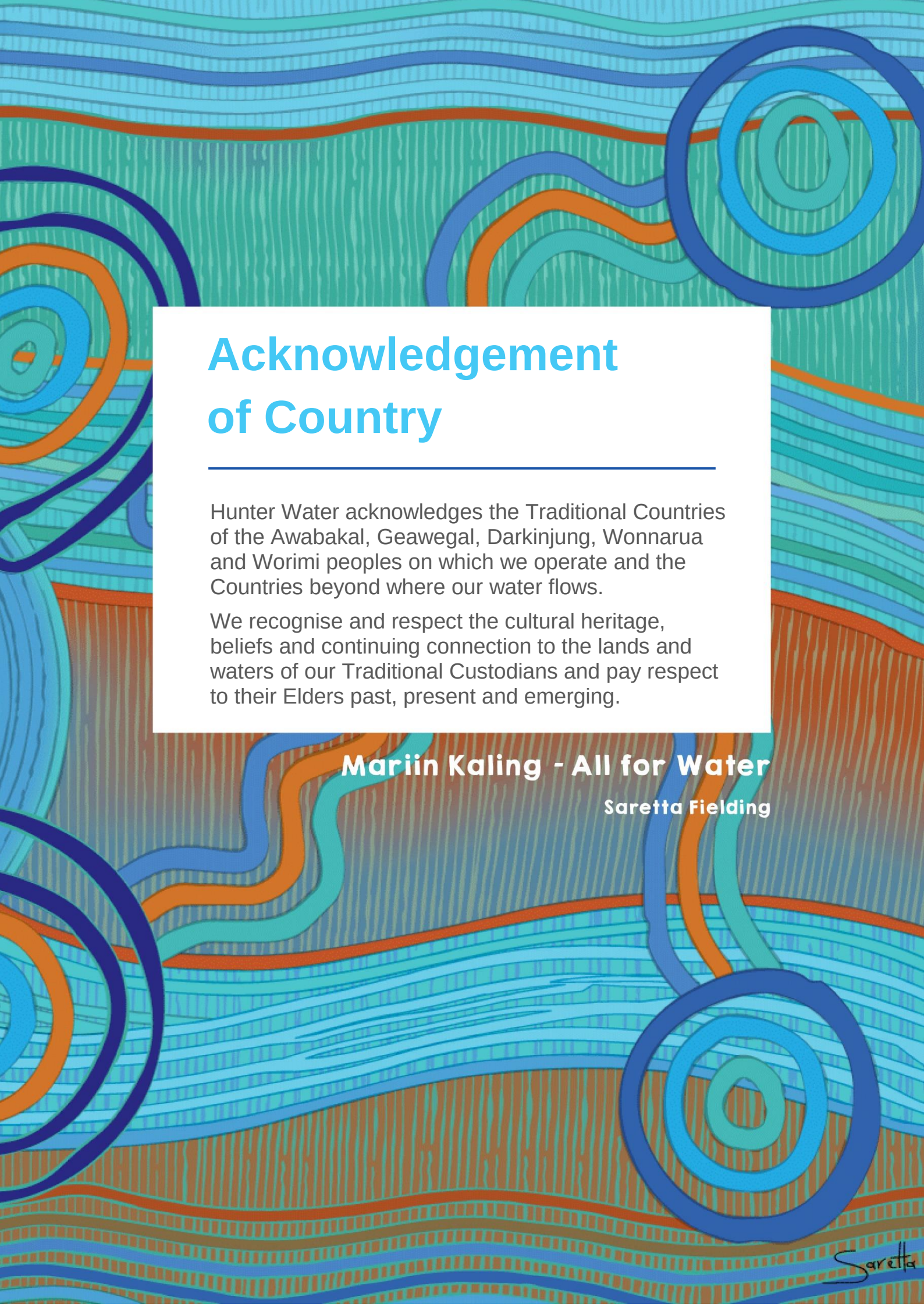
FIVE YEAR WATER CONSERVATION PLAN

December 2023

Acknowledgement of Country

Hunter Water acknowledges the Traditional Countries of the Awabakal, Geawegal, Darkinjung, Wonnarua and Worimi peoples on which we operate and the Countries beyond where our water flows.

We recognise and respect the cultural heritage, beliefs and continuing connection to the lands and waters of our Traditional Custodians and pay respect to their Elders past, present and emerging.



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EXECUTIVE SUMMARY

Hunter Water is a State-Owned Corporation with a vision of providing a sustainable water future for all. We provide safe, reliable and efficient water and wastewater services to around 630,000 people in the Lower Hunter region. Our Operating Licence is the key regulatory instrument that enables and requires us to provide our services.

This Five Year Water Conservation Plan provides detailed information, in accordance with the requirements in our Operating Licence Reporting Manual, on the water conservation projects and activities Hunter Water carried out in 2022-23 as well as our future 5 year plan. The Plan takes into consideration the amendments and recommendations from the Water Efficiency Framework released in October 2022.

Our water conservation activities support the delivery of the Lower Hunter Water Security Plan (LHWSP). Water conservation is a key element to managing the supply and demand balance for the Lower Hunter region.

The Love Water campaign, launched early 2018, provided a brand position for Hunter Water as a leader in water conservation focus and action, and helped in significantly raising water literacy and awareness, leading to substantial behaviour change in how our community use water. The Love Water brand has since been adopted by several other utilities, nationally and internationally.

In 2022-23, customer focussed leakage and water efficiency programs saved 845 megalitres. Active leak detection, pressure management and Hunter Water asset replacement programs also continued during the year, however the Infrastructure Leakage Index (ILI) increased from 0.99 to 1.21 and real losses from 64 to 83 litres per service connection per day. This was due primarily to some significant break events that were not identified for extended periods due to their remote or hidden location in addition to a general increase in watermain leaks and breaks. Hunter Water will continue to prioritise the expansion of our digital network to proactively identify leaks and this result is expected to improve in coming years.

The cool wet weather has contributed to household annual water consumption in 2022-23 still remaining relatively steady but slightly increasing to 152 kilolitres (up from 151 kilolitres for the past 2 years). Our community has also maintained the behaviours related to the Smart Water Choices permanent water conservation measures and the ongoing Love Water messaging. This has contributed to annual customer demand being 10.1% lower than expected when compared to pre-drought consumption behaviours.

Water conservation at Hunter Water targets water loss and water efficiency while seeking opportunities to introduce alternative, fit for purpose, water sources and support a more integrated approach to water planning. Water conservation initiatives are designed to focus on residential and non-residential customers and Hunter Water operational water consumption.

INTRODUCTION

Hunter Water is a state-owned corporation that provides safe, reliable and efficient water and wastewater services to around 630,000 people in the Lower Hunter region. We also manage the trunk stormwater channels in the Newcastle, Lake Macquarie and Cessnock local government areas. We are governed by the State Owned Corporations Act 1989 and the Hunter Water Act 1991. The NSW Government regulates Hunter Water's operations through a number of regulatory bodies and instruments.

Our Operating Licence is the key regulatory instrument that enables and requires us to provide services. The Operating Licence sets the terms and conditions that specify how services are provided. It contains quality and performance standards that must be achieved. The Operating Licence makes us accountable to the NSW Government for our performance, which is monitored by the Independent Pricing and Regulatory Tribunal (IPART).

This Five Year Water Conservation Plan provides detailed information against Clauses 12(4) and 12(5) of the 2022-27 Operating Licence and has been prepared in accordance with the relevant sections of the associated Operating Licence Reporting Manual. This Plan provides detailed information on the water conservation projects and activities Hunter Water carried out in 2022-23 as well as our future 5 year plan. The Plan takes into consideration the amendments and recommendations from the Water Efficiency Framework released in October 2022.

Section 1 of the report provides information on Hunter Water's overarching approach to water conservation, including how it is related to the LHWSP.

Section 2 describes and explains the water conservation activities Hunter Water carried out during 2022-23 and provides information on the volumes of water drawn from all sources, level of leakage and consumption per person.

Section 3 sets out our five-year plan for water conservation activities.

Further details of the methods used to assess water conservation options are provided in Appendix A.

Regulatory reporting requirements are provided in Appendix B along with cross-references to the location in this report that addresses each requirement.

1 WATER CONSERVATION APPROACH

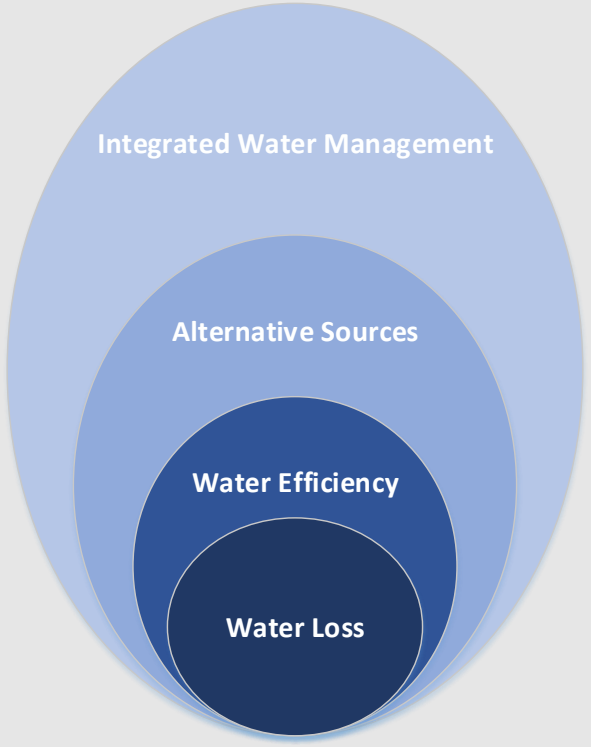
1.1 Why do we need to conserve water?

