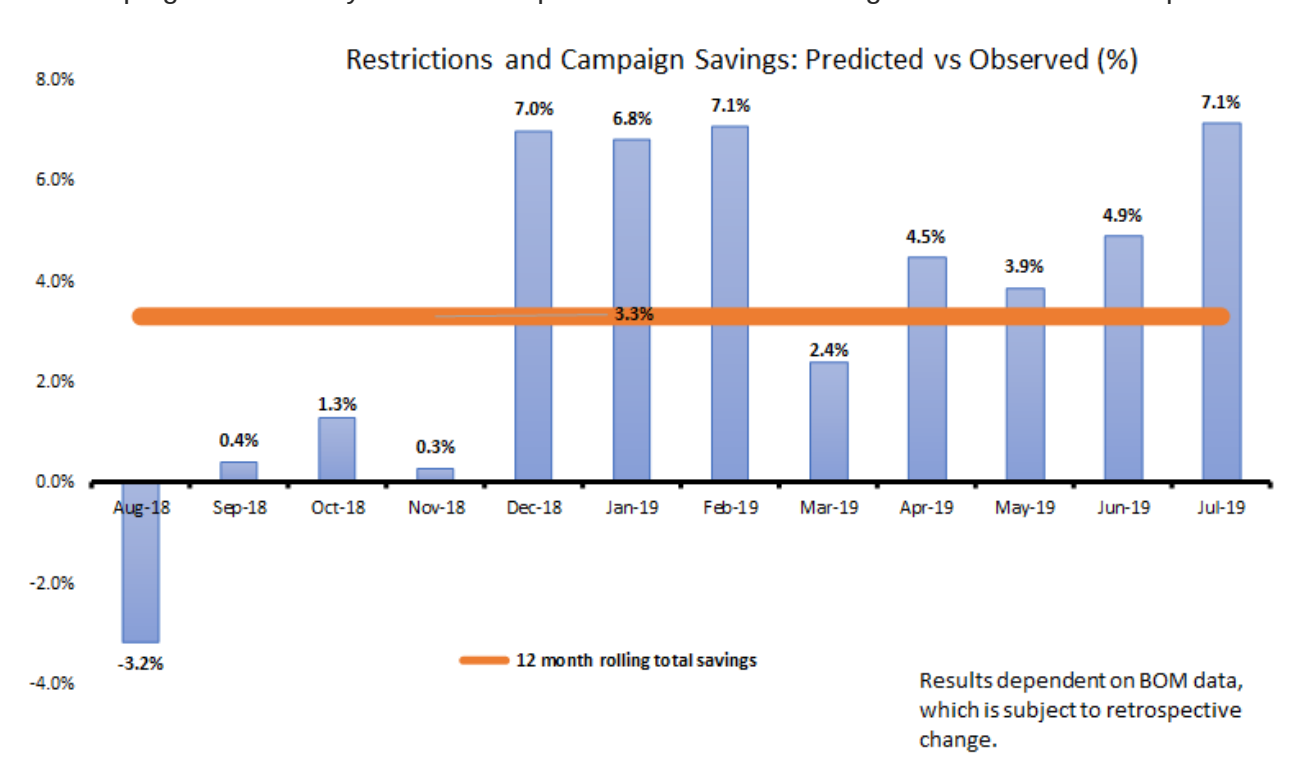
Water restrictions

On 1 June 2019, level 1 water restrictions were introduced, with advertising to help our community adapt to water restrictions. We rolled out advertising across multiple channels, including radio, social media, digital, out of home, press and direct email.



4.5.2 Water Savings

The campaign successfully resulted in a peak of 7.1% water savings across our area of operation



during summer. Savings were calculated by measuring observed demand compared to forecast demand and weather corrected.

Figure 4-4 Water savings from water conservation campaign and restrictions (observed demand versus projected demand).

4.5.3 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 community 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 2018-19, our formal education, community and stakeholder tours team connected with over 12,054 people. Of those, 5,481 young professionals, university and high school students and a range of community and industry stakeholders participated in a treatment plant tour and presentations.

