



PERFORMANCE AUDIT

23 JUNE 2020

Water conservation in Greater Sydney

NEW SOUTH WALES AUDITOR-GENERAL'S REPORT

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We conduct financial or 'attest' audits of State public sector and local government entities' financial statements. We also audit the Total State Sector Accounts, a consolidation of all agencies' accounts.

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Performance audits are reported separately, with all other audits included in one of the regular volumes of the Auditor-General's Reports to Parliament – Financial Audits.



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In accordance with section 38E of the *Public Finance and Audit Act 1983*, I present a report titled '**Water conservation in Greater Sydney**'.

A handwritten signature in black ink, appearing to read 'Margaret Crawford'.

Margaret Crawford

Auditor-General
23 June 2020

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Section one

Water conservation in
Greater Sydney

Executive summary

The current, 2017 Metropolitan Water Plan states that water conservation, including recycling water, makes the drinking water supply go further. The plan also states that increasing water conservation efforts may be cheaper than building new large-scale supply options and can delay the timing of investment in new supply infrastructure.

Water conservation refers to water recycling, leakage management and programs to enhance water efficiency. Water recycling refers to both harvesting stormwater for beneficial use and reusing wastewater.

This audit examined whether water conservation initiatives for the Greater Sydney Metropolitan area are effectively investigated, implemented and supported. We audited the Department of Planning, Industry and Environment (the Department) and the Sydney Water Corporation (Sydney Water), with a focus on activities since 2016.

The Department is responsible for the integrated and sustainable management of the state's water resources under the *Water Management Act 2000*, which includes encouraging 'best practice in the management and use of water' as an objective. The Department is also responsible for strategic water policy and planning for Greater Sydney, including implementing the Metropolitan Water Plan.

Sydney Water is a state-owned corporation and the supplier of water, wastewater, recycled water and some stormwater services to more than five million people in Greater Sydney. It is regulated by an operating licence that is issued by the Governor on the recommendation of the Independent Pricing and Regulatory Tribunal (IPART). The Tribunal determines Sydney Water's maximum prices, reviews its operating licence and monitors compliance. Sydney Water's operating licence and reporting manual set out requirements for its planning, implementing and reporting of water conservation.

From 2007 to 2012, the Climate Change Fund was a source of funds for water conservation activities to be undertaken by the Department and Sydney Water. The Climate Change Fund was established under the *Energy and Utilities Administration Act 1987*. Four of its six objectives relate to water savings. Water distributors such as Sydney Water can be issued with orders to contribute funds for water-related programs. The Fund is administered by the Department.

In 2016, Sydney Water developed a method for determining whether and how much to invest in water conservation. Known as the 'Economic Level of Water Conservation' (ELWC), the method identifies whether it costs less to implement a water conservation initiative than the value of the water saved, in which case the initiative should be implemented.

Conclusion

The Department and Sydney Water have not effectively investigated, implemented or supported water conservation initiatives in Greater Sydney.

The agencies have not met key requirements of the Metropolitan Water Plan and Sydney Water has not met all its operating licence requirements for water conservation. There has been little policy or regulatory reform, little focus on identifying new options and investments, and limited planning and implementation of water conservation initiatives.

As a result, Greater Sydney's water supply may be less resilient to population growth and climate variability, including drought.

The Department has not undertaken an annual assessment of Sydney Water's level of investment in water conservation against water security risks and the capacity to respond when drought conditions return, as required by the Metropolitan Water Plan. It did not complete identified research and planning activities to support the plan, such as developing and using a framework for assessing the potential for water conservation initiatives for Greater Sydney, and developing a long-term strategy for water conservation and water recycling. It also did not finalise a monitoring, evaluation, reporting and improvement strategy to support the plan.

Sydney Water has been ineffective in driving water conservation initiatives, delivering detailed planning and resourcing for ongoing initiatives, and in increasing its investment in water conservation during drought. These were requirements of the Metropolitan Water Plan. Sydney Water's reporting on water conservation has not met all its operating licence requirements and lacked transparency with limited information on key aspects such as planning for leakage management, how the viability of potential initiatives were assessed, and how adopted initiatives are tracking.

The Department and Sydney Water did not put in place sufficient governance arrangements, including clarifying and agreeing responsibilities for key water conservation planning, delivery and reporting activities. There has also been limited collaboration, capacity building and community engagement to support water conservation, particularly outside times of drought.

1. Key findings

Governance around water conservation is weak

The Department and Sydney Water have not identified clear responsibilities nor established formal arrangements that support planning, implementation, reporting and capacity for water conservation. This is despite reviews of previous metropolitan water plans by the Department and reviews by IPART highlighting weakness in water resource management in general, and specifically for water conservation.

Frequent structural changes in the Department and staff turnover have limited its ability to support water conservation and lead policy and regulatory reform. Between August 2005 and July 2019, the function changed departments six times and was split on two occasions into separate offices before being re-merged.

There have been no recent, detailed analyses of water conservation options

The Department has not undertaken detailed analyses of a range of water conservation options since 2013. Limited progress has been made to address evidence gaps related to the full range of costs and benefits of water conservation. The Department was required to undertake research activities to inform the Metropolitan Water Plan, but not all of these were completed. This has hampered the Department's ability to provide policy guidance and support Sydney Water's water conservation activities.

Sydney Water has developed the Economic Level of Water Conservation (ELWC) method to assess the costs and benefits associated with water conservation initiatives but has not applied the method to a detailed assessment of a broad range of water conservation options and their potential for Greater Sydney.

There is a lack of planning for water conservation, including securing the necessary funds

The Department does not have a documented strategy for water conservation in Greater Sydney, even though this was a requirement in developing the Metropolitan Water Plan. The Department also does not have an approach for supporting Sydney Water's water conservation programs.

The Department and Sydney Water have struggled to fund water conservation initiatives. Funding for water efficiency programs was scaled back when Sydney Water was not required to contribute to the Climate Change Fund between 2012–13 to 2016–17. Both the Department and Sydney Water were using the fund to resource their water conservation activities.

Further, Sydney Water did not request funding for water conservation in its 2015 price submission to IPART, for water pricing from 2016 to 2020, even though it needed resources to develop and implement its ELWC methodology as required under its operating licence. Sydney Water requested funding in its latest submissions to IPART. In its June 2020 pricing determination IPART allowed this.

Under its operating licence Sydney Water should have developed a water conservation program consistent with its ELWC methodology by September 2017 but did not do this. While its water conservation activities are outlined in its annual water conservation reports, these lack information on objectives, strategies and targets. Most of its leak management activities have not been included in its reported forward program.

There are also anomalies in the way that Sydney Water has assessed the economic viability of water conservation projects using its ELWC method. This includes anomalies in the way it is valuing water, especially at lower dam storage levels, and irregularities in the way it has been costing potential water conservation initiatives. This creates a risk that some initiatives that could have been viable were assessed as uneconomic, and vice versa.

Sydney Water did not implement initiatives as required and was slow to respond to drought

Sydney Water's lack of planning led to its water conservation initiatives being limited and not timely in response to the recent drought. The Metropolitan Water Plan required that the ELWC method should result in increased investment in water conservation during drought. Sydney Water should have increased its water conservation investments as dam levels dropped from 2017 but it did not start to do so until May 2019 through drought funding and funds sourced from the Climate Change Fund.

Sydney Water recorded in its Water Conservation Program Control Board minutes in May 2019 that, 'the ELWC has not been applied in 2016 to 2020, no budget was allowed, and no mechanism was enacted.'

There is limited evaluation and reporting on water conservation initiatives

Sydney Water provides some analysis of water savings and costs in its water conservation reports. However, there has been limited evaluation of the success of its initiatives. Variations between expected and actual water savings are not explained. This makes it difficult to gauge the impact of water conservation, changes in initiatives and investments, and scope for improvement. Sydney Water does assess customer satisfaction with its efficiency initiatives.

Some water efficiency initiatives that were economically efficient were not included in Sydney Water's 2017–18 and 2018–19 programs. It did not provide information in its water conservation reports on initiatives identified as economically efficient but not implemented, even though this was a reporting requirement of its operating licence.

The Department has not done annual assessments on the level and appropriateness of investment in water conservation, despite this being an expectation under the Metropolitan Water Plan.

There has been limited action to remove barriers to water recycling and stormwater harvesting

The Department has not made substantial progress to remove or coordinate a response to reported policy, regulatory and institutional barriers to water recycling and stormwater harvesting. These water conservation approaches are necessary to meet Greater Sydney's growing water needs and build resilience to drought. Investigations to understand and identify potential solutions to some of these barriers, particularly in growth areas in Western Sydney, have been led by Infrastructure NSW.

Also, the Department has not undertaken the community engagement required by the Metropolitan Water Plan to understand whether highly treated recycled water may be a future option for potable (drinking) water. The Department has not reviewed the costs and benefits of the 2008 NSW Government Direction to set developer charges for traditional water and wastewater servicing to zero. By comparison, charges are levied for recycled water schemes making these less attractive to developers.

Sydney Water has not expanded its water recycling capacity in over eight years. It assessed the viability of one major recycling scheme in 2019, and the options were found to be 15 to 40 per cent more expensive than traditional water and sewer services. Sydney Water advises it is currently considering a range of the other recycling schemes.

Measures to encourage efficient urban water use are in place

The Department has an administrative role in the Building Sustainability Index (BASIX) and the National Australian Built Environment Rating System (NABERS), which are measures that can encourage more efficient water use in residential and commercial buildings.

The Department reviewed BASIX in 2013 and recommendations to increase water targets were not adopted by the NSW Government. With changes in technology and the evidence-base for water conservation since that time, there may now be potential to enhance BASIX by revisiting water saving targets, recycling initiatives and the use of rainwater tanks.

There has been a lack of support and coordination for water conservation

The Department has not developed policy, engaged the community, and consolidated an evidence-base around water conservation. As such, opportunities have been missed for the Department to support Sydney Water's water conservation initiatives, and to engage directly with the community on opportunities to save water.

Sydney Water has not maintained baseline funding for its water conservation program, particularly outside times of drought.

2. Recommendations

By July 2021:

1. The Department should develop a clear policy and regulatory position on:
 - water efficiency - reducing water demand through programs that aim to increase water efficiency and change behaviour
 - potable water reuse - engaging with the community to understand whether highly treated recycled water can be considered as a future option for drinking water
 - water recycling - addressing reported barriers such as developer chargers and improved access to planning and land release processes for private water utilities
 - stormwater harvesting - enhancing cooperation between State and Local Government, Sydney Water and private water utilities.