This is an important time in our water planning. The population in our region is expected to increase by around 175,000 over the next 20 years and we are seeing our climate changing. When planning for the future we need to balance the demand for water with the available supply. Decreasing our water consumption can help reduce the amount the region needs to invest in new drinking water sources and preserves this precious resource.

While the Lower Hunter's existing water supply system performs well in typical climate conditions, it is vulnerable to drought, and water storage levels can fall quickly in prolonged periods of hot dry weather. The introduction of water restrictions is a key component of Hunter Water's drought response along with a Water Conservation program that includes activities that can be easily ramped up or expanded as required during drought.

1.2 Where do we need to conserve water?

Hunter Water's approach to water conservation aims to sustainably and effectively manage water demand in a manner that responds to the expectations of our community. Our approach has four focus areas:



Integrated Water Management – ensuring that sustainable water extraction, use and treatment is fully considered when planning for, designing and building towns, cities, businesses and homes.

Alternative Sources – replacing potable water with water from alternative sources by matching end use with fit for purpose water quality.

Water Efficiency – installing more efficient fittings, appliances and equipment and changing water use behaviours to carry out the same activities but with less water consumed.

Water Loss – identifying and repairing leaking fittings and pipes and reducing evaporation and leakage from water storages.

1.3 How are we conserving water?

Water demand is generally divided into four areas:

- *Residential* – this is the water consumed by our customers in their homes and apartments and includes both indoor and outdoor use. Around 60% of the potable water produced each year is used for this purpose.

- *Non-residential* – industrial, commercial and government customers (for example local councils, schools and hospitals) consume around one quarter of the potable water produced.

- *Other service providers* – water sold to private network operators

- *Non Revenue Water (NRW)* – the remainder is the water used in areas such as Hunter Water operations and firefighting, or is lost due to leakage from the distribution system or theft. Non Revenue Water also occurs when metering inaccuracies mean that volume of water supplied to customers is not fully accounted for.

Hunter Water has a variety of water conservation activities and projects targeting residential, non-residential and NRW. Each initiative aims to address one or more of the water conservation focus areas (water loss, water efficiency, alternative source or integrated water management).

Hunter Water has applied the Economic Level of Water Conservation (ELWC) methodology to determine whether initiatives are economically efficient. The methodology considers social and environmental costs and benefits in addition to the cost of the water conservation activity or project and the volume of water saved. Further details of this methodology can be found in Appendix A.1.

Water conservation objectives are also an inherent part of Hunter Water's Strategic Asset Management Plan, see more detail in Appendix A.2. This plan sets out the priorities, framework and process for decision making within Hunter Water – including options for water conservation and service efficiency improvements.

1.4 Who are we working with?

To be effective, water conservation programs need to achieve long-term, large-scale behaviour change with the adoption of new technologies and attitudes towards how water is used. This means that collaboration with customers, industry and government is key. Hunter Water has therefore carried out a broad range of engagement activities such as consultative forums, surveys and focus groups to help ascertain the expectations of our customers and the broader community in relation to water conservation, and to identify the potential barriers to behaviour change.

All of the customer, community and stakeholder related programs are carried out in accordance with our broader engagement approach. This approach involves listening and learning with customers to understand and appreciate their values, preferences and priorities, building strong and trusted relationships and seeking advocates and allies to help promote water conservation.

Hunter Water also recognises we have a critical role in driving water conservation outcomes by making sure water loss from the distribution system is minimised and that we are using water as efficiently as possible in our operations.

1.5 Monitoring and review

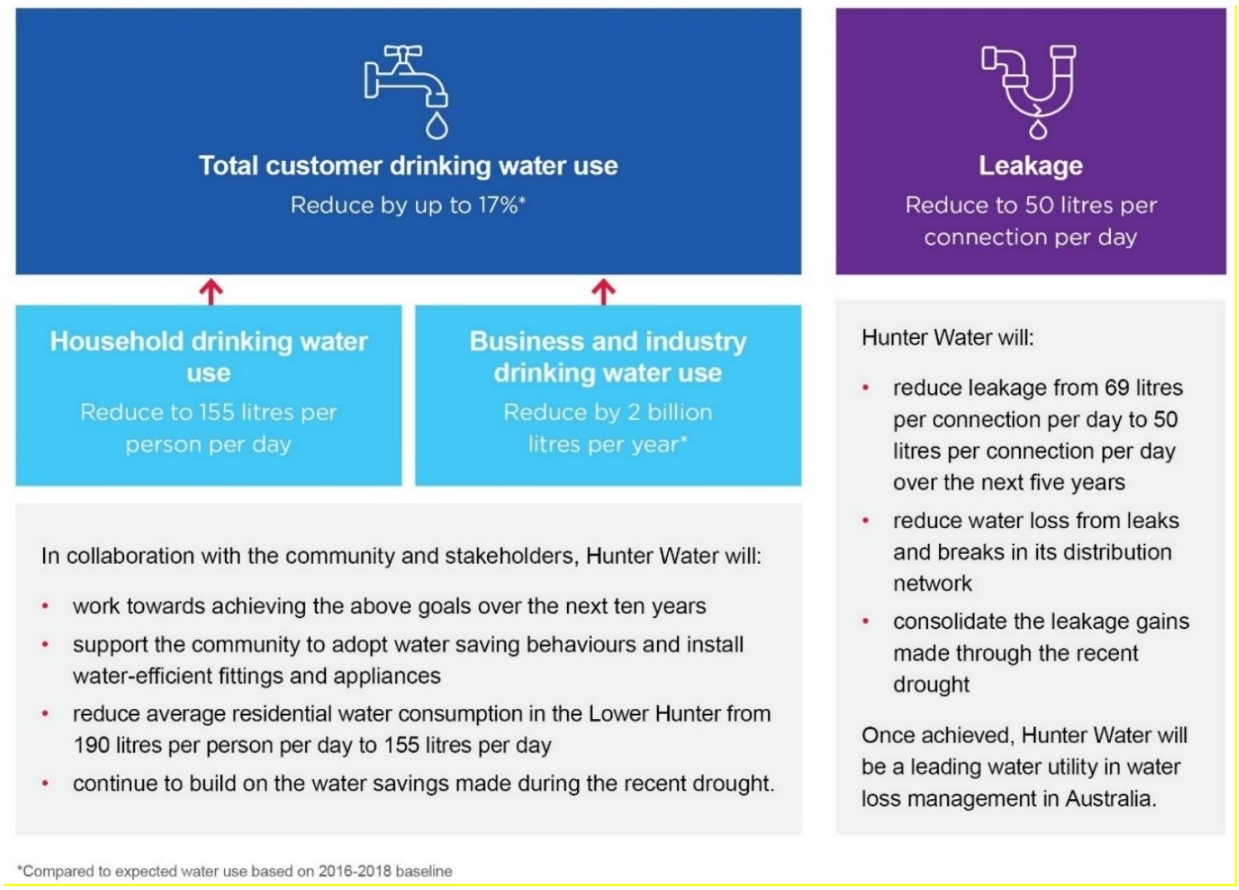
Consumption patterns at a site or population level are monitored to assess the effectiveness of each of the water conservation initiatives and the overall program. The scope and design of the program and associated activities and projects are then adjusted in response to this monitoring and, where necessary, to respond to drought.

1.6 Lower Hunter Water Security Plan

The Lower Hunter Water Security Plan (LHWSP) is a whole-of-government approach to ensure we have a sustainable and resilient water supply for our region, now and for future generations. The first plan was released in 2014 and included actions to supply, save and substitute water; as well as additional measures to respond to droughts when they occur.

A review was carried out to ensure the LHWSP reflects our changing community values and priorities, while being both robust and adaptable in the long term. Hunter Water investigated new sources of water and new ways to conserve water, so we can effectively balance water supply and demand in our region. The updated LHWSP was released by the NSW Government in April 2022.

The LHWSP has set ambitious water conservation goals to be reached by 2032-33 in relation to customer drinking water use and leakage. The water conservation program described in this report is aligned with the goals set in the LHWSP.



2 OUR PERFORMANCE IN 2022-23

2.1 Volumes of water sourced and supplied

In 2022-23, Hunter Water supplied 68,940 million litres (or 68.9 gigalitres) of water. The sources of extracted water are listed in Table 2.1. Of this, 3.2 gigalitres of recycled water was supplied for non-potable end uses. Water usage statistics are shown in Table 2.2.

Table 2.1 Sources of water supplied by Hunter Water in 2022-23 (megalitres)

Source of water	Volume sourced in 2022-23	Proportion in 2022-23
• Surface water[1]	58,371	84%
• Groundwater[1]	6,320	9%
• Received from other service providers or operational areas within the urban water system (ML)[1]	1,583	2%
• Recycled water [1,2]	3,215	5%
Total water sourced	69,490	100%
• Water returned to surface water and groundwater from the urban water supply system[3]	550	
Total water supplied[1]	68,940	

Notes: Figures may not add exactly due to rounding.