4.6 Regulatory measures

Two external regulatory measures, implemented during the millennium drought, 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.

4.7 Discontinued programs prior to 2018-19

Previous initiatives have been extremely successful in reducing water use. We expect savings from these initiatives to continue in the future, 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 WaterFix Business and Government and WaterFix Small Business

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

We are currently developing new water efficiency offerings for business and government customers that are likely to include online water use monitoring, water audits, updated benchmarks and retrofit services. The rollout of these programs will help our business customers achieve best practice water and wastewater management.

5.1.2 Enhanced Leakage Response

The Enhanced Leakage Response program is about increasing the short-term resources available for leak detection, response and repair consistent with the increase short-run value of water as dams deplete.

5.1.3 Community awareness campaigns

With dam levels still in decline and long-term weather forecasts remaining drier than average, there continues to be a need to engage our community and help them further reduce their water use.

An essential component of our drought response, our communications campaign aims to inform and educate that we are all in this drought together and we all win if everyone saves a little. The campaign will remind everyone about water restrictions and promote the many ways to save water in and around the home.

The campaign takes a similar multi-channel approach as the first phase in paid media as well as earned communications through partnerships, PR, activations, events, Influencers and social. Our website and digital tools will complement the campaign by offering online content and resources to help people learn about their individual water usage and find the many ways to save.

There are five million people living across Sydney, the Blue Mountains and the Illawarra and of these, more than one third speak a language other than English at home. The campaign will be translated into our five focus languages and shared through multicultural channels to help reach these communities. These five languages include Arabic, Traditional and Simplified Chinese, Vietnamese and Korean.

The campaign has been planned with a staged approach and will continue to work in line with the NSW Government's drought response strategy.

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

Sydney Water is currently undertaking a filter assessment initiative across all 5 western water hub plants with two main objectives:

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

The water savings achieved so far in this project are as follows:

- At Cascade WFP, we are working on extending filter run time in-between backwashes, which will save water. As these changes are still being implemented the final amount of water savings will be determined in a phased manner.
- At North Richmond WFP, we concluded we could reduce the backwash duration and are now saving around 400kL/day. Further optimisations may lead to more savings soon.

While saving water is an important target in these assessments, protecting public health and meeting water quality specifications at our treatment plants is always priority. We are now working on the other 3 water filtration plants.

5.2 Research and development activities

5.2.1 New recycled water opportunities

In the future, we will proactively evaluate recycled water opportunities as part of an integrated water cycle management approach when planning for water services.

This approach is consistent with the concept of “one water” where we holistically consider all sources and end uses for water, and the benefits and costs of managing water, energy and nutrients. Such an approach will ensure that we use the right water, of the right quality for the right purpose.

Recycled water will be provided when:

- economically viable for all customers
- efficient and scalable to cater for growth
- better environmental and liveability outcomes.

We are currently in the planning and design phase of water recycling projects in Colobee, Oran Park, Ropes Crossing and Hoxton Park. The Hoxton Park recycling plant once operational will be supplying recycled water to the new Western Sydney airport for construction purposes.

5.2.2 Developing and adopting new end use technologies

Using new and novel approaches and technologies with high water savings potential will be investigated to understand the impacts, costs and benefits prior to any full-scale roll out. This will

enable Sydney Water through its program of research and innovation to continually leverage new technology and processes for promoting water conservation.

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

Our drought response initiatives and campaigns are based on data and evidence to help ensure their effectiveness. Sydney Water are working to leverage demand and usage data in order to best inform its decision making, support drought response and measure its drought campaign effectiveness.

Through a combination of smart meters and customer surveys Sydney Water is creating a robust evidence base for progressing its drought response. Figure 4-4 below depicts a preliminary understanding of where Sydneysiders use water in their homes.