2. The Department should establish clear mechanisms to ensure water conservation is treated explicitly in the management of Greater Sydney's water resources, including:
 - establishing formal governance arrangements to assist in developing and implementing Sydney Water's planning and reporting for water conservation
 - establishing roles and responsibilities for water conservation research, planning and implementation, and engaging Sydney Water, IPART and other agencies in this activity
 - evaluating progress with the Greater Sydney Water Strategy, including annual reviews of the level of investment (by the Department and Sydney Water) in water conservation.
3. The Department should determine and implement a practical mechanism for funding water conservation initiatives in Greater Sydney including:
 - ensuring the Climate Change Fund is being used to effectively fund water saving initiatives
 - identifying and assessing other funding mechanisms for water conservation, including resourcing for research and development.
4. The Department, working with Sydney Water, should assess the viability of current and future water conservation initiatives, including:
 - commissioning a detailed options study to inform a water conservation program
 - applying an evidence-driven method to assess water efficiency and leakage management initiatives, and water recycling schemes
 - reviewing BASIX including water savings targets, program design and implementation.
5. Sydney Water should develop and implement a rolling detailed five-year plan for water conservation with clear objectives that, at a minimum meets the requirements of the Greater Sydney Water Strategy and its operating licence, including:
 - establishing baseline funding and resourcing for water conservation including research and pilots
 - reviewing, in conjunction with IPART, the ELWC methodology and the way it is being applied
 - developing and maintaining relationships with sector specialists, businesses and government
 - detailing how its individual initiatives will be implemented.
6. Sydney Water should improve its annual reporting on its water conservation that at a minimum meets the requirements of its operating licence and provides clear and evidenced information on:
 - water savings for each initiative for the previous five years, how these compare with forecast savings and how these savings are verified
 - expenditure on each initiative for the previous five years
 - how customer interaction and education initiatives are encouraging behavioural change
 - ongoing water savings from previous initiatives and whether its water efficiency initiatives are focusing on where there is the greatest potential to maximise water savings.

1. Introduction

1.1 Water conservation

Water conservation refers to water recycling, leakage management and programs to enhance water efficiency. Water recycling refers to both harvesting stormwater for beneficial use and reusing wastewater. Activities such as recycling (including the use of purified recycled water for drinking and stormwater harvesting) can represent large scale and long-term infrastructure investment.

Water conservation also involves using demand management strategies to encourage lower or more efficient water use. Awareness-raising campaigns about water use behaviours can lead to water savings and complement efficiency measures. Water efficiency measures include repairing leaks and replacing taps, shower fittings and other high water-use appliances. There can be good opportunities to do this in new residential and commercial buildings. In established urban areas, maintaining and upgrading ageing water pipes is important, as is engaging with tenants and landowners to retro-fit appliances. Monitoring water consumption and auditing water use in buildings or other sites can identify opportunities for further water savings.

Planning for and effectively implementing these initiatives requires an integrated approach with land use planning. As such, water conservation can involve new investments but can also avoid, minimise or defer the costs of building additional water storages and water supply (e.g. desalination) infrastructure.

Effective and innovative water conservation may involve policy or regulatory changes to enable new water uses and technologies. Approaches to water pricing can impact on water use behaviours among customers, and on the incentives and capacity for water utilities to save water.

Exhibit 1 lists a broad range of water conservation options.

Exhibit 1: Summary of a broad range of urban water conservation options

Focus	Examples
Efficiency	<ul style="list-style-type: none"> Installing new or retrofitting existing water appliances and fixtures (e.g. taps, toilets, washing machines), with scope to refine by location or market segmentation Rainwater tank installation, assessments, tank optimisation, and repairs Cooling tower optimisation in airconditioned commercial or large residential buildings Irrigation and landscape efficiency programs Leveraging sustainability and energy efficiency programs that focus on reducing hot water use/bills
Efficiency plus education	<ul style="list-style-type: none"> Point-of-sale disclosure of water efficiency and alternative water sources, for residential and commercial buildings Water audit accreditor/assessor programs Installing smart metering to improve water use practices and encourage active leak management 'Tick' programs that encourage businesses to take up water efficiency practices Broad based public communications campaigns to raise awareness among customers about the value of water, and how to save water Targeted communications to customers about water use and opportunities to save water, such as information and usage targets on water bills Relationship building between governments and with high water use businesses to build capacity to implement efficiency measures and comply with water restrictions, which can be formalised (e.g. Water Saving Action Plans)
Recycling, including as part of integrated land use planning	<ul style="list-style-type: none"> Precinct-wide water and land-use planning to maximise opportunities for water efficiency, loss reduction and water re-use (including urban design, use of green space) Water treatment plants to recycle water for non-potable (e.g. irrigation) or potable (e.g. drinking water) purposes Stormwater harvesting i.e. capture, treatment, storage and re-use
Reducing systems leaks and losses	<ul style="list-style-type: none"> Active leak detection and repair in network pipes and water mains Online monitoring and audits of concealed leaks Pressure management in pipes Timeliness and quality of repairs Ongoing pipeline and assets management
Regulation	<ul style="list-style-type: none"> Mandatory water efficiency labelling schemes Regulating the standard of water efficiency in new buildings or renovations Water price signals Reported voluntary targets for water consumption; or requirements in water utility licence conditions 'Water Wise' rules covering outdoor water use, and potentially indoor use Water restrictions and various trigger levels (primarily a drought response)

Source: Audit Office of NSW analysis, 2020.

1.2 2017 Metropolitan Water Plan for Greater Sydney

Water conservation initiatives are part of a portfolio of options for metropolitan water planning in Greater Sydney. The current Metropolitan Water Plan for Greater Sydney (the 'Metropolitan Water Plan') was endorsed by the Premier of NSW in 2017.

The Metropolitan Water Plan follows from plans produced in 2004, 2006 and 2010. The plan aims to secure water supply for a growing population in Greater Sydney over the next ten or more years by:

1. providing a secure and affordable water supply
2. investing in value-for-money water conservation projects
3. responding flexibly to drought with a strategy that can cope with more extreme droughts
4. integrating water, wastewater and stormwater services to contribute to more liveable communities and healthy waterways
5. releasing environment flows from Warragamba Dam to help protect and improve river health.

Exhibit 2 contains statements and commitments from the Metropolitan Water Plan that relate to these objectives. The plan also highlights the WaterSmart Cities program and it introduces the Economic Level of Water Conversation (ELWC) method (explained in Section 1.5) to replace water savings targets and recycling goals from previous metropolitan water plans.

Exhibit 2: Key statements and commitments related to water conservation in the Metropolitan Water Plan

- Water conservation has a critical role to play in balancing supply and demand
- We will invest in economically efficient leakage management, water efficiency and recycling measures
- We will increase investment in water conservation measures as dam levels drop and drought conditions return
- We will invest in water conservation measures, where economically efficient, and increase investment if demand grows rapidly and water use is significantly above the business as usual water use demand forecast in this plan
- We will support the WaterSmart Cities program with an investigation into the barriers and enablers of investment in economically efficient recycling initiatives, and work to establish partnerships and collaborative arrangements between government and industry
- The Department will undertake an annual assessment of Sydney Water's level of investment in water conservation against water security risks and our capacity to respond when drought conditions return, or demand rises and make recommendations to government in relation to any required actions
- Sydney Water will take the lead on water conservation initiatives through development of a Water Conservation Program based on the Economic Level of Water Conservation.
- The new Economic Level of Water Conservation method applies to leakage reduction, water efficiency, and water recycling projects
- The method will set investment priorities for each type of project, and details of which projects have been selected for delivery will be explained in a Water Conservation Program report.
- Sydney Water will maintain its knowledge, skills and experience in water conservation as part of the program
- The first new five-year Water Conservation Program will be released in September 2017 and updated annually
- Alongside the Drought Response Strategy, investment in water conservation will increase as dam storage levels fall. This includes increased efforts to reduce leaks and programs to reduce water use
- Increasing water conservation may be cheaper than building new large-scale supply options or could delay the timing of investment in a large new supply
- The plan is supported by a monitoring, evaluation, reporting and improvement strategy, which will guide implementation and ensure we can adapt to changing circumstances
- Government will ensure there is the capacity to manage demand during drought, rising water use and other water security risks
- The Department leads and coordinates metropolitan water planning for Greater Sydney
- Engagement with the community to understand whether highly treated recycled water can be considered as an option for drinking water supply in the future. Recycled water for drinking is wastewater or stormwater that receives an advanced level of treatment to achieve high-quality drinking water.

Source: 2017 Metropolitan Water Plan.

1.3 Water savings under the Climate Change Fund

The NSW Government established the Climate Change Fund in 2007 during the Millennium Drought under the *Energy and Utilities Administration Act 1987* (the Act). It is intended to address the impacts of climate change, encourage water and energy saving activities, and increase public awareness and acceptance of climate change.

Section 34F of the Act sets out the purposes of the Fund, which includes:

- to provide funding to encourage water and energy savings and the recycling of water [34F(b)]
- to provide funding to reduce the demand for water and energy, including addressing peak demand for energy [34F(c)]
- to provide funding to stimulate investment in innovative water and energy savings measures [34F(d)]
- to provide funding to increase public awareness and acceptance of the importance of climate change and water and energy savings measures [34F(e)].

The Minister administering the Act (currently the Minister for Energy and Environment) can issue orders for Sydney Water to contribute funds to the Climate Change Fund with the concurrence of the Minister administering the *Sydney Water Act 1994* (currently the Minister for Water, Property and Housing). The Minister can approve money payable from the fund for any measure that the Minister is satisfied promotes a purpose referred to in the *Energy and Utilities Administration Act 1987*. The Fund is administered by the Department.

1.4 Water conservation requirements in Sydney Water's operating licence

Sydney Water operates under a licence issued by the Governor and administered by the Independent Pricing and Regulatory Tribunal (IPART). The licence authorises Sydney Water to supply water, wastewater, recycled water and some stormwater services, and sets out certain requirements.

Sydney Water was required to develop a water conservation program consistent with an economic method by 1 September 2017, under its previous (2015 to 2020) operating licence (s3.2.6). This economic method, the 'Economic Level of Water Conservation' (ELWC), was developed by Sydney Water and approved by IPART. IPART required that Sydney Water assess water leakage, water recycling and water efficiency including demand management (s3.2.1) under this method. For more detail on the ELWC calculation, see Section 1.5 below.

While developing the ELWC method from July 2015 and December 2016, Sydney Water was required to maintain its 'existing water conservation requirements', namely to maintain water usage below 329 litres per person per day; ensure that the level of leakage from the system does not exceed 121ML per day; and promote, foster and encourage the efficient use of water and the production and use of recycled water, where financially viable (s3.2.5).

Sydney Water is required to report to IPART, in accordance with the Reporting Manual. The water conservation program was to be outlined in the first Water Conservation Report, which was to be submitted to IPART by 1 September 2017 in accordance with clause 3.2.1 of the Reporting Manual.

The Reporting Manual from July 2015 and the manual from July 2018 that was current until November 2019, stated that the annual water conservation report must include the elements of Sydney Water's water conservation program for at least the next five financial years, including (but not limited to):

- its strategies, programs and projects relating to water leakage, recycled water and water efficiency
- its water conservation objectives, targets and timetables
- extent to which these elements accord with the ELWC activity and method (clause 3.2.1).

The manual also required Sydney Water include information on any element of the water conservation program that may be identified as economically efficient by the methodology, but that Sydney Water has not implemented or is not proposing to implement.

Sydney Water's current operating licence (2019 to 2023) states that Sydney Water must:

- implement water conservation measures that have been assessed as economic, according to the agreed ELWC method
- maintain a water conservation program consistent with this economic method
- update and report on the program annually.

Sydney Water's current reporting requirements, under the 2019 to 2023 Reporting Manual, also state that its Water Conservation Report must include information on its water conservation program for the previous financial year and for at least the next five financial years. This manual includes more specific reporting requirements than previously, including that Sydney Water's reporting must include, but is not limited to, information on:

- strategies, programs and projects relating (at a minimum) to water leakage, recycled water and water efficiency
- 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.

IPART commissions annual audits of Sydney Water's compliance with its operating licence (i.e. operational audits), as required under the *Sydney Water Act 1994*. The audit for 2017–18 found Sydney Water to be 'compliant' on requirements related to:

- develop a water conservation program consistent with its ELWC
- report to IPART, in accordance with the Reporting Manual, on water conservation.