1. National Performance Report indicators W1, W2, W5, W7, W26
2. An additional 3,464 ML was supplied to coNEXA (another service provider). NPR Indicator W15
3. Losses at water treatment plants. NPR Indicator W31

Table 2.2 Usage of water supplied by Hunter Water in 2022-23(megalitres)

Water Usage	Volume Supplied in 2022-23	Proportion in 2022-23
Potable Water		
• Residential sector[1]	38,518	58%
• Non-residential sector[1]	15,981	24%
• Other service providers (within our operating area)[1]	1,147	2%
• Other service providers (outside our area of operation)	795	1%
• Non-revenue water[1]	9,833	15%
Total potable water supplied	*66,274*	*100%*
Observed average potable water use per person[3]	286 Litres a day (or 104 kL a year)	
Weather corrected average per person potable water demand[4]	289 Litres a day (or 106 kL a year)	
Recycled Water		
• Residential sector[1]	78	2%
• Non-residential sector[1,2]	3,137	98%
Total recycled water supplied	3,215	100%

Notes: Figures may not add exactly due to rounding.

1. National Performance Report indicators W8.3, W9.3 (with non-revenue water removed to prevent double counting), W14.3, W10.1, W20 and W21 which are all based on the April to April water year.
2. This doesn't include the 3,464 ML of recycled water supplied via coNEXA. NPR Indicator W15
3. Financial year consumption corrected for transfers to and from other service providers, includes residential, non-residential and non-revenue water
4. This figure is calculated on a comparable basis to the weather corrected average per person water demand reported by Sydney Water

The cool wet weather has contributed to household annual water consumption in 2022-23 still remaining relatively steady but slightly increasing to 152 kilolitres (up from 151 kilolitres for the past 2 years). This equates to residential customers using on average 168 litres per person per day in 2022-23, a slight increase on the 167 litres per person per day recorded in 2021-22. When all of the potable water supplied by Hunter Water is considered (residential, non-residential, service providers within our area of operation and NRW), the equivalent of 286 litres per person per day was used during the year, up from the 2021-22 figure of 281 litres per person per day.

Climatic conditions have a strong influence on the levels of customer water use, mainly because they affect outdoor and cooling tower use. Water use by residential customers is seasonal, with higher use over summer months. Changes in weather can vary annual water consumption by up to 7% compared to consumption under average weather conditions.

The purpose of weather (or climate) correction is to remove, as much as we can, the impact of climatic variations as an influencer on water usage. This helps us determine how much water would have been used under 'average weather conditions'. This is important, as year-to-year total demand figures may show significant variation. Weather correction is necessary to monitor and identify underlying demand trends.

Figure 2.1 shows the long-term trend in observed and weather-corrected water demand. Although population increased by 28% between 1991 and 2012, demand for water actually decreased over that time. Weather-corrected water demand remained relatively constant between 2012 and 2019 while a 9% population increase was observed.

Weather-corrected water demand increased during 2022-23 due to the ongoing softening of residential customer behaviour but did not return to previous levels likely due to water saving behaviours retained post restrictions. It is estimated that wetter weather in 2022-23 resulted in a 0.8 GL decrease in demand compared to what would be expected in a year with average weather conditions.

Figure 2.1 Observed and Weather-Corrected Total Demand

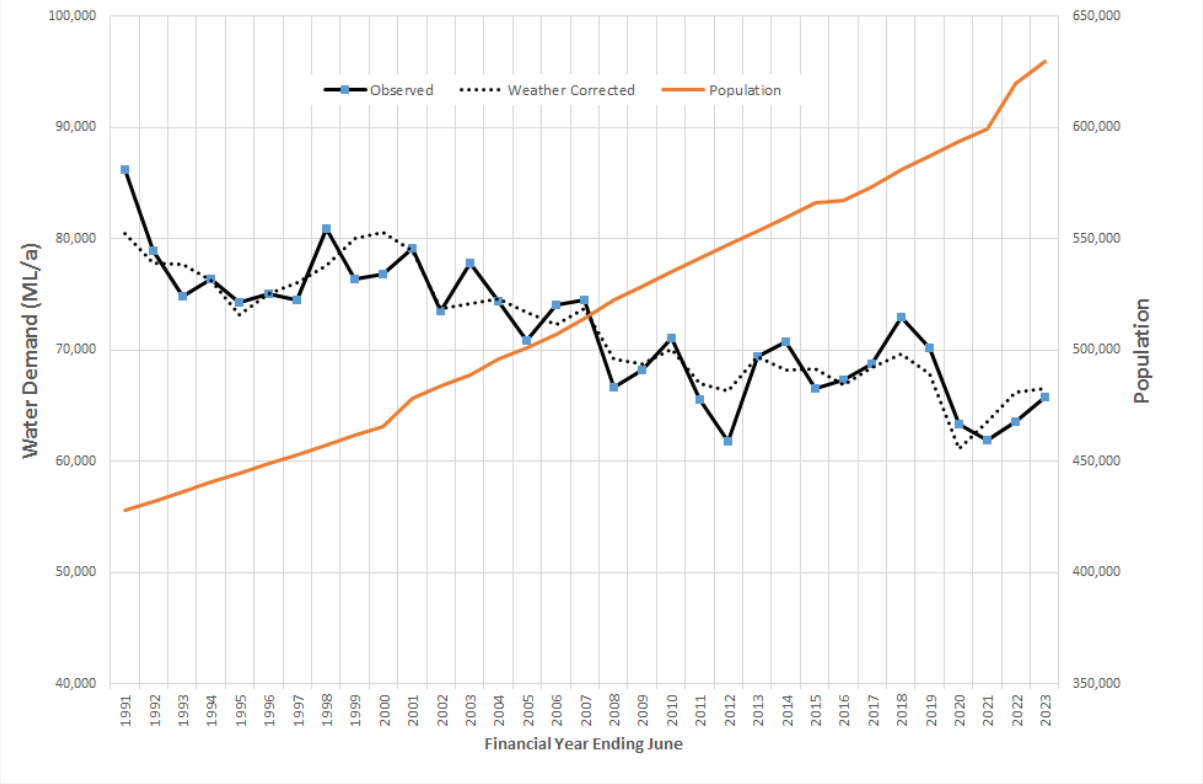


Figure 2.2 Observed and Weather-Corrected Total and Residential Per Capita Demand