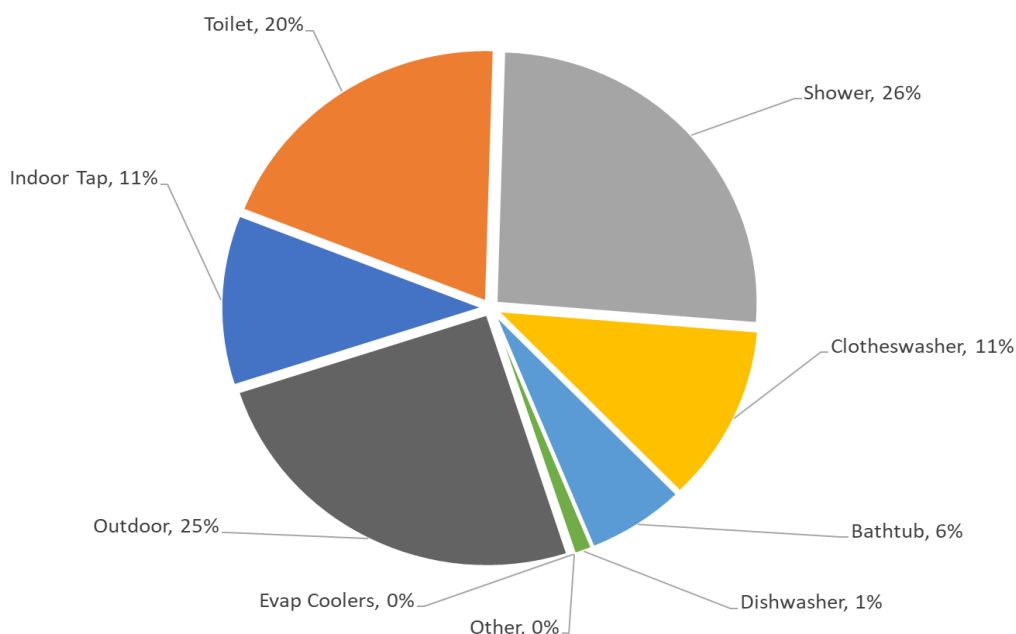


Figure 5-1 Preliminary usage split results from Sydney Water's end-use analysis (July 2018-March 2019)

We have also gained valuable insights into individual water use behaviours prior to the commencement of water restrictions, for example:

- The average shower length in Sydney is 6 minutes and uses approximately 50 litres of water;
- The average volume of water used in a washing machine load is 75 litres;
- The average volume of an outdoor water use activity is 185 litres.

These data insights are providing Sydney Water a sound understanding of where and how we can help customers save water.

5.2.4 Trial – Digital meters

As part of our Internet of Things (IoT) trial, we are currently installing digital meters of various technologies in Sydney's west. Our goal is to assess the functional capability and reliability of different metering solutions and to gain insights into potential benefits and opportunities for demand management, leakage management and customer service. During the 3-year project, we are following a phased roll-out which will finally cover a full metering zone with around 8,400 digital meters. The data collected will support the detection of leaks in properties and the location of network leaks.

5.2.5 Advanced pipe sensing for leaks and breaks

The advanced pipe sensing for leaks and breaks research program addresses the problem of water loss via leaks and breaks in pipes. It has been coordinated by the NSW Smart Sensing Network, with Sydney Water as the lead industrial partner. Commencing in June 2019, the program brings together Sydney Water, four leading research universities from across NSW, and a further five water utilities from Queensland, Victoria and South Australia.

The work will establish that acoustic sensing and measuring of pressure transients is at world's best practice. Australia, and in particular Sydney, already have low water loss percentages from its pipes when compared globally, and this work will ensure that this water loss prevention technology will be driven to the physical limits of acoustic science. Ground breaking new research in quantum sensing will be drawn upon to provide knowledge of underground hydrology that has been impossible up to now; new technologies in drones and Light Detection and Ranging (LiDAR) will bring novel imaging science; while hydrophone arrays adapted from the defence industry will pick leak signals out of noisy pipe networks with previously unimagined ability.

This will all be combined into enhanced analytics models which will combine data sets to provide predictive models that will help avoid water loss through proactive preventative maintenance. The techniques being developed have the potential to be adapted for wider water monitoring and control, thus greater water conservation.