The operational audit for 2018–19 did not examine these water conservation requirements. The requirement to develop a program consistent with the ELWC was listed as 'NR - No requirement' (for audit or statement of compliance). The requirement for reporting to IPART in accordance with the Reporting Manual was listed as 'SC - Statement of Compliance' signed by Interim CEO in August 2019 i.e. Sydney Water did not report any non-compliance with Water Conservation requirements.

IPART provides the operational audit reports to the relevant minister, currently the Minister for Water, Property and Housing, and the reports are tabled in the NSW Parliament.

1.5 Sydney Water's Economic Level of Water Conservation

Sydney Water developed the ELWC method, which was approved by IPART in 2016. The method was introduced to replace the 'water conservation targets' that were part of Sydney Water's operating licence until December 2016. Specifically, a requirement to:

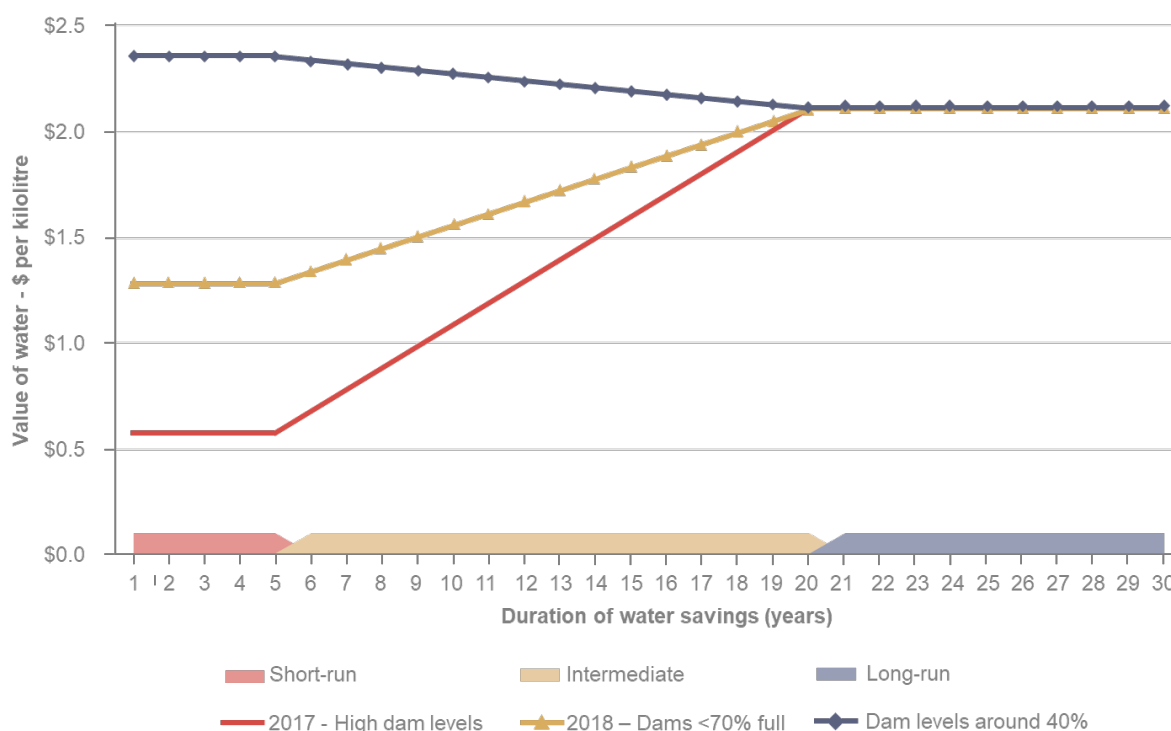
- maintain water usage level to less than or equal to 329 litres per person per day
- ensure that the level of water leakage from its drinking water supply system (the water leakage level) does not exceed 121 ML per day.

Sydney Water's ELWC method is an approach to determining when to invest in water conservation: simply put, when the cost of a water conservation initiative is less than the value of the water saved, it should be implemented. The method is designed to consider different types of water conservation investments against the value of water, in two ways.

- Short-term investments, such as partnering with councils to encourage businesses to implement water savings:
 - in the short term, when the value of water is related to dam storage levels, the method is designed to respond to falling storage by increasing investment in water conservation, particularly because falling storage levels will otherwise start to trigger new costs—such as more expensive desalinated water or water restrictions that have social costs.
- Longer-term investment, such as water recycling schemes:
 - in the longer-term (e.g. 20 years or more) the value of water is related to the wider range of investments required to support a reliable ongoing supply of water. The usage price of water is used as a proxy for this value as, in theory, it should reflect the long run marginal cost of water supply.

The stated purpose of the ELWC method is to enable Sydney Water to determine the optimal future mix of, and right amount of investment in, water conservation. An implication of the method is that investment in water conservation should be higher in times of drought and lower when dam storage levels are high.

Exhibit 3: Changes in the value of water under Sydney Water's ELWC methodology

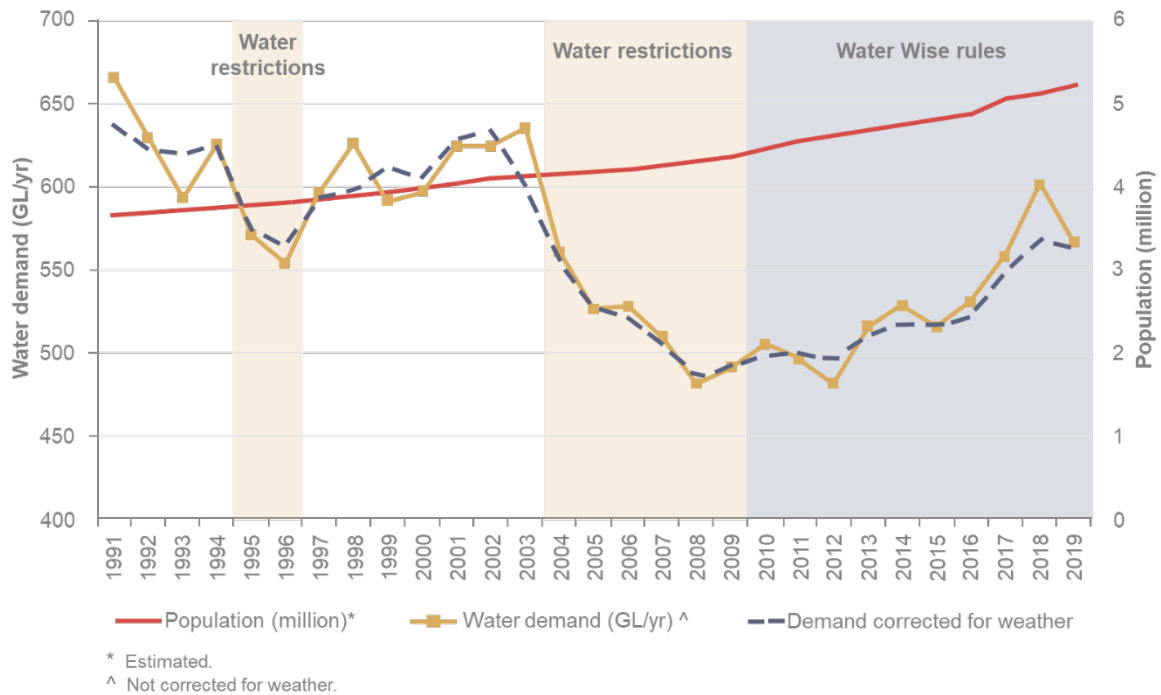


Source: Sydney Water's 'Economic Level of Water Conservation Method Summary'.

1.6 Recent trends in water consumption

Overall water consumption in Greater Sydney had been increasing since 2012, until water restrictions were introduced by the NSW Government in June 2019, in response to drought (Exhibit 4).

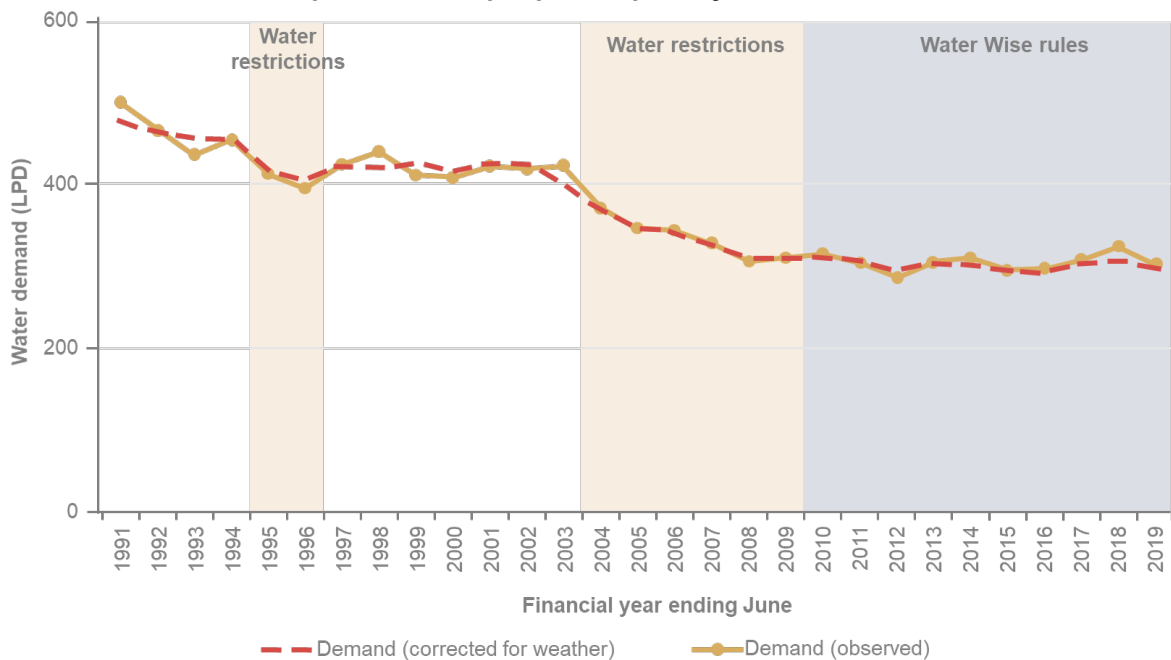
Exhibit 4: Population and water consumption each year (GL/year)



Source: Data provided by the NSW Department of Planning, Industry and Environment.

It is likely that population growth has been the major driver of this overall increase in (weather corrected) water demand over time. This is because average consumption (litres used per person each day, see Exhibit 5) has been relatively stable since 2008, although this did start to climb too in the lead up to the recent drought.

Exhibit 5: Water consumption in litres per person per day



Source: Data provided by the NSW Department of Infrastructure, Planning and Environment.

1.7 Population and climate projections affecting future water needs

Greater Sydney had a population of around 5.3 million in 2019. This is set to increase by over two million people over the next 20 years. Planners and service providers are expecting significant pressure on the water supply system.

The cost of maintaining and replacing assets such as water mains and pipes in established suburbs will continue to increase, and meeting expectations for green urban spaces will also drive the overall demand for water—particularly in growth areas. Infrastructure NSW estimates that an additional 47 GL of water per year will be required to achieve the liveability vision for Western Sydney. To put this in perspective, this additional volume is equivalent to around half the water produced by the Sydney desalination plant each year when operating at capacity.

This increased demand for water is taking place in the context of climate projections which indicate that south-eastern Australia, including Greater Sydney, will get warmer and experience more frequent heat waves. Projections also indicate that rainfall patterns will become more unpredictable, with potential for both wetter times and much longer periods of drought. As Greater Sydney is heavily reliant on rainfall-dependent dams for its water supply, this climatic variability presents a particular risk.