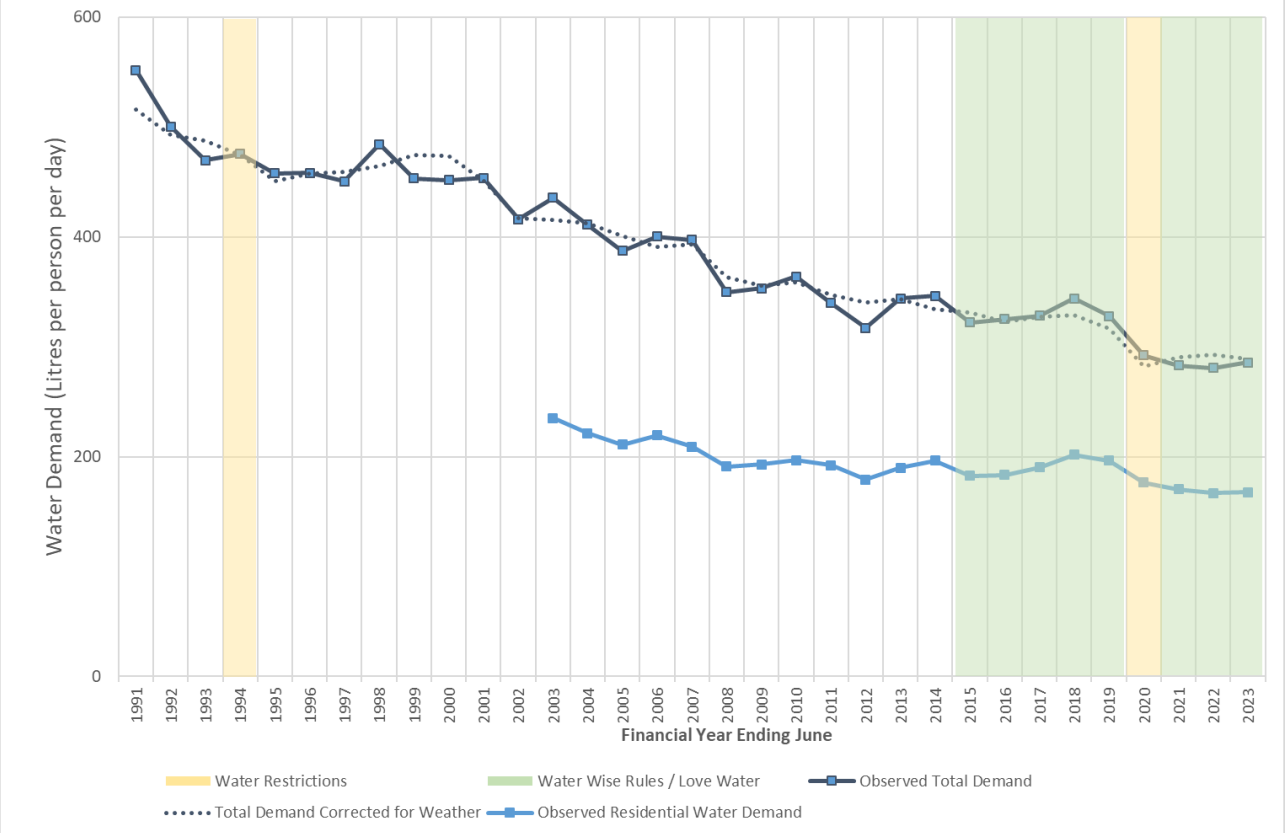
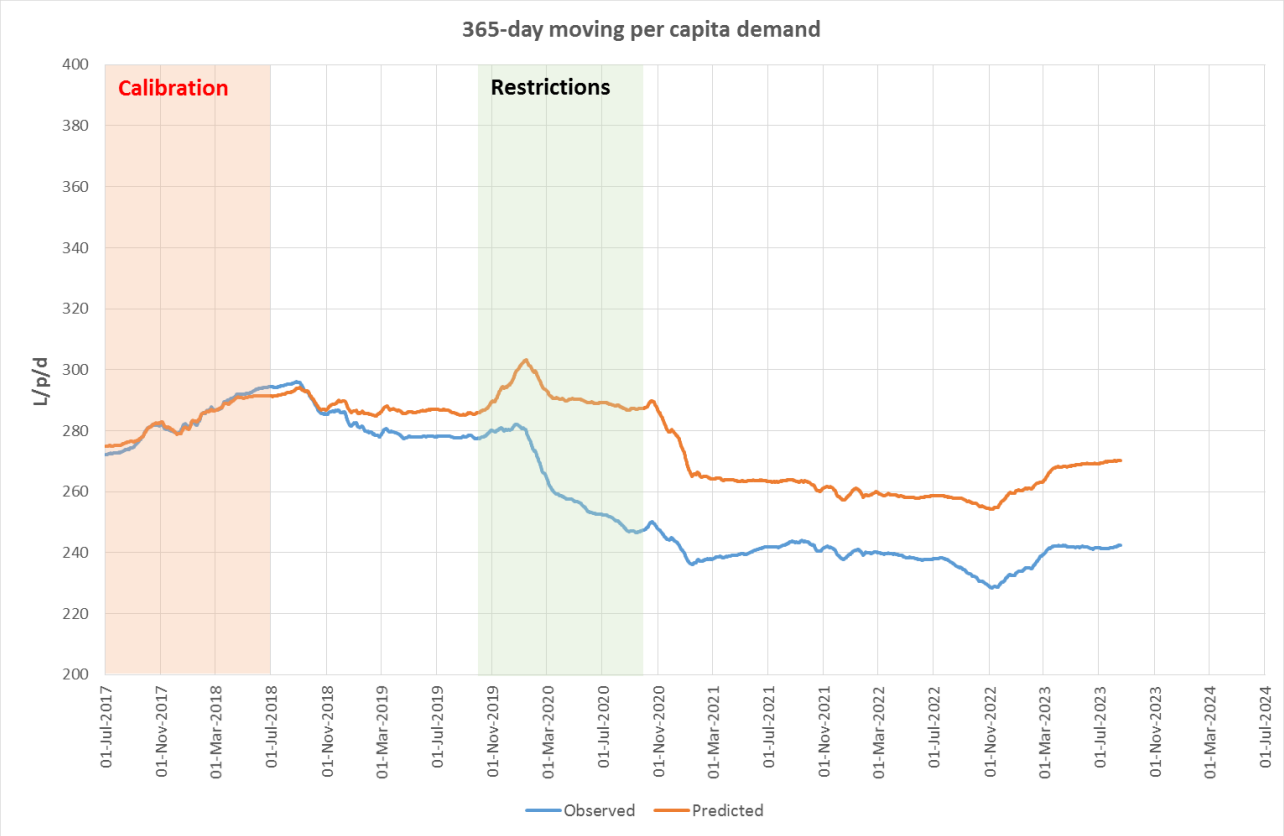


Figure 2.2 suggests that weather-corrected per capita demand has been relatively stable between 2015 and 2019. There was a significant reduction in weather-corrected per capita demand in 2019-20 due to the influence of water restrictions. That result has rebounded slightly during the last three financial years however remains well below pre-restriction levels. The wetter-cooler weather in 2022-23 caused around 3 litres per person per day less water to be used than would be expected in an average climatic year.

Figure 2.2 below shows the observed and predicted per capita water demand since 2017. The rolling annual customer demand for 2022-23 was 10.1% (6,306 ML) lower than the predicted, when compared to pre-drought conditions (the calibration period). The rolling average varies year by year however in general it appears we are seeing a continual improvement in water demand in order to reach our LHWSP target.

Figure 2.3 Observed and Predicted Total Per Capita Demand



In 2022-23, the Infrastructure Leakage Index (ILI) increased from 0.99 to 1.21 and real losses from 6.0 gigalitres in 2021-22 (64 L per service connection per day) to 7.4 gigalitres (83 L per service connection per day) in 2022-23. All of the leakage projects and programs carried out in 2022-23 were assessed using the Economic Level of Water Conservation (ELWC) methodology.

2.2 Water Conservation Measures for Water Storage and Transmission

Hunter Water extracts water from the Williams, Paterson and Allyn Rivers as well as groundwater sources under conditions specified in our Water Licence and approvals package issued under the *Water Management Act 2000.* Figure 2.4 provides an overview of Hunter Water's raw water storage, treatment and transmission assets.

Figure 2.4 Hunter Water storage, treatment and transmission network

2.2.1 Source Operating Strategy and Bulk Supply Procedure

Hunter Water's Source Operating Strategy ensures that our bulk water sources are operated in a manner that maximises net water storage levels, while also considering source water quality and ensuring compliance with regulatory requirements that govern the operation of the bulk water assets. The Strategy comprises procedures that guide operational decisions in areas where Hunter Water has discretion. These decisions relate to how much water should be supplied from particular sources, and how much water to transfer from the Williams River into Grahamstown Dam.

The key mechanism by which the Source Operating Strategy is implemented on an ongoing basis is the Bulk Supply Procedure.

The Bulk Supply Procedure specifies the target rates of supply from the major bulk surface and ground water sources that are used by Hunter Water. This procedure, which was reviewed in 2019, reflects source operating rules developed as part of the 2014 Lower Hunter Water Plan and the 2014 Tomaree Peninsula Drought Strategy. These operating rules are designed to minimise the risk of the bulk water sources running out of water. Some sources have explicit rules governing their use, including Chichester Dam, Tomago Sandbeds and the flowrate in the Tomago to Tomaree pipeline.

Decisions relating to which raw water source to use at Gresford (which can be supplied by either the Allyn River or Paterson River) are specified in the relevant Water Supply Work and Water Use Approvals.

2.2.2 Evaporation reduction

In 2020 a review was carried out of the various methods available for covering the surface area of dams to reduce evaporation. The review identified four that warranted further investigation. In 2022-23 we spent $56k to undertake a feasibility study on floating solar on Grahamstown of which one of the benefits considered was evaporation. Further investigations into the ecological impacts now needs to be considered to inform the risk of installing floating solar.

Extraction from various ground and surface water sources is managed to minimise the overall risk of depletion, this includes losses due to evaporation.

2.2.3 Leakage in Water Storage and Transmission infrastructure

Leakage is a consideration of the Asset Management Plans for raw water assets. A summary of existing programs to manage leakage is summarised below:

- Condition assessments are periodically carried out on the dams and downstream raw water mains. These assessments monitor the overall condition of the assets and inform the program of management initiatives included in Asset Management Plans.
- Routine inspections are carried out on the above ground sections of the Chichester Trunk Gravity Main (CTGM) upstream of Dungog Water Treatment Plant. These inspections focus on leakage, general condition of the main and access.
- Daily inspections are undertaken at the Chichester and Grahamstown Dams with results reported 6-weekly to the Hunter Water Dams Management Committee.
- Leakage from borefields raw water infrastructure is managed through maintenance inspections and periodic operational exercises

2.3 Water Conservation Measures for Water Treatment and Transmission

Following the drought in 2019-20 where Hunter Water was required to implement water restrictions, Smart Water Choices was implemented on 1 October 2020. These permanent water conservation measures have accompanied a range of activities within and downstream of water treatment plants. An overview of these activities is provided below.

2.3.1 Residential

All of Hunter Water's water conservation activities are positioned under the Love Water brand to ensure alignment with the clear, consistent message of the value of water. This message was balanced with also providing the 'how' customers could save water in their homes and gardens.

During 2022-23, almost 400 customers were contacted about potential leaks on their property. These were leaks that had been identified by Hunter Water during acoustic surveys of the water distribution network. It is estimated that the proactive notification potentially saved around 600 megalitres of water from being lost through concealed leaks underground and in toilets, taps and pipes in homes around the Lower Hunter.

In 2021-22 a partnership between NSW Land and Housing Corporation (LAHC) and Hunter Water delivered water efficiency upgrades and water leak repairs to more than 1,300 social housing properties. Tenants in these properties had more efficient toilets, taps and shower heads installed, helping them to reduce their water and electricity costs. LAHC are soon to assess the outcomes of this trial.