Appendix A Reporting Requirements

Reporting guide for auditors.

Reporting Manual Requirement	Subject	Location in report
Clause 3.2.1 Water Conservation Report	The elements of Sydney Water's water conservation program for the previous financial year	Section 2.2 Section 4
	The elements of Sydney Water's water conservation program for at least the next five financial years	Section 3 Section 5
	Sydney Water's strategies, programs and projects relating to water leakage, recycled water and water efficiency	Section 4
	Sydney Water's water conservation objectives, targets and timetables, and extent to which these elements accord with the economic level of water conservation activity and the methodology	Section 3
	Describe and explain Sydney Water's progress against each of the elements of its water conservation program for the previous financial year, including any deviations from this 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
	Outline how Sydney Water's water conservation program relates to the Metropolitan Water Plan and its progress against the Metropolitan Water Plan	Appendix B
	WC1 - Quantity of Drinking Water drawn by Sydney Water from all sources, expressed in Gigalitres per year (aggregate), litres per person per day (weather corrected) and kilolitres per person per year (weather corrected) for the previous financial year, as well as earlier financial years (where applicable) of the Licence term	Section 2.1
	WC2 - The level of water leakage from Sydney Water's Drinking Water supply system against the economic level of leakage for that financial year for the previous financial year, as well as earlier financial years (where applicable) of the Licence term	Section 4.3 Appendix D
	WC3 - The volume of water sourced from Recycled Water (in Megalitres) for the previous financial year, as well as earlier financial years (where applicable) of the Licence term	Appendix C

Appendix B Method Overview

Demand forecasting and monitoring

The method

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 2018–19.

Forecasts assume average weather conditions and are aligned to the Department of Planning, Industry and Environment's (DPI&E) 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 plausible futures with an associated combination of demand drivers and their impacts. Three of these futures and associated forecasts (higher use, lower use and 'base case') were adopted for use in Metropolitan Water Planning in 2015.

These futures provide an indication into the potential longer-term level of demand under a set 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.