1.8 About the audit

This audit assessed whether water conservation initiatives for Greater Sydney are effectively investigated, implemented and supported.

We addressed the audit objective by answering two questions:

1. Are water conservation initiatives effectively investigated and implemented?
2. Are effective arrangements in place to coordinate and support water conservation initiatives?

The audit focused on the recent history of water conservation approaches and programs since 2016, with particular attention to commitments for the Department and Sydney Water outlined in the 2017 Metropolitan Water Plan.

More information about the audit approach can be found in Appendix two.

2. Investigating and implementing water conservation

2.1 Investigating water conservation opportunities

There have been no detailed analyses of a broad range of water conservation options

The Department did not complete all the research into water conservation that was required to inform the Metropolitan Water Plan. The Department was required to develop a preferred portfolio of water conservation strategies for community engagement, and a long-term strategy for water conservation and for water recycling by June 2015, but did not undertake this work.

The Department has also not undertaken detailed analyses of the viability of water conservation options for Greater Sydney since 2013. Options need to be regularly reassessed given 'demand hardening' that is, less capacity for customers to save more water once relatively easy and inexpensive measures have been implemented. There can also be technology advances to consider in option assessments, such as smarter metering for the water distribution network and homes, and improvements in leak management and recycling.

Sydney Water did examine a range of water efficiency initiatives for its 2018–19 program but as shown in Exhibit 6 most were not adopted, or reported in its annual water conservation reports.

Exhibit 6: Initiatives assessed under ELWC for 2018–19 program

Project	Levelised cost/KL	Benefit period (years)	Viable under ELWC (67% storage - July 2018)	Adopted
Rebates washing machines (100%-50%)	79c	12	Yes	No
Rebates toilets (100%-50%)	53c	10	Yes	No
Rebates water saving fund (100%-50%)	91c	10	Yes	No
Rebates rainwater tank (50%-25%)	90c	20	Yes	No
WaterFix Residential (100%-50%)	\$2.69	17	No	Yes*
WaterFix Strata (100%-50%)	\$4.10	17	No	Yes*
Audits online monitoring	\$2.94	2	No	No
Audits concealed leaks	24c	10	Yes	No^
Love your garden	\$12.65	10	No	No
Audits rainwater tank repair	69c	10	Yes	Yes#
Council partnerships	\$1.34	10	Yes	Yes#
Audit – high business users (100%-50%)	\$2.60	10	No	No
Education schools	\$3.76	7	No	No
Economic level of leakage program	3c	5	Yes	Yes

* Offered as a full cost recovery service i.e. not subsidised.

Pilot program initiated.

^ Sydney Water did deploy an algorithm to monitor increases in water usage for residential customers.

Note: Percentages indicate range of storage levels where relevant.

Source: Data provided by Sydney Water; 2018–19 Water Conservation report.

Options considered by Sydney Water for its 2019–20 program included expanding its WaterFix programs for homes and businesses, rolling out ‘smart metering,’ enhancing leak management, and implementing water saving programs for schools, hospitals, social housing, hotels and high-water users. However, the overall approach to analysing these options and other opportunities has been ad hoc and lacking depth.

The absence of detailed analyses means that the most effective options may not have been considered when developing a program of water conservation initiatives in Greater Sydney. It also means that opportunities for partnerships with other NSW Government agencies and councils to implement programs have not been fully scoped, and that activities have not been optimally developed—for example, water efficiency programs may not have been targeted to the suburbs or customer groups where there is the most potential for new or increased take-up.

Sydney Water also commenced some pilots in 2018 and 2019 to inform its water conservation program. It is unclear whether Sydney Water intends to progress and expand the council and school initiatives.

Exhibit 7: Sydney Water's water conservation pilots

- Since mid-2019, Sydney Water has been running a council partnership pilot across five local government areas. It is anticipated that the pilot will save 2.14 GL of water across 250 businesses. Sydney Water had run a similar program with a larger number of councils, from 2010 to 2015.
- Sydney Water carried out a pilot to identify potential for water savings in nine public schools in 2018. Water audits were funded to check for visible and concealed leaks, and opportunities to improve irrigation. The pilot found potential to save about 1.9 ML/year across these nine schools, equivalent to 39 per cent of their current water use, but there was limited uptake of water saving actions, reportedly due to costs and issues engaging different maintenance contractors to implement fixes.
- Sydney Water piloted approaches to maintaining residential rainwater tanks from February to May 2019 and found that many tanks were not operating as intended. According to Sydney Water's findings, the cost of replacing the pumps to fix these tanks was often more than what customers were prepared to pay. It is unclear whether the potential for sourcing less costly or more reliable pumps was explored or whether it was possible for Sydney Water to subsidise an ongoing maintenance program where this was less than the value of water saved. Sydney Water is not continuing the rainwater tank program based on the results of this pilot. It has updated its website with information for customers about how to better maintain and fix their rainwater tanks.

Source: Sydney Water 2020.

In October 2019, Sydney Water developed a detailed framework for new initiatives to be considered under its ELWC method. There is little evidence that Sydney Water used this framework, or used it effectively, in preparing its 2019–20 water conservation program because only a limited range of initiatives was analysed, and fewer implemented.

2.2 Planning for water conservation

The Department does not have a strategy for water conservation in Greater Sydney

The Department has not created a strategy for water conservation in Greater Sydney. This is despite the ‘critical role’ identified for water conservation in the Metropolitan Water Plan (see Exhibit 2).

The Department does not have a plan for supporting Sydney Water's water conservation programs. Activities that the Department might undertake would include providing detailed options studies on the types and the scale of initiatives that could be implemented by Sydney Water and/or private sector utilities. It could also support relationships with stakeholders such as state agencies and Local Government, and undertake regular reviews of the level of investment in water conservation.

The Department has commenced the development of a water efficiency framework for New South Wales and a water efficiency program for Greater Sydney. It indicated that this work will involve:

- collaborating with Sydney Water, Water NSW and other stakeholders to build capacity for water conservation, and increase private sector involvement
- gaining a greater understanding of water use, improving the evaluation of water conservation programs, and developing a framework that considers the total water cycle—from water supply through to wastewater treatment and discharge to oceans and waterways
- providing a clear statement of government policy and messaging about the need to support and invest in water efficiency across all sectors, including the development of a water saving goal for Greater Sydney.

The Department advises it plans to include the water efficiency program in the Greater Sydney Water Strategy and is currently in the process of seeking funding to implement the program.

Sydney Water does not have detailed plans for water conservation

Sydney Water's water conservation reports outline water conservation activities for the next five years and state that this program is informed by its ELWC method. The reports include the estimated water savings of each water conservation initiative, information on the expected number of participants for some initiatives, and the overall level of investment that would be needed.

There is little information in these reports, and in other Sydney Water documents, about how each water conservation initiative will be resourced and funded annually, or over a five-year period. The reports provide no explanation of how initiatives will be expanded or contracted as dam storage levels change, which is an expectation of the Metropolitan Water Plan.

There is limited information on what initiatives will be economically viable at each storage level and no information on their scale and how this would be determined. Sydney Water has not included information on most of its leak management activities in its reported forward program. Reporting on leak management is required under its operating licence.

Sydney Water's water conservation reports do not clearly separate funds that are spent by Sydney Water in subsidised programs such as WaterFix Residential, and the money contributed by its customers. This information would support transparency on the level of investment.

Sydney Water has not effectively used the agreed economic method to develop its water conservation program

Sydney Water was required under its operating licence to develop a water conservation program consistent with the ELWC methodology by 1 September 2017. It did not do so and did not report on the initiatives that were economically viable but not implemented.

In 2017–18, WaterFix Residential and WaterFix Strata would have been economically viable for Sydney Water to implement with a subsidy. This is because, given the 17-year payback period that applies to WaterFix, the value of water is less than the levelised cost of these programs (\$1.47 per KL and 63c per KL, respectively) and close to the long-run marginal cost of water which varies between around \$1.80 and \$2.20 depending on dam levels (see Exhibit 3). A subsidised approach may have increased customer uptake. Sydney Water also assessed other initiatives against its ELWC method for 2018–19 but most initiatives that were economically viable were not adopted (see Exhibit 6 above).

We note that Sydney Water recorded in its Water Conservation Program Control Board minutes in May 2019 that, 'the ELWC has not been applied in 2016 to 2020, no budget was allowed, and no mechanism was enacted'.

There is a lack of transparency in Sydney Water's cost calculations for initiatives

Anomalies in Sydney Water's calculations for the levelised costs of water conservation initiatives mean that Sydney Water could be underestimating or overestimating these costs.

Levelised costs for the same activities should remain relatively constant each year, unless there are significant economies of scale associated with introducing a much larger program. Sydney Water's estimated levelised cost varies significantly from year to year for some initiatives. The WaterFix Strata levelised cost, for example, jumped from 63c to \$4.10 per KL between 2017 and 2018. The 2017 estimate has double the water savings at a third of the cost: 1.6 million KL saved from a \$1.0 million cost, compared to 0.8 million KL saved from a \$3.4 million cost. In 2019, Sydney Water reported the levelised cost for WaterFix Strata as \$2.06 per KL.

Given the data Sydney Water provided it is difficult to determine the reason for these large changes, although they appear inconsistent. These unexplained variations are an issue because the initiatives should be included in the water conservation program if their cost is less than the cost of water.

How Sydney Water values water does not encourage timely investment during drought

There are also anomalies in the way Sydney Water is valuing water under its ELWC method, which in turn affects its investment response to declining dam storage levels. These anomalies relate to the probability analysis it is using.

Sydney Water uses a probability analysis to calculate the short run value of water. This analysis is based on the probability of future dam storage levels over the next five years, starting from different storage levels. As it is more likely that dam storage levels will return to average over five years than within just 12 months, the value of water used in Sydney Water's ELWC calculations will be lower using its five-year approach. This, in turn, is less likely to encourage timely investment during the drought. Sydney Water does not explain why it uses probabilities over a five-year timeframe as it commits to a 12-month program, not a five-year program.

Sydney Water's ELWC method also includes a short-run scarcity value in the calculations for the short-run value of water. The table below includes the probability of being at or below different storage levels that trigger water restrictions and the corresponding scarcity values.

Exhibit 8: Sydney Water's scarcity values and probabilities used to calculate the value of water

Water restriction level	Scarcity value of water	Storage level trigger from 2017 Metropolitan Water Plan	Probability of dam storage starting at the trigger level and being at that level or less any time in the next five years
Level 1	\$2.31/KL	50%	27.8%
Level 2	\$5.79/KL	40%	7.7%
Level 3	\$9.38/KL	30%	0.0%

Source: ELWC Methodology, Metropolitan Water Plan, Sydney Water data.

The figures in the table mean that even if Level 2 or Level 3 water restrictions are triggered in Greater Sydney, the scarcity value at these low levels will provide little or no increase in the value of water used in the ELWC calculations. This is because of the low probability of low storage levels any time in the next five years. This means the scarcity values will not promote additional investment when storage levels are at these low levels. The ELWC method is meant to trigger investment during (or before) the drought.

The limited impact of the scarcity values used by Sydney Water on increasing the value of water is demonstrated in Exhibit 3. This shows that the maximum value of water under its method is around \$2.40/KL when dam levels are 40 per cent. This means the probabilities used in the ELWC calculations may undervalue water at lower storage levels.