Hunter Water collaborated with NSW Department of Planning and Environment (DPE) on a trial which provided social housing tenants the opportunity of purchasing a new highly efficient washing machine at a heavily discounted price. Participants in the trial were able to replace inefficient top loaders with energy and water efficient front loaders helping them save money on water, electricity and detergent. The trial commenced 2021-22 at a cost of $320,000. Approximately 200 households benefited from this offer in 2021-22 and a further 300 in 2022-23 bringing the total to around 500. DPE will assess the outcomes of this trial once sufficient water data is available.

We have continued to provide Essential Plumbing Assistance to help customers facing financial stress. These repairs often relate to leaking or broken taps, toilets or pipes. Assisting customers with these repairs, not only reduces water loss but also limits water usage charges on the account and helps to minimise the customer's debt and maintain long-term payment of water bills. Over the 2022-23 financial period we supported 1200 customers.

We commenced trials with social housing partners in order to identify potential high consumption and leaks directly to their maintenance teams in order to reduce consumption. In 2022-23 $45k was spent on this trial to investigate and engage with the right teams to start to identify processes and benefits. Working with one maintenance team would cover several thousand residential households within our region.

Hunter Water recognises that with our ongoing Smart Water Choices it is important to maintain capacity to respond to community queries and reports that are made. Our Call Centre has scripts in order to respond to queries around Smart Water Choices and if necessary this can be escalated to others within the organisation. Our website also contains supporting information. This approach combined with wet conditions and full storages meant that a dedicated Community Water Officer was not considered necessary so the role was rolled in with the Water Conservation and Compliance (WCC) role.

Everything that was addressed during 2022-23 met ELWC requirements or was considered economically viable.

Community engagement and the promotion of water conservation behaviours were key in encouraging customers to not only comply with Smart Water Choices but to also reduce their consumption in other ways. An overview of the engagement and communications initiatives is provided in Table 2.3.

Table 2.3 Water conservation community engagement programs & partnerships in 2022-23

Description	Actions in 2022-23
Love Water Campaign	We continued our Love Water campaign to build on previous water conservation messaging including Smart Water Choices. A three-part video ad for TV and digital has focused on 'the value of water'. The campaign increased presence in the market during the spring and summer periods. Both awareness and behaviour change across the community was strong during this time. Our campaign activity remained strong during autumn aligning with the Bureau of Meteorology issuing an El Nino watch in March. Our campaign activity was reduced in the market over the winter months.
Education Program	This year we developed a new program for preschool students, Young Water Warriors, to teach them about the water cycle, how to save water and what to flush. Since its Launch in April, it has been performed to more than 650 students and educators at 25 centres across the region. The Let's Love Water show is now only offered to primary schools and at targeted community events with a sustainability focus. Our reach has increased from 4,000 to over 6,000 students this year. We continue to have strong partnerships with organisations in our region to deliver collaborative learning experiences for primary and high school students about water conservation.
Hunter Water Website	Our website includes a dedicated Smart Water Choices section outlining the Lower Hunter's permanent water conservation measures and information on how to be water efficient around the home, and in business. The tips and information provided complement the Love Water objectives. The carousel on the website homepage has consistently included promotion of water conservation habits and benefits seeking to connect with customers at an emotional level. Our online water usage calculator has also continued to be popular attracting more than 284,000 views, indicating our community is thirsty for more when it comes to understanding their water use behaviours.
Community Events	We had an increased presence at community events, focusing on water conservation messaging at the Living Smart Festival, Surfest, the Girls Day Out Women in Sport, the Newcastle Show and the Maitland Show. These opportunities allowed us to engage our community and ensure we had a presence to communicate the value of saving water. During National Water Week in October, we focussed attention on the third annual Love Water Day on the Saturday as an online event. We called on our community and encouraged advocates to share on social media channels how they value and conserve our most precious resource.
Media – Awareness Raising	In our media messaging during 2022-23 we emphasised the need for households to be water efficient, led by messaging from our Love Water campaign, with reinforcement from reiterating the actions under Smart Water Choices. Our awareness campaign included television commercials, radio, print and digital advertising. This was supported by an active and growing social media presence and through earned media.

Description	Actions in 2022-23
Community Funding Program	In 2023-23, in the strongest field of applications ever received through the Love Water Grants program, we supported 15 organisations, each with a share of over $100,000. Each successful project contributed to both water conservation through infrastructure support, as well as community education and advocacy, where we will see continued benefits in years to come.
Support of WELS	We continued to support the Water Efficiency Labelling & Standards (WELS) scheme for household appliances by including information on WELS under the 'How to save water' section of the Hunter Water website and through our customer communications. In addition, Hunter Water attended several community events to promote and encourage householder uptake of water efficient products.
Smart Water Advice	Ongoing collaboration with the Water Conservancy (formerly Smart Approved WaterMark) has meant that we have been able to adopt, embed and link to the latest best practice water efficiency advice on our website.

2.3.2 Non-Residential

During 2022-23 there were 60 temporary data loggers deployed to help identify leaks at Hunter Water sites and on customer assets including hospitals, schools, council and business sites. This was in addition to the 383 permanent data loggers rolled out across major and large industrial and commercial customers and the 19 government schools, 40 Catholic schools and 2 independent schools (61 total) that have permanently installed data loggers to assist with the early detection of leaks and irregular usage. Water savings of 423 megalitres were achieved during the year through the repair of leaks and faulty valves and operational improvements identified as a result of this Find & Fix initiative.

Hunter Water has continued to work with our large and major non-residential customers to assist them prepare and implement Water Efficiency Management Plans (WEMPs). This has included detailed water audits of their businesses to help identify water savings that can be achieved through improved operational processes, leak repairs, fittings upgrades, cooling tower and irrigation system improvements and the use of alternative water sources. In 2022-23 customers have gone on to implement a number of these initiatives, saving 422 megalitres of water.

Collaboration with the six local councils in our area of operations has also been a focus area to make the region more water resilient. This has included the roll out of a best practice guide for turf management to assist councils reduce water use without compromising the aesthetics and functionality of parks and sports fields. In addition, consultative groups have been formed with Councils across three key sectors: Strategy and Planning, Operations and Facilities and Communication and Engagement. These groups provide the opportunity to bring together conservation initiatives between and in conjunction with Lower Hunter Councils and provides consistency in water conservation outcomes across the region

As discussed above collaboration between Councils and Hunter Water has been ongoing throughout 2022-23 however no targeted irrigation and facilities audits on Council assets were completed due to full storages and wet conditions.

Everything that was addressed during 2022-23 met ELWC requirements or was considered economically viable.

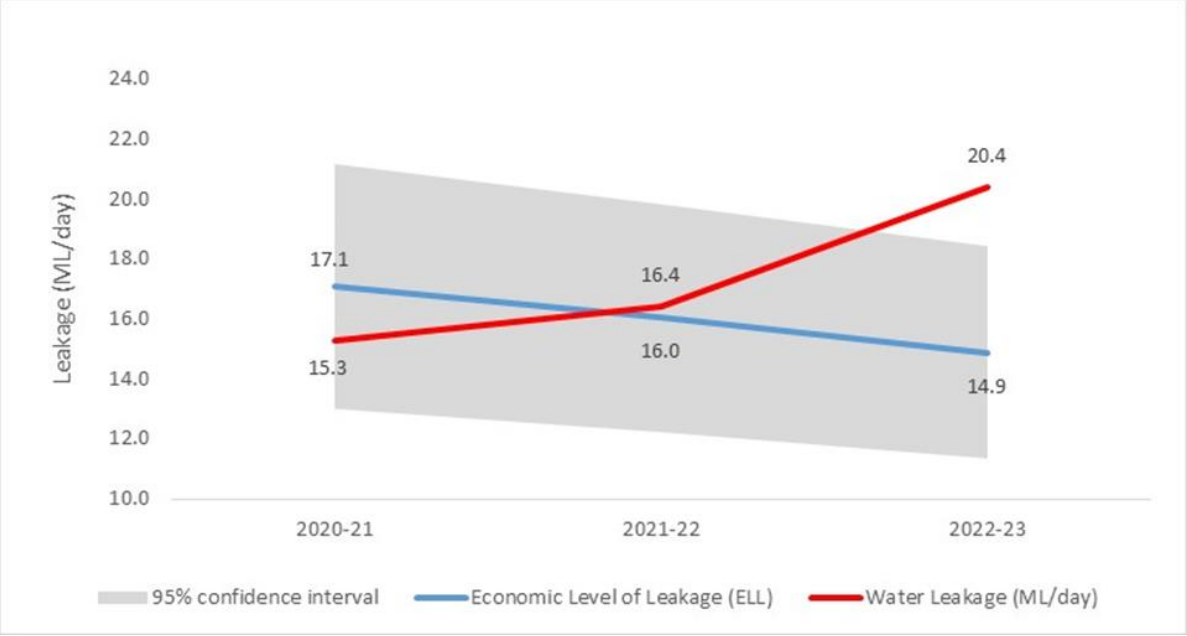
2.3.3 Reducing Hunter Water Leakage & Consumption

Hunter Water implements programs to reduce the frequency and size of leaks. These programs include:

- Active leakage control
- Pressure management
- District metered areas
- Repair of point sources

Leakage programs are justified based on achieving an Economic Level of Leakage (ELL) which is the point where the cost of reducing leaks equals the value of the water saved. It is based on a least cost model to determine the best rate of expenditure to manage leaks with the aim of reducing leakage to the ELL within 95% confidence interval. Hunter Water's ELL for 2022-23 has been calculated in accordance with the ELWC methodology approved by IPART in August 2019. Leakage performance is shown against the ELL in Figure 2.5.