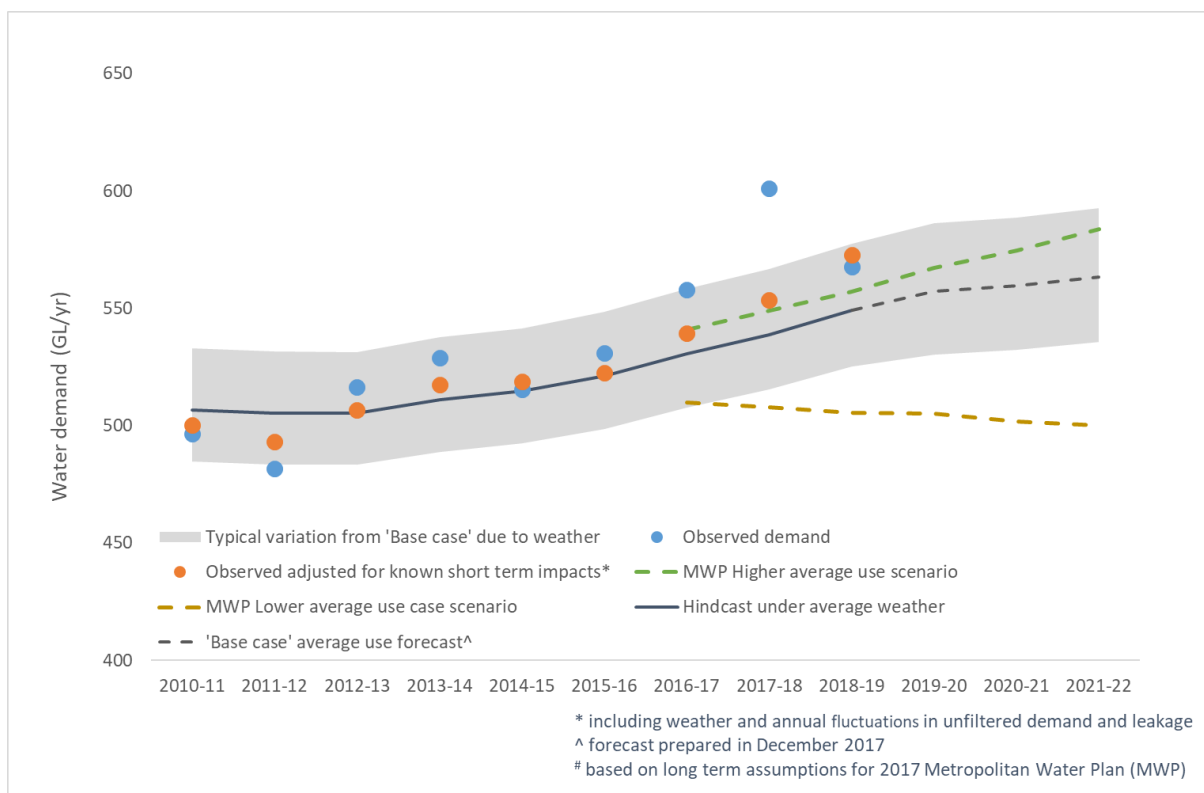


Figure 5-1 - Monitored and forecast demand for drinking water. See Water Use in 2018-19 for known short term effects on demand.

The updated forecast incorporates:

- observed water use information
- latest population and dwelling projections (DPE, September 2016 release)
- end use trends resulting from new population and dwelling projections, e.g. presence of more BASIX dwellings due to higher growth of development
- latest 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 2016
- mid and long-term demand assumptions, approved in 2015, used in modelling for the NSW Government's 2017 Metropolitan Water Plan
- leakage projections based on estimates of actual leakage and the economic level of leakage set in 2016.

Weather correction

Weather has significant impact on demand. Deviations from average weather conditions can increase or decrease annual water consumption by up to 5% compared to consumption under average weather conditions. Prolonged extreme weather events, such as heatwaves, can cause more variation, particularly on a short-term basis.

Economic Level of Water Conservation

The method

The ELWC methodology was 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 2019, which was 52.1% on 1 July 2019. The value of water is dependent on its scarcity, so a high dam level results in a low 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 2019 - 20 financial year.

At the start of July 2019, the values of water were:

- Short-run value of water was \$1.85 per kL
- Long-run value of water was \$2.11 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.

Alignment with the Metropolitan Water Plan

The 2017 Metropolitan Water Plan was released in March 2017. The Plan is the NSW Government's plan to ensure there is sufficient water to meet the current and future (10-15 years) needs of the people and environment of the Greater Sydney region. It was developed in collaboration with state agencies, key industry stakeholders, the community, and water utilities, including Sydney Water.

The Metropolitan Water Plan recognises the critical value of water conservation in balancing supply and demand. It reinforces investment in economically efficient water conservation, which is the intent of the ELWC methodology.

It also notes that investment will increase if demand rises rapidly. We are therefore monitoring demand (Appendix B) to support our 5-year Water Conservation Plan and the 2017 Metropolitan Water Plan.

Appendix C Recycled water

Table C-1 Summary of total recycled water supplied, and volume of drinking water replaced by recycled water initiatives in 2018-19.