Sydney Water's probabilities used for its ELWC calculations show inconsistencies in future (over the next five years) dam storage levels at different starting levels. For example:

- If storage is at 55 per cent, the data shows a 66 per cent probability of future storage being at or above 80 per cent. If storage is at 60 per cent the data shows a 51 per cent probability of future storage being at or above 80 per cent.
- If storage is at 50 per cent the probability of reaching 100 per cent in the next five years is 25 per cent. If storage is at 60 per cent the probability of reaching 100 per cent is only ten per cent.

IPART has also noted potential problems with how Sydney Water has been costing the short-run value of water. In its June 2020 review of Sydney Water's prices, IPART reported that Sydney Water could have been undervaluing water, and therefore under performing in water conservation and leakage management.

How Sydney Water values water in the long run may limit investment in water conservation

Under the ELWC methodology, the long-run value of water is assumed to be the usage price determined by IPART. In its June 2020 review of Sydney Water prices, IPART recognises that the usage price may not always accurately reflect the long-run cost of supplying water. In effect, the probability of triggering large scale infrastructure investment increases as storage levels deplete.

The implication for Sydney Water's current ELWC calculations is that, in years where the starting storage is low, Sydney Water will underestimate the long-run cost of water which may result in an underinvestment in water conservation activities.

There is a lack of transparency in proposed investment in water conservation at different dam levels

There are discrepancies when comparing Sydney Water's proposed investments with what would be expected given different values of water and dam levels. This reflects Sydney Water's poor planning and lack of subsequent implementation of economic water conservation initiatives. Increased investment as dam levels fall is an expectation of the 2017 Metropolitan Water Plan.

To illustrate, Sydney Water's proposed water conservation expenditure for 2019–20 of \$18.6 million was calculated in July 2019, when dam levels were at 52 per cent. By comparison, a proposed annual expenditure of \$40.0 million was proposed soon after, in November 2019 when dam storage levels were at 50 per cent. Sydney Water has indicated that the \$18.6 million budget was prepared by diverting operating expenditure from elsewhere, given a lack of funds for water conservation for 2019–20. In contrast, the November 2019 proposal of \$40.0 million was reportedly prepared using its ELWC methodology.

Exhibit 9: Sydney Water's planned investments in water conservation compared to dam levels

Reporting year for forward planning	Date of dam level calculation	Dam levels	Short run value of water	Investment in active leak management	Investment in water efficiency	Proposed investment for next financial year
		% full	\$/KL	\$'000	\$'000	\$'000
2016–17	Jan 2017	90%	\$0.56	\$883	\$631	Not reported
2017–18	Jul 2018	67%	\$1.28	\$1,124	\$1,061	Not reported
2018–19	Jul 2019	52%	\$1.85	\$1,600	\$1,373	\$18,600
Nov 2019	Nov 2019	50%	\$2.03	Not reported	Not reported	\$40,000

Note: Water efficiency primarily includes WaterFix, PlumbAssist and pilots. Also includes funding from customers as WaterFix was full cost recovery.
Source: Sydney Water's, Water Conservation Reports and Sydney Water's Update to 1 July Price Proposal, 12 November 2019.

The Department and Sydney Water did not plan to secure timely water conservation funding

In 2007, the then Minister for Environment, Climate Change and Water issued a contribution order to Sydney Water requiring it to contribute to the Climate Change Fund. This was to resource the Department's and its own water conservation activities. This source of funding ceased in June 2012 following the expiry of the order. The Department's proposed plan for water conservation is currently unfunded.

Sydney Water has not maintained a baseline level of investment in water conservation. A consultancy report commissioned by the Department in 2013 stated that baseline water conservation (that is, activities which occur at all times including outside of drought) is critical to ensuring that water savings are retained, and that water conservation can increase quickly, should drought return. Maintaining relationships with sector specialists, businesses and government are particularly important.

Sydney Water did not request baseline funding for water conservation in its June 2015 price submission to IPART, although this may have been an option available to it in preparation for developing a program consistent with the ELWC method by 1 September 2017.

Sydney Water did request baseline water conservation funding (\$10.0 million) in its July 2019 pricing submission to IPART. Also, in its updated November 2019 price submission, Sydney Water requested a mechanism that would allow it to pass-through to customers (in the next year) the costs of delivering initiatives including an expanded water conservation program. IPART has allowed this baseline funding and cost pass-through in its June 2020 pricing determination.

In July 2019, Sydney Water also secured around \$5.8 million in funding from its contributions to Climate Change Fund to subsidise WaterFix Residential.

2.3 Implementing and reviewing water conservation

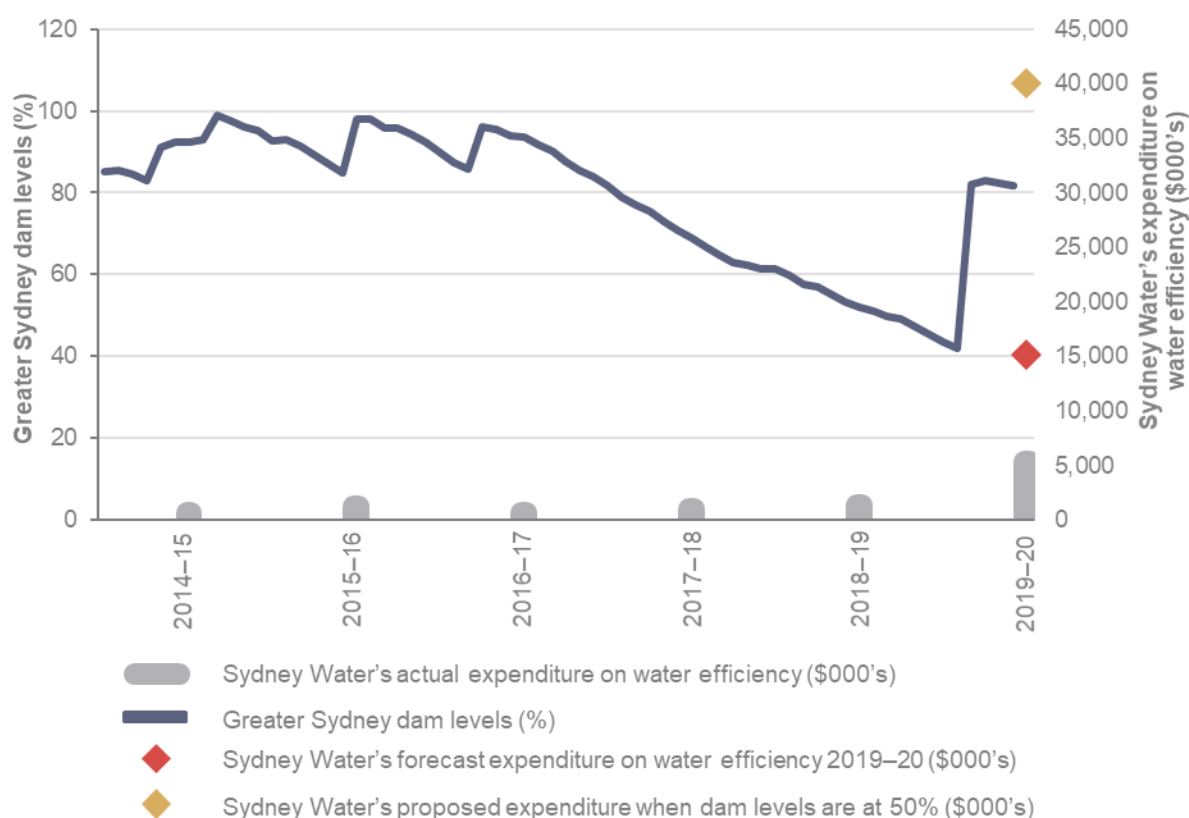
Sydney Water's initiatives were not implemented as required, and were slow to respond to drought

Sydney Water's water conservation initiatives were limited in scope since 2017. The evidence indicates that Sydney Water did not implement initiatives that were economic under the ELWC methodology and did not meet 2017 Metropolitan Water Plan requirements.

There was a limited investment response from Sydney Water on water conservation when dam storage levels started to decline from 2017. As shown in Exhibit 10, as the storage levels were dropping, the costs associated with providing water were increasing, which means that more water conservation initiatives should have become economically viable under its ELWC method. In 2017–18 Sydney Water did run its WaterFix Residential and WaterFix Strata initiatives although this was done on a full cost recovery basis and was limited in scale. It also reported an increase in investment in its active leak detection program.

For 2018–19, as noted in Exhibit 6, three out of the eight initiatives that were assessed as economically viable under the ELWC were implemented. WaterFix Residential and WaterFix Strata continued on a full cost recovery basis. An expanded and subsidised version was being run with funding from the Climate Change Fund from July 2019.

Exhibit 10: Expenditure on water efficiency initiatives and changing dam storage levels



Note: Does not include leakage management activities and the ongoing costs of recycling schemes.

Source: Sydney Water, Water Conservation Reports; Sydney Water forward program 2019-20; Water NSW, Audit Office Analysis.

The number and scope of these initiatives is limited compared with the suite of water conservation initiatives developed and implemented during the Millennium drought as shown in Exhibit 11.

Exhibit 11: Impact of investments following the Millennium drought response

The Department and Sydney Water were successful in reducing overall water consumption during the Millennium drought, with Sydney's consumption each year reducing from around 630 GL in 2003 to around 500 GL in 2012.

The Department estimates that cumulative water savings achieved during the drought exceeded 116 GL from programs that were operating prior to 2011-12. However, the gains made during the Millennium drought have been partially eroded with consumption peaking in 2017-18 at 600 GL/year, noting that population increases are also a factor.

Up until 2012, water conservation initiatives in Sydney Water and the Department were being funded from the Climate Change Fund with contributions of around \$30.0 million/year from Sydney Water.

Source: The Department of Planning, Industry and Environment 2020.

The initiatives from the Millennium drought were not funded from June 2012, when Sydney Water was no longer required to contribute to the Climate Change Fund. This was despite stakeholders and the Minister raising concerns that there was still community support for the water conservation program and potential for further water savings.

Sydney Water stated that water leakage increased in 2017-18 because of pipes breaking due to clay soils contracting in the recent drought. Sydney Water exceeded its economic level of leakage in 2017-18 and 2018-19. Sydney Water reported a leakage level of 129.5 ML/day for 2017-18 and 131 ML/day for 2018-19.

There was a requirement in its previous operating licence until December 2016, when Sydney Water's ELWC method was approved by IPART, that leakage should not exceed 121 ML/day. It reports that it did respond to more watermain breaks and did invest more in active leak detection over the period, and there was a significant increase in time taken to repair breaks and leaks.

IPART released findings on the matter in June 2020. It concluded that Sydney Water's increased reactive pipe maintenance is partly due to previous inefficient leakage management and a declining trend of planned maintenance between 2012 and 2016. IPART also noted that Sydney Water's leakage and broader water conservation performance is an area where the performance has recently declined and there are increased community expectations for this activity, particularly given recent drought conditions.

In 2018–19 Sydney Water expanded its approach to conserving water with around \$5.8 million recently returned to it from the Climate Change Fund and funds redirected from other programs. Specifically, in 2019–20, Sydney Water has started to expand WaterFix to improve residential water efficiency. It did plan to implement a range of water saving measures for businesses but is yet to undertake this work.

In early May 2020, it advised it had spent around \$4.0 million out of \$5.8 million from the Climate Change Fund, and spent around \$650,000 of the \$10.4 million that it had directed from other programs.