Figure 2.5 Actual leakage vs the Economic Level of Leakage (ELL) in our system



Non-revenue water, including leakage, increased in 2022-23 by approximately 860 ML compared to the previous year. This was due primarily to some significant break events that were not identified for extended periods due to their location in addition to a general increase in watermain leaks and breaks.

Performance is forecast to return to the forecast ELL band as large events pass outside of the reporting period and the ongoing program of works are implemented. In particular, as the current District Metered Area work package is implemented across the network, the likelihood of such break events occurring will be reduced. Additional measures have also been undertaken to address performance including a temporary increase in the level of active leakage detection, acceleration of high priority components of the water loss program and additional monitoring of high risk water mains utilising fixed acoustic devices.

Water loss activities during 2022-23 included:

- The survey of more than 6,300 km of water mains was completed using active leak detection technology to identify over 1,340 leaks, many of which were hidden from sight. This rate was increased in response to higher network leakage and will be maintained at higher levels until performance stabilises.
- Pressure management – a program to implement pressure management zones specifically to address leakage and existing high pressure areas across the distribution network. Detailed design of the next package of areas was completed and the procurement process for construction was commenced during 2022-23. A focus on the mitigation of operational risks in the design phase has impacted the delivery schedule however opportunities to accelerate high priority components are currently being assessed.
- Pressure management (seasonal) – system pressures are being reduced across two water supply zones during lower demand periods (cooler months) to reduce leaks and main breaks in these zones. Seasonal pressure management is implemented through operational changes to reservoir levels. Reductions were not undertaken during 2022-23 due to competing operational priorities, however will be maintained as an ongoing seasonal activity.
- District Metered Areas – a program to implement DMA monitoring across 96.5% of the water distribution network through the installation of new flowmeters was approved for the 2020-25 Price Path period. DMAs are now in place across 54% of the network. Detailed design of the next package of areas was completed and the procurement process for construction was commenced during 2022-23. A focus on the mitigation of operational risks has also impacted the District Metered Area schedule but will be reduced through the early delivery of high priority areas.
- Point Sources – the detailed design was completed and construction procurement process for replacement of a large leaking trunk main in Louth Park commenced.
- A range of improvements are being investigated to increase the effectiveness of the above activities including fixed acoustic and pressure devices to improve District Metered Area monitoring and network break prediction analysis to refine Active Leakage Detection deployment. Implementation of these improvements would be undertaken to maintain or improve the activities economic assessment in accordance with ELWC.

There are a number of other works that support water loss management but are justified through other drivers and include:

- Water main replacement program – the ongoing replacement of reticulation mains with a history of multiple breaks or leaks recorded. The replacement of water mains is primarily driven by asset lifecycle costs, however the value of the water lost through leaks and breaks is also taken into consideration.
- Water service replacement program – the ongoing replacement of service mains (pipe located between the reticulation main and customer meters) that have previously failed. The replacement of water services is primarily driven by asset lifecycle costs, however the value of the water lost through leaks and breaks is also taken into consideration.
- When water mains do break, we can influence the quantity of water lost by promptly responding to and rectifying the break.

Opportunities to replace potable water supplies and implement water efficiency improvement works were progressed at Edgeworth, Shortland and Toronto Wastewater Treatment Works. Work at Shortland is in the design phase. The Edgeworth project is at tender stage prior to construction with

the Toronto project in construction. The levelised cost of water saved was used as justification for these projects in accordance with the Economic Level of Water Conservation methodology.

Everything that was considered up to 2022-23 and was economically viable is currently being undertaken however there is a number of activities that only become viable as storage levels decrease and these have been detailed in the Drought Response Plan.

2.3.4 Alternative Sources

Recycled water forms an important part of our supply 'portfolio' by utilising these resources in applications where drinking-quality water is not required.

Hunter Water operates 19 wastewater treatment plants across the Lower Hunter. Hunter Water has 16 recycled water schemes which provide water for industry, irrigation, agriculture and residential use. Approximately 11 per cent of effluent is treated to a recycled water standard and supplied to recycled water users.

We consider recycled water to be a water conservation initiative when recycled water is provided instead of drinking water. A summary of our recycled water scheme performance in 2022-23 is provided in Table 2.4. As a result of recycled water operations, approximately 5,867 ML of drinking water was conserved. Our plant and supply locations are shown in Figure 2.6. We also used recycled water for internal purposes at our own wastewater treatment plants.

In 2022-23, the Kooragang Industrial Water Scheme (KIWS) increased its capacity, further increasing the amount of drinking water that it offsets. KIWS is owned and operated by coNEXA, whose water recycling plant takes treated wastewater from Hunter Water's Shortland Wastewater Treatment Works, and further treats it to a grade that's safe and suitable for industrial use in accordance with national guidelines. The water is then transported to industrial users on Kooragang Island

Hunter Water continues to engage with stakeholders, including council and the community, about how we value the social, environmental and resilience benefits that recycled water provides. Reflecting the true value that recycled water provides will ensure that beneficial recycled water opportunities are not overlooked.

Figure 2.6 Hunter Water's water recycling operations

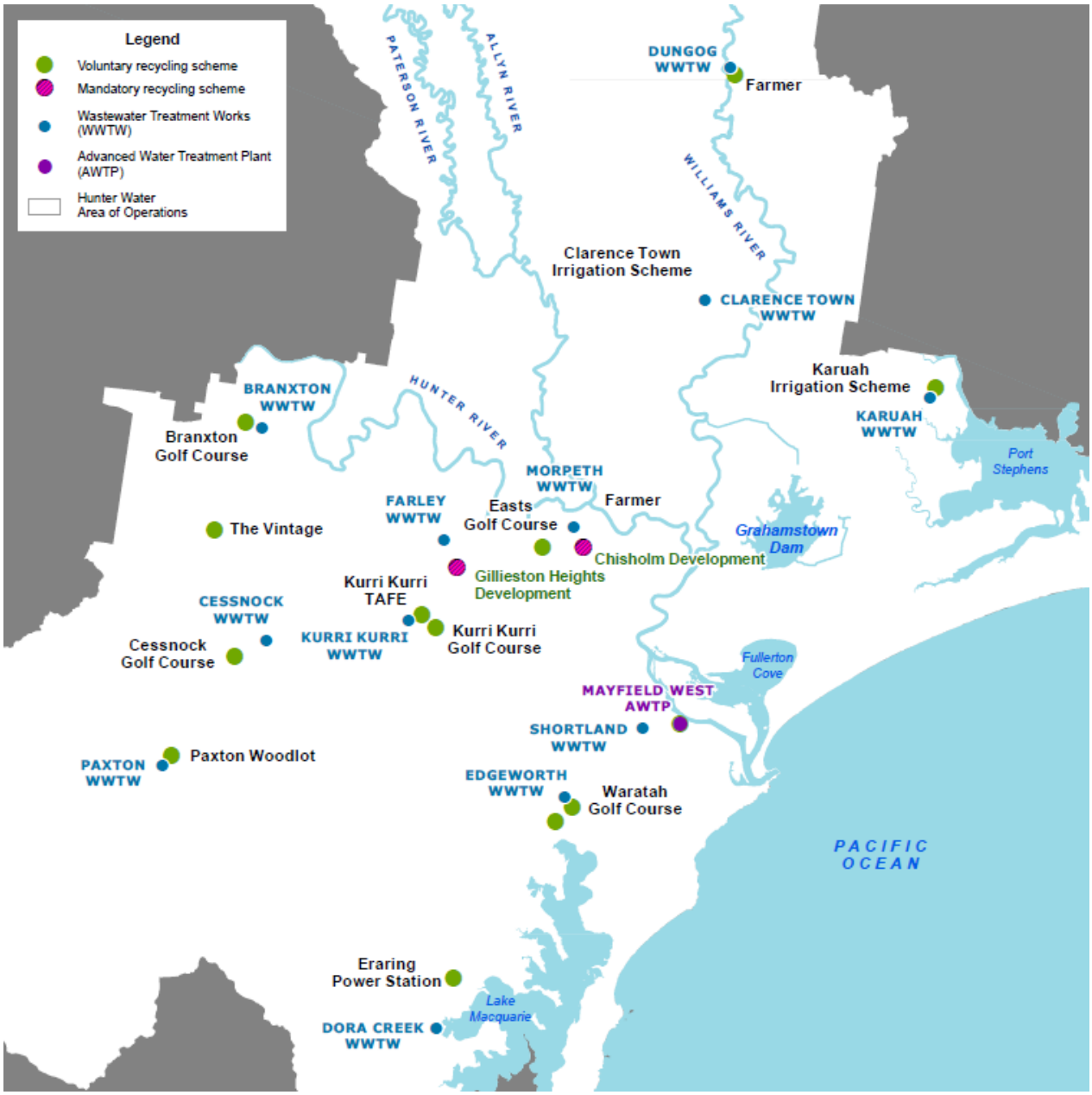


Table 2.4 Hunter Water's recycled water schemes

Recycled water source	Recycled water use	2022-23 reuse volumes (ML)	2022-23 drinking water replaced (ML)
Branxton WWTW	Branxton Golf Course & The Vintage Golf Course	138	138
Cessnock WWTW	Cessnock Golf Course	17	17
Clarence Town WWTW	Clarence Town Irrigation Scheme	33	-
Dora Creek WWTW	Eraring Power Station	921	921
Dungog WWTW	Local farmer	327	-
Edgeworth WWTW	Waratah Golf Course	86	86
Farley RWTP	Gillieston Heights dual reticulation	54	54
Karuah WWTW	Karuah Irrigation Scheme	80	-
Kurri Kurri WWTW	Kurri Kurri Golf Course and Kurri Kurri TAFE	7	7
Shortland WWTW	Kooragang Industrial Water Scheme	3,464	3,464
Morpeth WWTW	Easts Golf Course and local farmer	51	51
Morpeth RWTP	Chisholm dual reticulation	24	24
Paxton WWTW	Paxton Woodlots	17	-
Indirect agricultural reuse[1]	Downstream irrigation users	357	-
On-site reuse	Process water at Hunter Water WWTWs	1,105	1,105
Total		**6,776**	**5,867**

Notes:
1. Indirect agricultural reuse includes discharges from Cessnock WWTW and Farley WWTW to downstream watercourses that are beneficially used for agricultural irrigation. Estimates are determined based on weather conditions throughout the year and calculated irrigation rates for downstream users.