Recycled water scheme	Water Recycling Plant	Recycled water (ML/year)	Water savings (ML/year)	Type of use
Kiama Golf Course	Bombo	42	-	Irrigation, golf course
BlueScope Steel	Wollongong	5,609	5,609	Industrial
Port Kembla Coal Terminal	Wollongong	235	235	Industrial
Wollongong Golf Club	Wollongong	45	45	Irrigation, golf course
Wollongong City Council	Wollongong	5	5	Irrigation, parks, sports fields
Warwick Farm Racecourse	Liverpool	62	-	Irrigation, racecourse
Liverpool Golf Club	Liverpool	72	54	Irrigation, golf course
Industrial Foundation and Rosehill Racecourse	Rosehill	1,279	1,279	Industrial, racecourse
Hickeys Lane	Penrith	23	-	Irrigation, parks, sports fields
Penrith Council parks	Penrith	22	22	Irrigation, parks, sports fields
Stonecutters Ridge Golf Club	Quakers Hill	-	-	Irrigation, golf course
Agricultural release	Quakers Hill	365	-	Agricultural release
Rouse Hill residential	Rouse Hill	2,748	2,748	Residential, commercial
Castle Hill Golf Course	Castle Hill	86	-	Irrigation, golf course
Dunheved Golf Course	St Marys	102	5	Irrigation, golf course
St Marys Agricultural Release	St Marys	2,428	-	Agricultural release
Hawkesbury-Nepean replacement flows ¹²	St Marys	10,591	-	Environmental flows
Elizabeth Macarthur Agricultural Institute	West Camden	37	-	Irrigation, farm
Agricultural release	West Camden	1,830	-	Agricultural release
Richmond Golf Course	Richmond	93	-	Irrigation, golf course
University of Western Sydney, Hawkesbury	Richmond	433	-	Irrigation, farms, parks, sports fields
Picton Farm	Picton	615	-	Irrigation, farm
Aorangi Farm	Gerroa	125	-	Irrigation, farm
Sydney Water reuse	Various	17,159	1,995	Industrial
Total for recycled water projects		44,021	11,997	

¹² 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 for drinking water saved.

Appendix D Leakage management

Key leak management statistics

Table D-1 details our key statistics for leak management in 2018-19. Our leakage level was above the range of our Economic Level of Leakage.

Table 5-1 Key leak management statistics 2018-19

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

The Economic Level of Leakage for the 2018-19 period was estimated to be 108±16 ML/day which was calculated using the short run cost of water against a dam level 65-70%, which was the case in 2018.

The Economic Level of Leakage forecast for 2019-20 is estimated to be 102±16 ML/day which is calculated using the short run cost of water against a dam level of 40-45%.

¹³ 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 1.63 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.

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 2018-19 Q4 (Figures in ML)

Water Supplied 570,643 ¹⁴	Authorised consumption 512,061	Billed authorised consumption 502,584	Revenue water 502,584	Billed metered consumption 498,787	
				Billed unmetered consumption 3,797	
		Unbilled authorised consumption 9,477		Unbilled metered consumption 469	
		Unbilled unmetered consumption 9,008			
	Water losses 58,582	Apparent losses 10,750		Non-revenue water 68,059	Unauthorised consumption 571
					Customer meter under-registration 10,179
		Real losses 47,832		Real losses from distribution system 47,832 - 9.1% ¹⁵ (131 ML/D)	

¹⁴ This number is different to total water use stated earlier in the report. The difference is due to different timeframes. Total water use is measured from water supplied between 1 July 2019 to 30 June 2019. The water balance is calculated between May 2018 and May 2019.

¹⁵ 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 5-2 - 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 2018/19)	Commentary
Residential								
WaterFix Residential	Plumbing service to install efficient fittings and fix minor leaks	1998	Ongoing	489,344	Households	10,227	74,834	Funding increase through Climate Change Fund for FY19-20
WaterFix Strata	WaterFix service in strata buildings	2016	Ongoing	1,820	Units	96	906	Ongoing
PlumbAssist	WaterFix service for customers in financial hardship	2011	Ongoing	1,994	Households in financial hardship	199	4,460	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
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

Project	Description	Year started	Year on hold	Total participation	Unit	Total savings, ML/year	Total investment (uncorrected) ('1000s, to 2018/19)	Commentary
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	No new customers in final 2 years of program.
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
Leak reduction								
Active leak detection	Acoustically scanning for concealed leaks in buried pipes and repairing pipes identified	1999	Ongoing	217,635	km pipe surveyed	20,000	53,185	Ongoing

Project	Description	Year started	Year on hold	Total participation	Unit	Total savings, ML/year	Total investment (uncorrected) ('000s, to 2018/19)	Commentary
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			11,997	394,036	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						87,213	766,361	

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