Sydney Water reports limited information on water conservation outcomes

Sydney Water has reported limited information on how water savings and investments are tracking. While Sydney Water produces an annual water conservation report with some analyses of water savings and costs, which is a requirement of its operating licence, these reports lack detail and meaningful performance information.

It is difficult to use these reports to gauge the impact of water conservation initiatives, changes in initiatives and in the levels of investment over time, and scope for improvement. Many of the variations between expected and actual water savings are not explained. Sydney Water does not display previous year's water conservation reports on its website, further limiting transparency.

Sydney Water did not include information in its 2017–18 and 2018–19 water conservation reports on initiatives that it identified as economically efficient (using the approved method) but did not implement - this reporting was required by the reporting manuals accompanying its operating licence.

The Department has not conducted reviews on investment in water conservation

The Department has not done annual assessments on the level and appropriateness of investment in water conservation, but this was expectation under the Metropolitan Water Plan. The plan states that the Department 'must undertake this assessment against water security risks and capacity to respond when drought conditions return, or when demand rises, and make recommendations to government in relation to any required actions'.

The Metropolitan Water Plan also states that, 'a detailed Monitoring, Evaluation, Reporting and Implementation Plan is being developed to guide and support the Plan's implementation,' but the Department did not complete or implement this. This creates a lack of transparency and accountability around activities and limits potential for performance improvements. It also creates a risk that reforms, including work to develop a new water strategy for Greater Sydney, will have a limited evidence-base with regards to water conservation on which to draw.

3. Coordinating and supporting water conservation

3.1 Governance around water conservation

The Department has not clearly defined responsibilities and accountabilities

The Department and Sydney Water have not adequately identified and allocated responsibilities for key activities to plan for, undertake, support and report on water conservation. There is no overall water conservation strategy for Greater Sydney. The absence of clearly defined responsibilities has led to poor accountability, oversight and direction by the Department.

Concerns with the lack of governance around water conservation, and strategic water management more broadly, have been noted by the Water Coalition Senior Officers Group. In November 2019, the group raised the need for stronger water policy and leadership in Greater Sydney to support integrated water management, and the need for more clarity around water management objectives, outcomes and accountabilities. The group has members from Sydney Water, the Department, the NSW Environment Protection Authority (EPA) and Water NSW. Consultants engaged by the Department also reported governance issues in 2015, as did IPART in its 2019 submission to the NSW Productivity Commissioner.

Further, reviews of previous metropolitan water plans highlighted governance as an issue, but the 2017 Metropolitan Water Plan still failed to allocate responsibilities to agencies for a range of important activities. Examples of activities for which responsibilities are not clear include to:

- 'continue to monitor water use and review options to meet the future water needs of Sydney's growing population'
- 'plan and develop innovative water solutions that address, in a holistic way, the water needs of our new and expanding communities'
- 'use our existing supplies more efficiently, invest in water conservation initiatives, and make sure there is sufficient water to meet Greater Sydney's long-term water needs'
- 'support the WaterSmart Cities program with an investigation into the barriers and enablers of investment in economically efficient recycling initiatives'.

There is also no clearly defined role or agreement for the Department to have input into Sydney Water's water conservation program and ELWC method.

Sydney Water developed a roles and responsibilities protocol for the Metropolitan Water Plan and was required under its 2015 to 2020 operating licence to use its 'best endeavours' to agree on this with the Department. The document was never agreed and finalised by the parties. The Department advised Sydney Water and IPART that it did not wish to progress the Roles and Responsibilities Protocol due to the formation of the Water Coalition Senior Officers Group.

The Department's ability to develop policy and identify and undertake, or allocate responsibilities, to support water conservation has been negatively impacted by frequent structural changes and staff turn-over for the team with carriage of metropolitan water planning. Between August 2005 and July 2019, the function changed departments six times and was split on two occasions into separate offices before being re-merged as shown in Exhibit 12.

Exhibit 12: Overview of structural changes to the metropolitan water planning function

Date	Activity
August 2005	The Metropolitan Water Directorate (MWD) moved from the Department of Infrastructure, Planning and Natural Resources to the Cabinet Office.
May 2007	The MWD moved to the Department of Water & Energy.
July 2009	The MWD split and moved to the Department of Environment, Climate Change and Water (DECCW), and the Office of Water established as a separate office within DECCW.
April 2011	The MWD moved to the Department of Finance and Services; Office of Water moved to Department of Primary Industries (DPI).
May 2014	The MWD moved to the Department Primary Industries and merged with Office of Water.
July 2017	The MWD moved to Department of Planning & Environment.
2018–19	The MWD was abolished and the Metro Water and Utilities teams created, the WaterSmart Cities program cancelled.
July 2019	Metro Water team and former Office of Water staff remerged into Water Division within the Department of Planning, Industry and Environment.

Source: The Department of Planning, Industry and Environment 2020.

The Department is developing a water strategy for Greater Sydney as a new approach to metropolitan water planning for the region. This is planned for completion by mid-2021 and may better articulate roles and responsibilities.

3.2 Integrating water conservation with urban planning

The Department has not led the coordination of water and land use planning

The Department has not provided leadership in the coordination of water resource planning in Greater Sydney, particularly to confirm the role of water conservation in the portfolio of water management options.

The Department cancelled the WaterSmart Cities program in 2018. The program was a major Climate Change Fund initiative identified in the Metropolitan Water Plan to explore integrated water cycle management and improve interagency coordination, including with Sydney Water (see Exhibit 2). The stated reason for the cancellation of WaterSmart Cities was potential duplication with other activities. There were also concerns raised by a program review as to whether the work was on track to deliver against key milestones. But the issues that the program aimed to address, for Greater Sydney as a whole, remain.

Around \$5.8 million for the program from the Climate Change Fund was then returned to Sydney Water to fund its water efficiency activities. At one point in 2018–19, the funds were to be re-purposed within the Department to explore regulatory and other barriers to stormwater harvesting in Sydney, but this project was dropped. We note that, since the cancellation of WaterSmart Cities, no similar program has been established with coverage across Greater Sydney although Infrastructure NSW has investigated integrated water cycle management options for Western Sydney through the South Creek Sector Review.

Infrastructure NSW estimates that an additional average 47 GL of water per year will be required to achieve the 'Parkland City' vision for Western Sydney of green neighbourhoods and urban spaces, which is 35 per cent more than if activities were not undertaken to achieve this vision.

Sydney Water has been exploring options for integrating water and land use planning

Sydney Water's Strategic Capital Investment Plan for 2020 to 2044 considers integrated water cycle management as an option for Western Sydney—this would include water recycling plants and indirect potable reuse via pipelines to Prospect Reservoir. Sydney Water also advises that it is working closely with the Greater Sydney Commission, Infrastructure NSW and other agencies through a range of forums, such as the Western Sydney Growth Infrastructure Compact.

In March 2019, the Sydney Water Managing Director wrote to all Greater Sydney councils with advice on how to better align land use planning and water management. Copies of Sydney Water's advice was also provided to the Greater Sydney Commission and the Department.

There has been limited action on addressing barriers to water recycling

There has been no expansion in Sydney Water's water recycling in the last eight years. It assessed the viability of one major recycling scheme in 2019, and the options were found to be 15 to 40 per cent more expensive than traditional water and sewer services. Sydney Water advises it is currently considering a range of the other recycling schemes.

Barriers to water recycling have been noted by the Department, IPART, other state agencies and water industry stakeholders. Reported institutional, policy and regulatory barriers to the uptake of economically efficient water recycling that have not been addressed include that:

- private sector utilities who may include recycled water in their developments have limited access to planning and land release processes
- developer charges are levied for recycled water schemes, but not for traditional water and wastewater servicing, making the former relatively more expensive: the Department has not reviewed the costs and benefits of the 2008 NSW Government Direction to set these developer charges to zero
- there is unclear policy direction on the direct or indirect reuse of potable water, which means houses and buildings that are connected to water recycling schemes must have a third pipe for the non-potable water, which can be expensive to install (see Exhibit 13).

The Department has not made substantive progress towards addressing or coordinating a response these or other barriers.

Also, the Department has not completed a regulatory framework that should accompany amendments to the *Water Industry Competition Act 2006*. As such, the amendments which were passed by NSW Parliament in 2014 to facilitate competition, encourage innovation and improve efficiency have not come into force.

The Department and IPART accepted a recommendation, from a report on barriers to recycling commissioned by Infrastructure NSW in July 2018, to make more information available to private sector utilities about current and projected demand, and water and wastewater system capacity. This will include current and projected capacity constraints and the cost of alleviating or deferring those constraints. The provision of this information may help current and new entrants to the water recycling market. Under its operating licence, Sydney Water will be required to provide this information on its website from 30 September 2020.

Some of the challenges associated with developing economically viable recycling schemes are evident in the Hoxton Park recycling scheme outlined in the following exhibit.

Exhibit 13: Hoxton Park recycling scheme

Construction of Sydney Water's Hoxton Park recycled water plant was started in 2010 with the aim of providing 14,000 homes and an industrial area with recycled water by 2013. Recycled water flows were estimated to gradually increase to 800 ML a year by 2025.

In 2016, the recycled water scheme was still inactive, with the delay attributed to less demand than expected for housing in Sydney's planned growth suburbs. Currently about 4,000 properties have been connected. Another 2,500 homes are needed to connect to 'ensure there is enough demand to efficiently operate the scheme and produce recycled water that meets the water quality guidelines'.

Customers in the scheme area are expected to be supplied with recycled water from late 2022 at the earliest. There is no requirement for people to connect to the scheme, making it less economically viable.

Sydney Water advises it is in the process of designing important changes to the Hoxton Park scheme that will allow recycled water to be used during construction of the new Western Sydney Airport, particularly for dust suppression. Once construction of the airport has progressed, it expects that the number of residential customers will have increased sufficiently to maintain on-going operation.

Source: Sydney Water 2020.

There has been limited progress on addressing barriers to stormwater harvesting

The Department has not widely explored or progressed stormwater harvesting as a water conservation option. In most areas in Greater Sydney, stormwater infrastructure (e.g. drains) is owned by councils and stormwater is directed away to avoid local flooding.

The Productivity Commission has noted that effectively managing stormwater and harvesting this water for other uses involves a complex interface between local governments, water utilities and regulators. Recent investigations by Infrastructure NSW have highlighted that stormwater harvesting has a role in meeting water needs in Western Sydney's growth areas.

The Department did not progress a 2018 project, to be funded with \$5.8 million from the Climate Change Fund, to address stormwater infrastructure delivery by 'establishing a model for delivering and maintaining stormwater infrastructure in high growth areas in Western Sydney'. The model was to be piloted and considered for its applicability in other areas of Greater Sydney.

There is a need for departmental leadership in identifying a catchment-based approach to waterways governance, which operates across local government areas to integrate stormwater management including harvesting, with floodplain management and river health.

Measures are in place to encourage efficient urban water use

The Department has had a role in measures to encourage efficient water use in residential and commercial buildings, and in urban growth and infill areas.

- The Department is the Australia-wide administrator of the National Australian Built Environment Rating System (NABERS). NABERS can be used to measure and compare a building's water consumption, as well as energy efficiency, carbon emissions and waste. Participants are encouraged to reduce energy and water consumption and so improve their building's NABERS rating over time.
- The Department reports on progress with the Building Sustainability Index (BASIX), which was introduced in 2004 to encourage the installation of water-saving fixtures and alternative water sources in new homes and large renovations. Since 2011, over 160,000 certificates have been issued under BASIX for residential dwellings.