3 FIVE YEAR WATER CONSERVATION WORK PROGRAM

3.1 Program Overview

Hunter Water is currently preparing our next IPART Price Path Submission due to commence July 2025. The Five Year Water Conservation Plan presented in this report is based on the current proposed program of works however until the IPART Price Path Submission is finalised our future program may be subject to change. Water conservation continues to be important to our customers and the community and this will be explored in more detail as part of a deliberative forum process commencing November 2023.

An adaptive approach will be adopted over time as the effectiveness of programs is assessed, customer insights sought and ELWC methodology revised.

The following table provides an overview of the water conservation projects and activities that have been considered as part of Hunter Water's approach to water conservation.

Further details are provided in Section 3.2.

Table 3.1 Water Conservation Projects and Activities

Activity / Project	Levelised Cost[1]	Economic Method to Assess Implementation[2]	Economically efficient[2]	Forecast extent (per year)	Water savings potential[3] (ML/yr)
Residential					
Essential Plumbing Assistance	$0.64/kL (HWC) $0.64/kL (societal)	Short-run	At all times	50 households	48
Leak Repair Assistance Rebate	$0.84/kL (HWC) $0.94/kL (societal)	Short-run	When storage level below 70%	500 households	472
DIY Rainwater Tank Tune-Up	$0.04/kL (HWC) $4.49/kL (societal)	Intermediate	When storage level below 60%	400 households	203
Rainwater Tank Repair Assistance Rebate	$3.53/kL (HWC) $7.01/kL (societal)	Intermediate	When storage level below 60%	4,000 households	637
Rainwater Tank Repair Assistance & Retrofit Rebate	$4.82/kL (HWC) $8.06kL (societal)	Intermediate	When storage level below 60%	4,400 households	832
Efficiency Upgrades – Minor Fittings Rebate	$0.48/kL (HWC) $2.73/kL (societal)	Intermediate	When storage level below 70%	3,300 households	1502
Efficiency Upgrades – Major Items Rebate	$3.96/kL (HWC) $7.14/kL (societal)	Intermediate	When storage level below 60%	1,000 households	114
Multi-Res Monitoring & Audits	$1.68/kL (HWC) $2.75/kL (societal)	Intermediate	When storage level below 70%	3 sites	6
Love Water	$1.26/kL (HWC) $1.26/kL (societal)	Short-run	When storage level below 70%	All customers	728
Community Water Officers	$2.93/kL (HWC) $2.93/kL (societal)	Short-run	When storage level below 70%	720 sites	16
Non-Residential					
Find & Fix	$0.34/kL (HWC) $0.42/kL (societal)	Short-run	At all times	30 sites	764
Large & Major WEMPs & Audits	$0.64/kL (HWC) $1.02/kL (societal)	Varies	At all times	12 sites	659
Medium, Large & Major WEMPs, Audits & Efficiency Grants	$0.65/kL (HWC) $0.91/kL (societal)	Varies	At all times	15 sites	972
Local Council Water Resilience & Audits	$3.14/kL (HWC) $3.51/kL (societal)	Intermediate	When storage level below 70%	5 sites & 6 councils	30
Schools Program	$1.08/kL (HWC) $1.89/kL (societal)	Intermediate	When storage level below 70%	25 schools	109
Targeted Business Support & Awards Program	$0.72/kL (HWC) $3.24/kL (societal)	Intermediate	When storage level below 70%	150 sites	140

[1] In the ELWC method, the levelised cost from a societal perspective is compared with the value of water saved (societal levelised costs include those incurred by Hunter Water, program participants and the community). The levelised cost to Hunter Water has been included for transparency purposes.

[2] The life of the project is set by the total length of time that water conservation benefits are expected to be realised from the project investment. In the ELWC method, water conservation projects with a life of 6 to 14 years are compared with the 'intermediate' value of water saved. The intermediate value of water saved is a linear interpolation between the short-run value of water (which is based on the prevailing water storage level) and the long-run value of water saved ($2.67/kL in $2022-23). The short-run value of water when the storage level is greater than 79% is $0.70/kL ($2022-23), when at 70-79% water storage level it is $0.75/kL ($2022-23), when at 60-69% water storage level it is $4.01/kL ($2022-23) and when at 50-59% water storage level it is $9.41/kL ($2022-23)

[3] Average annual savings for the Residential and Non Residential initiatives have been assessed over a 40 year period.

Activity / Project	Levelised Cost[1]	Economic Method to Assess Implementation[2]	Economically efficient[2]	Forecast extent (per year)	Water savings potential[3] (ML/yr)
Non Revenue Water					
Active leak detection survey – 14 month return frequency	< $0.70/kL	Short-run	Yes	Approximately 4,160 km/yr*	750
Active leak detection survey – 9 month return frequency	> $0.70/kL	Short-run	No	Approximately 6,760 km/yr*	820
Pressure management	≤ $2.67/kL	Long-run	Yes	30 sites	757
District metering	≤ $2.67/kL	Long-run	Yes	96.5% of network (by 2025) with ongoing refinement	1172
Point sources	≤ $2.67/kL	Long-run	Yes	Various	681
Research and Development					
Evaporation Management			Not measurable		
BASIX optimisation			Not measurable		
Behaviour change			Not measurable		

* A total of approximately 6300km of active leak detection was undertaken in 2022/23.

Table 3.2 provides a summary of the water conservation initiatives that were assessed as being efficient at a water storage greater than 80% or that have other important community or customer benefits and have therefore been included in our current five year program. Should the water storage level fall below 80%, additional initiatives will be added to the program.

Our ELWC for the next five years is 13.9 ML/day. This means that investment to reduce demand beyond this volume is not considered to be economically beneficial (see Appendix A2 for further explanation). This increase in the ELWC, from the 13.2 ML/day assessed on 1 July 2022 for the 2021-22 Water Conservation Report, is due to a growing population and variety of additional initiatives being commenced to support the LHWSP goals. Investment in previous years has also provided foundational equipment and relationships to support greater levels of water efficiency and water loss reduction over the next five years.

The overall five year program has the potential to reduce demand by 16.9 ML/day, which is 2 ML/day above ELWC. The additional expenditure above ELWC relates to initiatives that support the goals and objectives of the LHWSP. These include reducing customer drinking water consumption by 17% over the next ten years, meeting community expectations and preferences for a strong focus on water conservation and creating a broad foundational program that allows us to quickly and effectively respond to drought.

Table 3.2 Water conservation program for 2023-24 to 2027-28 based on the current value of water

Activity / Project	Status[4]	Predicted New Water Savings (ML/year)					TOTAL New Savings (ML)
		2023-24	2024-25	2025-26	2026-27	2027-28	
Residential							
Essential Plumbing Assistance	Ongoing – efficient	9	9	9	9	9	45
Leak Repair Assistance	Proposed – other drivers	44	88	88	90	91	400
Fittings Upgrades	Proposed – other drivers	0	132	134	135	137	1336
Multi-Res Monitoring & Audits	Proposed – other drivers	0	0	2	2	2	6
Love Water	Ongoing – other drivers	462	469	533	541	549	2555
Community Water Officers	Ongoing – other drivers	14	14	14	14	14	70
Non-Residential							
Find & Fix	Ongoing - efficient	125	150	150	150	150	725
Medium, Large & Major WEMPs, Audits & Efficiency Grants	Ongoing - efficient	241	241	370	370	370	4619
Local Council Water Resilience & Audits	Ongoing – other drivers	3	3	3	3	3	15
Schools Program	Proposed – other drivers	6	12	12	12	12	48
Non Revenue Water							
Active leak detection	Ongoing - efficient	820	820	750	750	750	3890
Pressure management	Ongoing - efficient	160	310	350	15	15	850
District metering	Ongoing - efficient	360	362	449	30	30	1231
Point sources	Ongoing - efficient	170	170	29	30	30	429
Research and Development							
Evaporation Management	Technology Review	Not applicable					
BASIX Optimisation	Feasibility Study	Not applicable					
Behaviour Change	Research Project	Not applicable					
Total possible ELWC water savings (ML)		3607	4886	5615	5657	5550	25315
Total potential water savings (ML)		4155	5725	6757	7048	7194	30874
						ELWC (ML/day)	**13.9**
						Total potential (ML/day)	**16.9**

[4] Total storage level was 83% as of November 2023 so all activities included in the current 5 year program were assessed against the value of water for storage level >79%. Some activities were not assessed as efficient but were included based on other drivers.