There may be potential for BASIX to be enhanced, especially in relation to water use targets and the use of recycling and rainwater tanks. The NSW Government did not adopt recommendations made in 2013 to increase the BASIX water saving targets. Also, the Department does not have accurate data on the number of individual homes covered by BASIX as certificates can be issued for individual dwellings (i.e. houses) or one certificate can apply to a whole apartment block.

3.3 Collaborating on water conservation

There has been limited collaboration between the Department and Sydney Water

People in Greater Sydney value water conservation, according to community engagement conducted by the Department and Sydney Water. But the Department has not leveraged this opportunity in collaboration with Sydney Water, particularly outside times of drought.

The Department has missed opportunities to support Sydney Water's water conservation partnerships. For example, to facilitate engagement with relevant government agencies such as:

- the Department of Education, to encourage schools to conduct water efficiency audits and implement these measures
- the Office of Local Government, to enhance councils' engagement with programs to improve water efficiency in local businesses, and to implement sustainable water solutions in their Local Strategic Planning Statements.

The Department did not support businesses and government agencies to 'ramp-up' water conservation during the recent drought.

There is no evidence that the Department has done regular assessments of different sectors' capacity to engage specialist water efficiency auditors and plumbers to implement water saving action plans. Water savings activities in place during the Millennium drought have also ceased: at that time, 240 high water-use business and all 44 councils in Greater Sydney were required to prepare water savings action plans, and over 30 government sites also developed plans.

There has been limited community engagement on water conservation

In developing the Metropolitan Water Plan, the Department found that the community is interested in ways to use water more wisely in and around the home, and they consider water efficiency and recycling to be important. It also found that people may be willing to pay to facilitate investment in water conservation, including recycling.

The Department has not implemented some community engagement activities required under the Metropolitan Water Plan. For example, there is no evidence that it has progressed identified actions to pursue and report on community attitudes about highly-treated recycled water for drinking water supply in the future.

The WaterSmart Cities program would have represented a collaborative approach to water and land use planning, including comprehensive community and stakeholder engagement. The Department did some engagement in the early stages of developing the program but discontinued before outputs were developed.

Sydney Water commissioned extensive surveys on customers willingness to pay in 2018 but there has been little focus in these on water conservation initiatives. A customer forum in 2018 indicated support for voluntary demand reduction (i.e. tougher Water Wise Rules), including rules around internal use. Support to implement a voluntary target for water use, such as 180 litres per person per day, was also found. No progress has been made by Sydney Water or the Department on further investigating or implementing these opportunities.

Sydney Water conducts limited community awareness campaigns to encourage water conservation outside of drought. The community's response to the recent drought shows there is potential for this to reduce water consumption. Sydney Water commissioned a survey of 1,000 Sydney residents in late April 2019 that showed that nearly two thirds of Sydneysiders were unaware that Greater Sydney is in drought. Survey data also showed that almost one in five did not feel their water-saving efforts would make a difference, despite almost two thirds of people knowing they could reduce their water usage.

From May 2019, Sydney Water ran community awareness campaigns focused on drought awareness and understanding. This included print, radio, social media and online advertising. Sydney Water estimates water savings of around 76 GL from water restrictions and awareness campaigns from November 2018 to March 2020.

Section two

Appendices

Appendix one – Responses from agencies

Response from Department of Planning, Industry and Environment



Planning,
Industry &
Environment

Office of the Secretary

Your ref: D2009211

Ms Claudia Migotto
Assistant Auditor-General Performance Audit
Audit Office of New South Wales
GPO Box 12
SYDNEY NSW 2001

Dear Ms Migotto,

Performance Audit – Metropolitan Water Conservation

Thank you for your correspondence regarding the final report for the performance audit on water conservation initiatives in Greater Metropolitan Sydney.

The Department of Planning, Industry and Environment (the Department) acknowledges that a greater emphasis on water conservation is needed and agrees with all the audit recommendations. It supports the report's findings that there are opportunities for the Department and Sydney Water to improve water conservation initiatives in Greater Sydney.

The report highlights the complexity of institutional arrangements in the water sector and many of the improvement opportunities raised in the report are a result of those arrangements. Since the formation of the Department and the recruitment of a Chief Executive Officer (CEO) for the NSW Water Sector, the Department has made considerable progress towards lifting water sector performance by having a single unifying role responsible for the strategic direction of the sector. This is the beginning of a significant program of reform that, as the audit recommends, will ensure the Department provides greater clarity around the NSW Government's desired outcomes for our community, defining water sector roles and responsibilities and an increased focus on useful monitoring and reporting. Actions relevant to the audit's recommendations that have been taken to date include:

- commencing work on a State Water Strategy to outline the Government's long-term vision and performance expectations for the sector
- establishing a coordinating group of CEOs and senior executives to agree responsibilities and implement the Government's vision for the water sector
- reviewing the barriers to good performance in the sector, including the regulatory and institutional arrangements.

Greater collaboration and information sharing with the water sector will be critical to lift water sector performance. In line with the audit's recommendations, the Department has commenced the development of a Water Efficiency Framework for NSW that will apply across all water utilities in the State and a water efficiency program for Greater Sydney specifically. This work involves:

- commissioning a detailed analysis of water conservation options to understand best-practice methods and initiatives for water efficiency
- collaborating with Sydney Water, WaterNSW and other stakeholders to build capacity for water conservation, and increase private sector involvement
- gaining a greater understanding of water use, improving the evaluation of water conservation programs, and developing a framework that considers the total water cycle, from water supply through to wastewater treatment and discharge to oceans and waterways

Four Parramatta Square, 12 Darcy Street, Parramatta NSW 2150 | dpie.nsw.gov.au

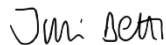
- providing a clear statement of government policy and direction about the need to support and invest in water efficiency regardless of dam levels, including the development of a water saving goal for Greater Sydney
- identifying clear governance arrangements between Sydney Water, WaterNSW and the Department
- coordinating with state owned corporations to develop and implement a public engagement program to understand public attitudes to recycled water
- exploring a range of funding sources to support the program.

The Department, with the support of Sydney Water and WaterNSW is developing the Greater Sydney Water Strategy. It 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. It will highlight how the efficient use of water, in combination with additional supply-side options such as desalination and recycling, will ensure that we have the water to meet the needs of a city forecast to grow to around 8 million people over the next 30 years.

The Department has been working with Sydney Water and key stakeholders to address the issues raised and recommendations in the audit report.

If you have any questions, please contact Mr Jim Bentley, CEO of the NSW Water Sector on 0448 762 851.

Yours sincerely,



Jim Betts
Secretary

12/6/2020

Many thanks to the AO team.

Response from Sydney Water Corporation



15 June 2020

Ms Margaret Crawford
Auditor-General
Audit Office of NSW

Dear Ms Crawford

Thank you for your letter of 18 May regarding the Audit Office's final report for the performance audit on water conservation in Greater Metropolitan Sydney.

Sydney Water acknowledges the performance report's findings that there are opportunities to improve water conservation initiatives and agrees with the recommendations. We recognise the critical value of our most precious resource and place a high priority on conserving water as part of a range of measures to ensure a resilient and secure water supply for Greater Sydney.

I would like to highlight that we have made very significant achievements in water conservation and will continue to work collaboratively with the Department of Planning, Industry and Environment (DPIE) as we further implement our program and assist in the development of the Greater Sydney Water Strategy.

Our recent range of water conservation achievements and initiatives include:

- Overall water savings of 11.4 per cent against forecast since June 2019, in response to the recent drought. This equates to more than 76.4 billion litres of water saved – or 30,560 Olympic-sized swimming pools.
- Our water conservation awareness and education campaigns, along with current water restrictions, have reduced the average residential daily-water-used from about 210 litres per person in 2017 to about 180 litres earlier this year. Despite a 26 per cent increase in population, the total demand for drinking water remains lower than it did before mandatory restrictions were introduced in late 2003.
- Completed more than 14,000 WaterFix appointments since July 2019, with over 48,000 repairs and replacements completed for our residential customers. This will continue to save 404 million litres per year.
- Responded to increased leaks and breaks, caused by prolonged dry weather and drought conditions, by increasing investment in our frontline workforce. Sydney Water has also increased proactive inspections, preventative maintenance and longer-term asset investments.
- Introduced new technology to improve the efficiency of preventative maintenance inspection programs such as acoustic tools, sensors and robots, as part of a plan to improve condition monitoring of pipes.
- Reduced average response time to fix reactive and corrective leaks, to the lowest levels since 2016.

Sydney Water Corporation ABN 49 776 225 038
1 Smith St Parramatta 2150 | PO Box 399 Parramatta 2124 | DX 14 Sydney | T 13 20 92 | www.sydneywater.com.au
Delivering essential and sustainable water services for the benefit of the community

- Completed more than 16,500kms of active leak detection this financial year to date, and we are on track to complete a record 18,000kms of our 23,000km water network by the end of June 2020, which is a 100% increase from 2018.
- 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. This complements the two highly-trained dogs already working on leak detection across our wastewater network.
- Supplied about 44 billion litres of recycled for household, commercial, industrial and agricultural use. This helps recycle wastewater that otherwise would have been treated and sent to the waterways and ocean. Sydney Water's Rouse Hill Water Recycling Scheme services 32,000 properties and is the largest residential scheme in Australia. It treats 20 million litres of wastewater each day, then recycles most of it back to customers for non-drinking purposes. Over the next 25 years, we expect to at least double our water recycling to more than 80 billion litres a year.
- Conserving water through multiple other programs including our WaterFix Residential and Strata services, PlumbAssist, Councils Partnership, Schools Pilot Program, Water Wise Coach, and End Use Study.
- Sydney Water has requested \$40 million in our Pricing submission currently being finalised by the Independent Pricing and Regulatory Tribunal (IPART) for our 2020-2024 forward program.

I would like to also highlight that IPART's independent operational audits assessed Sydney Water as being compliant with Operating Licence requirements.

Sydney Water looks forward to working further with DPIE and key stakeholders to address the issues raised and recommendations in the audit.

Our alignment with DPIE in the development of the Greater Sydney Water Strategy will help deliver sustainable, efficient and productive water management to ensure the ongoing water supply needs of the growing Greater Sydney Metropolitan region.

Yours sincerely

A handwritten signature in black ink, appearing to read "Roch Cheroux", written over a horizontal line.

Roch Cheroux
Managing Director

Appendix two – About the audit

Audit objective

This audit assessed whether water conservation initiatives for the Greater Sydney Metropolitan area are effectively investigated, implemented and supported.

Audit criteria

We addressed the audit objective by answering two questions:

1. Are water conservation initiatives effectively investigated and implemented?
2. Are effective arrangements in place to coordinate and support water conservation initiatives?

Audit scope and focus

In assessing the criteria, we checked the following aspects:

1. Are water conservation initiatives effectively investigated and implemented?
 - a) Are options and proposals for water conservation initiatives supported, and evidence based?
 - b) Are water conservation plans developed with clear objectives?
 - c) Are approaches to water conservation implemented and reviewed?
 - d) Are water conservation measures being adequately considered for urban growth and infill?
2. Are effective arrangements in place to coordinate and support water conservation initiatives?
 - a) Are responsibilities for key activities adequately identified?
 - b) Are regular reviews conducted on the level and appropriateness of investment in water conservation?
 - c) Are barriers to water conservation identified and addressed?
 - d) Are collaborative arrangements, partnerships and community engagement established?
 - e) Are arrangements for capacity building in place?

This audit focused on the Department of Planning, Industry and Environment (the Department) and Sydney Water.

The audit included examining:

- development and implementation plans for water conservation
- initiatives to conserve water and improve its efficient use of water, including public awareness campaigns about water usage
- leak management across the Greater Sydney water distribution network
- recycling, re-use and efficiency initiatives, opportunities to save potable water, both public and private
- the regulatory environment for water conservation initiatives.

Audit exclusions

The audit did not examine:

- the effectiveness of water restrictions
- the effectiveness of councils' in implementing water reuse and recycling initiatives
- water conservation initiatives outside the Greater Sydney Metropolitan area
- conservation initiatives undertaken by Water NSW.

However, we have commented on these issues where they affected our findings or to provide context.

Audit approach

Our procedures included:

1. Interviewing:
 - staff in the Department of Planning, Industry and Environment and Sydney Water responsible for developing and implementing water conservation programs and initiatives
 - stakeholders with knowledge and experience in water conservation programs
 - stakeholders and engaging with experts and consultants with a knowledge of pricing and its potential impact on water conservation initiatives.
2. Consulting with other stakeholders including:
 - the Greater Sydney Commission
 - IPART
 - Water NSW
 - Infrastructure NSW
 - private water utilities and water industry representative groups
3. Examining:
 - the 2017 Metropolitan Water Plan, and historical versions back to 2004
 - Sydney Water's Water Conservation Plan 2017 and its Operating Licence 2015 to 2020, and historical versions
 - information on the mechanism developed for investigating new proposals for meeting water supply and security needs
 - the list of options that have been assessed to meet long term water supply needs
 - the Department's Metro Water's annual assessment of the level of investment in water conservation
 - information on the relevant funds and status of these activities, such as the Climate Change Fund and WaterSmart cities program
 - activities by Sydney Water, the Department and agencies noted in the Metropolitan Water Plan to support public and private sector capacity building and community engagement
 - reviews of barriers and enablers to cost effective water recycling, including a key study by Infrastructure NSW
 - plans from the Greater Sydney Commission and others, and the results for conservation initiatives in some urban growth or infill (as potential case studies)
 - water pricing, especially as it relates to and may impact water reuse, water saving and leak management
 - information and audit reports related to metropolitan water supply and regulation from other jurisdictions (for comparison)
 - previous NSW Audit Office reports related to water resource management and supply, and Financial Volumes that included water indicators.

4. Collecting and analysing data on water conservation initiatives; potentially examining information on the Sydney Water's demand forecasting, the Economic Level of Water Conservation, and leak management.

The audit approach was complemented by quality assurance processes within the Audit Office to ensure compliance with professional standards.

Audit methodology

Our performance audit methodology is designed to satisfy Australian Audit Standard ASAE 3500 Performance Engagements and other professional standards. The standards require the audit team to comply with relevant ethical requirements and plan and perform the audit to obtain reasonable assurance and draw a conclusion on the audit objective. Our processes have also been designed to comply with requirements specified in the *Public Finance and Audit Act 1983* and the *Local Government Act 1993*.

Acknowledgements

We gratefully acknowledge the co-operation and assistance provided by liaison officers in the Department and Sydney Water. We'd also like to acknowledge the input and guidance provided by expert consultant.

Audit cost

The total estimated cost for the audit is \$413,123.

Appendix three – Glossary

BASIX	Building Sustainability Index
Dam storage levels	Dam storage refers to how much water is in the 21 storage dams (11 major dams) that supply the Greater Sydney Region. Water NSW manages these dams, which hold more than 2.6 million ML of water.
ELL	Economic Level of Leakage
ELWC	Economic Level of Water Conservation
Greater Sydney	Greater Sydney refers to the geographical areas that comprise Sydney, the Illawarra and Blue Mountains.
Integrated water cycle management	An approach to water supply and demand management that considers all aspects of the water cycle. These include using recycled water (wastewater and stormwater) for non-potable and indirect potable options for water sensitive land use and urban design.
IPART	Independent Pricing and Regulatory Tribunal (New South Wales)
KL, ML and GL	<p>The main metric water volume measurement units used by the water sector in Australia:</p> <ul style="list-style-type: none"> • 1 Kilolitre (KL) = 1,000 Litres • 1 Megalitre (ML) = 1,000 KL • 1 Gigalitre (GL) = 1,000 ML.
Leakage management	Leak management comprises of leak detection and repair of damaged pipes in Sydney Water's network of over 22,000 kilometres of water pipes. Leak management is a major way Sydney Water reduces water loss.
Levelised cost	The present value of the stream of costs associated with water conservation projects divided by the present value of water saved. Both the costs and water saved are measured over the time period of the water savings resulting from the action. The levelised cost is compared to the estimated value of water to determine whether the investment in the water conservation project can be justified.
Long-run value of water	It represents the costs that are expected to be avoided by the community if potable water usage were to be reduced sometime beyond the next few years, when major infrastructure investments are possible. This value differs from the short-run value in that the value to customers from reducing the risk of water restrictions is replaced by the avoided costs of pushing back optimal combination of future demand and supply-side investments.
Millennium drought	A prolonged period of dry conditions with low rainfall which affected the southeast, southwest and in particular the Murray-Darling Basin and southern cropping zones of Australia from late 1996-mid-2010. The cities of Perth, Adelaide, Melbourne, Hobart, Canberra, Sydney and Brisbane were all affected by persistent or periodic drought episodes.
NABERS	National Australian Built Environment Rating System
Potable water	Water that is intended for use as drinking water and should materially meet the Australian Drinking Water Guidelines.

Present value	The present value is the current value of a future annual stream of dollars (or volume of water savings). The future stream is converted into a current value equivalent using a specified discount rate (e.g. the regulated real pre-tax Weighted Average Cost of Capital), taking account of the year in the cost/water saving was incurred (e.g. the current value of \$1 incurred in year ten would be greater than a \$1 incurred in year 30).
Short-run value of water	It reflects the Sydney Water's operating costs from supplying a kilolitre of water (such as electricity for pumping and chemicals for treatment), the value to customers from reducing the risk of water restrictions, as well as, any avoided 'externalities' (e.g. cost of environmental damage) associated with supplying the water. The short-run value will be higher at low water storage levels because under those conditions water is supplied from more expensive sources (e.g. desalination) and the risk of water restrictions is higher.
Smart meter	An advanced water meter that provides high resolution and frequent water consumption data, which can improve feedback to consumers and thus enhance water conservation and management.
Stormwater harvesting	Stormwater harvesting involves the capture, treatment, storage, and use of urban stormwater runoff. As opposed to rainwater harvesting, stormwater runoff is collected from drains rather than roofs.
The Department WaterFix	The New South Wales Department of Planning, Industry and Environment. WaterFix is a water efficiency measure operated by Sydney Water. WaterFix residential is a plumbing service for individual dwellings to install efficient fittings and fix minor leaks which has run since 1998. WaterFix Strata is a similar service that focuses on strata buildings.
Water recycling	Water recycling refers to the treatment and reuse of sewage, greywater and/or stormwater, for non-potable purposes.
Water reuse	The process of using treated wastewater for drinking water is called potable water reuse. Potable water reuse provides another option for expanding a region's water resource portfolio. There are two types of potable water reuse: <ul style="list-style-type: none"> • Indirect potable reuse: Uses an environmental buffer, such as a lake, river, or a groundwater aquifer, before the water is treated at a drinking water treatment plant. • Direct potable reuse: Involves the treatment and distribution of water without an environmental buffer.
Water restrictions	Water restrictions are a regulatory demand management and/or drought response measure, that seeks to reduce water use through restricting residential and business use of drinking water. Penalties may apply for non-compliance.
Water service developer charges	Developer charges are up-front charges that a water utility may levy to recover part of the infrastructure costs incurred in servicing new development or additions and changes to existing development.

Appendix four – Performance auditing

What are performance audits?

Performance audits determine whether state or local government entities carry out their activities effectively, and do so economically and efficiently and in compliance with all relevant laws.

The activities examined by a performance audit may include a government program, all or part of an audited entity, or more than one entity. They can also consider particular issues which affect the whole public sector and/or the whole local government sector. They cannot question the merits of government policy objectives.

The Auditor-General's mandate to undertake performance audits is set out in section 38B of the *Public Finance and Audit Act 1983* for state government entities, and in section 421D of the *Local Government Act 1993* for local government entities.

Why do we conduct performance audits?

Performance audits provide independent assurance to the NSW Parliament and the public.

Through their recommendations, performance audits seek to improve the value for money the community receives from government services.

Performance audits are selected at the discretion of the Auditor-General who seeks input from parliamentarians, state and local government entities, other interested stakeholders and Audit Office research.

How are performance audits selected?

When selecting and scoping topics, we aim to choose topics that reflect the interests of Parliament in holding the government to account. Performance audits are selected at the discretion of the Auditor-General based on our own research, suggestions from the public, and consultation with parliamentarians, agency heads and key government stakeholders. Our three-year performance audit program is published on the website and is reviewed annually to ensure it continues to address significant issues of interest to Parliament, aligns with government priorities, and reflects contemporary thinking on public sector management. Our program is sufficiently flexible to allow us to respond readily to any emerging issues.

What happens during the phases of a performance audit?

Performance audits have three key phases: planning, fieldwork and report writing.

During the planning phase, the audit team develops an understanding of the audit topic and responsible entities and defines the objective and scope of the audit.

The planning phase also identifies the audit criteria. These are standards of performance against which the audited entity, program or activities are assessed. Criteria may be based on relevant legislation, internal policies and procedures, industry standards, best practice, government targets, benchmarks or published guidelines.

At the completion of fieldwork, the audit team meets with management representatives to discuss all significant matters arising out of the audit. Following this, a draft performance audit report is prepared.

The audit team then meets with management representatives to check that facts presented in the draft report are accurate and to seek input in developing practical recommendations on areas of improvement.

A final report is then provided to the head of the audited entity who is invited to formally respond to the report. The report presented to the NSW Parliament includes any response from the head of the audited entity. The relevant minister and the Treasurer are also provided with a copy of the final report. In performance audits that involve multiple entities, there may be responses from more than one audited entity or from a nominated coordinating entity.

Who checks to see if recommendations have been implemented?

After the report is presented to the NSW Parliament, it is usual for the entity's audit committee to monitor progress with the implementation of recommendations.

In addition, it is the practice of Parliament's Public Accounts Committee to conduct reviews or hold inquiries into matters raised in performance audit reports. The reviews and inquiries are usually held 12 months after the report received by the NSW Parliament. These reports are available on the NSW Parliament website.

Who audits the auditors?

Our performance audits are subject to internal and external quality reviews against relevant Australian and international standards.

The Public Accounts Committee appoints an independent reviewer to report on compliance with auditing practices and standards every four years. The reviewer's report is presented to the NSW Parliament and available on its website.

Periodic peer reviews by other Audit Offices test our activities against relevant standards and better practice.

Each audit is subject to internal review prior to its release.

Who pays for performance audits?

No fee is charged for performance audits. Our performance audit services are funded by the NSW Parliament.

Further information and copies of reports

For further information, including copies of performance audit reports and a list of audits currently in-progress, please see our website www.audit.nsw.gov.au or contact us on 9275 7100.

OUR VISION

Our insights inform and challenge government to improve outcomes for citizens.

OUR PURPOSE

To help parliament hold government accountable for its use of public resources.

OUR VALUES

Pride in purpose
Curious and open-minded
Valuing people
Contagious integrity
Courage (even when it's uncomfortable)

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