3.2 Proposed Water Conservation Initiatives

3.2.1 Residential

Improvements to Leak Notification and Identification

Hunter Water is committed to improving early identification of high consumption and leak detection with our residential customers. We are looking to work closely with our internal teams, including Billing & Metering, Customer Assistance and Customer Care, to review our current thresholds for residential usage and improve our identification and engagement. Our intent is to improve our processes by introducing notifications to alert of higher than normal usage detected, based on reviewed threshold figures, as well as earlier referral to our Customer Assistance team where vulnerable indicators are present.

Through Hunter Water's current leak detection work our contractors regularly identify possible leaks on private property and notify the property owner. Following up on these leaks is important to confirm that the leaks have been fixed and also to see if the customer may be at risk of a vulnerability and may require further support in order to undertake the repair works.

Our customer segmentation found that around 22% of the households to whom we provide services are renting privately, and 5% are in public housing (e.g. NSW Housing, Compass Housing, Aboriginal Housing Office or Defence Housing Australia).[5] Currently, tenants are indirect customers of Hunter Water because some landlords may pass on water usage charges for payment by the tenant.[6] However, as water users, residential tenants play an equally important role to other households in helping to balance water demand and supply.

We face two challenges in encouraging water conservation with household tenants:

- Hunter Water has limited ability to identify which customer properties are owner occupied and which are rental properties.
- Tenants can engage in water use behaviour change or purchase more efficient appliances, but they are not in a position to carry out leak repairs or install more water efficient fittings.

Implementing these initiatives would therefore include engagement with real estate agents and public housing providers, as a means of reaching both tenants and landlords, so that we can improve water efficiency together.

These systems will enable leaks to be investigated earlier by the customers and repaired, or customers needing support will be linked to existing Essential Plumbing Assistance program to avoid further leakage and debt growth. Referrals can also be made to the Leak Repair Assistance Program or the Efficiency Upgrade program once it has been developed and implemented.

Essential Plumbing Assistance

This initiative helps customers facing financial stress with the cost of essential plumbing repairs to their property. These repairs often relate to leaking or broken taps, toilets or pipes. Assisting customers with these repairs, not only reduces water loss but also limits water usage charges on the account and helps to minimise the customer's debt and maintain long-term payment of water bills.

The plumbing assistance is provided reactively in response to customers who are at risk of non-payment of bills and ongoing debt due to financial stress. Upon assessing financial circumstances and identifying the potential for leaks, Hunter Water engages a plumber to provide a free inspection,

[5] Further detail on our customer segmentation is provided in Technical Paper 1 of the 2019 Pricing Submission to IPART.
[6] According to the Residential Tenancies Act 2010 a landlord can only pass on water usage charges if the rental premises is individually metered and the rental premises meet required 'water efficiency' standards (all internal taps and showers have a maximum flowrate of 9 litres/minute and no leaking taps). The landlord must also provide the tenant with a copy of the water bill setting out the charges, or other evidence of the cost of water used by the tenant.

water audit of the residence, and carry out any minor plumbing repairs such as washer, tap and toilet cistern replacements. Larger repairs are assessed on a case by case basis.

Essential Plumbing Assistance has been assessed as economically efficient at all times. It aids in minimising customer debt and additional financial pressure.

Leak Repair Assistance

Small internal leaks are often overlooked as a source of water loss, however the volumes lost can become quite significant over time. As part of the drought response Hunter Water provided a rebate of up to $500 per property to assist with the plumbing costs associated with repairing or replacing leaking taps, showers, toilets, pipes and tanks. Customers known to have internal leaks were also proactively contacted and encouraged to have repairs carried out. This initiative was in addition to the ongoing Undetected Leak Rebate which provides eligible customers an allowance of up to 50% of the increase in water usage that occurs due to a hidden leak.

The Leak Repair Assistance drought response program ended on 30 June 2020. Learnings from this initiative will be used in the design of a similar scheme with a smaller rebate being offered. When evaluated using the ELWC methodology and the average costs observed during the drought program, Leak Repair Assistance is only economically efficient when the water storage level is less than 70%, however it helps meet the LHWSP target in a relatively efficient manner and can be easily ramped up during drought. Depending on scheme implemented this assistance program may prove to be more economically efficient than estimated. It is therefore included in the current five year program.

Efficiency Upgrades

Replacing older shower heads, taps, toilets and washing machines with more efficient fittings or appliances or installing a pool cover can reduce household consumption by around 40 kilolitres per year.[7] Two different levels of efficiency rebate schemes were assessed.

1. *Minor Fittings Efficiency Upgrades* would provide property owners with a rebate where it is demonstrated that older inefficient showers, taps and toilets have been upgraded or replaced by a qualified plumber. This rebate scheme was assessed as economically efficient when the water storage level is less than 70%.
2. *Major Items Efficiency Upgrades* would provide households with a rebate where it is demonstrated that an inefficient washing machine has been replaced by a machine with a 4.5 or higher WELS star rating or an older toilet has been replaced with a 4 star or higher model or a pool cover has been purchased and installed. This rebate scheme was assessed as economically efficient when the water storage level is less than 60%.

Minor Fittings Efficiency Upgrades are only economically efficient when the water storage level is less than 70%, however it helps meet the LHWSP target in a relatively efficient manner and can be easily ramped up during drought. It is therefore included in the current five year program.

Carefully targeted appliance upgrades like the DPE/LAHC washing machine pilot may provide greater demand reductions at a lower cost than the approach assessed against ELWC. Therefore, while an appliance upgrade or pool cover rebate initiative has not been included in the current five year program, opportunities to fund or collaborate on such initiatives will be assessed on their merits as they arise.

Rainwater Tank Repairs & Retrofits

It is estimated that around 17 per cent of the households serviced by Hunter Water have rainwater tanks installed. Studies have found that the water supplied by rainwater tanks can reduce mains

[7] Based on an increase from 3 to 4 star WELS rating and average usage patterns, pool sizes and evaporation rates.

water needs by around 42 kL per year (20 to 25 per cent), but only 65 per cent of rainwater tanks are functional due to design and maintenance issues.[8]

Hunter Water carried out a Tank Tune-Up pilot in 2019, where customers in selected suburbs were offered plumbing audits of their rainwater tank systems. We found similar failure rates to those previously reported and identified particular trends in failure modes. Using this information along with the associated maintenance, repair and installation costs, three different rainwater tank initiatives were assessed using the ELWC methodology.

1. A *DIY Rainwater Tank Tune-Up* which involves Hunter Water preparing and regularly promoting a DIY tank inspection and maintenance regime with customers engaging a qualified plumber or electrician to diagnose or repair more complex issues. We already provide guidance on our website (https://www.hunterwater.com.au/home-and-business/information-for-homes/how-to-love-water/rainwater-tanks) however once the full costs of repair are included it was found that additional investment in this initiative is only economically efficient when the water storage level is less than 60%.
2. *A Rainwater Tank Repair Assistance Rebate* where customers are able to claim a portion of the costs associated with engaging a suitably qualified tradesperson to carry out maintenance or repairs on their rainwater tank system was also assessed as being economically efficient when the water storage level is less than 60%.
3. An expanded *Rainwater Tank Repair Assistance & Retrofit Rebate* which provides financial assistance for repairs and the retrofitting of a rainwater tank system in established homes was found to be economically efficient only when the water storage level is less than 60%.

None of these initiatives have therefore been included in the current five year program, however further investigation into opportunities for improved tank design are being pursued as part of a BASIX review and the potential for flood mitigation and water quality benefits in some catchments is being explored.

Multi-Residential Dwellings

Hunter Water has around 30,000 multi-residential customers (e.g. apartments, villa complexes and over 55's lifestyle villages) in our area of operations. These customers often only have a single water meter for the whole site. There is therefore little incentive for each apartment or dwelling to save water by taking actions like repairing plumbing faults because the usages charges are pooled and leaks in common areas are often overlooked.

We considered a similar program to that offered by Sydney Water, whereby strata buildings with high water use are offered plumber audit and repair services and the strata body pays no upfront costs, instead repaying costs with the savings achieved. That is, the water bill of the account is held static until the costs of the service are recovered.[9] On further investigation we found that the number and style of multi-residential sites in our region would not support this kind of scheme.

Instead, a simpler and more targeted program of leak monitoring and water efficiency audits for large multi-residential sites was assessed. It was found to be economically efficient only when the water storage level is less than 70%. However, it helps meet the LHWSP target in a relatively efficient manner therefore it has been included in the current five year program.

Ultimately, we encourage the installation of separate water meters on each individual dwelling, where this is a practical option.

[8] Retamal M, Mukheibir P, Schlunke A, & Prentice E., 2018 Work Package 4: Rainwater, Report prepared by The Institute for Sustainable Futures (University of Technology Sydney) for the Hunter Water Corporation.
[9] Sydney Water, 2017-18 Water Conservation Report, p. 11.

Love Water

Love Water provided a strong foundation for water restrictions messaging and is a common thread for all our water conservation activities to galvanise a community effort to achieve water conservation goals together. A variety of investment options were considered with the aim of providing the most cost effective coverage both in terms of breadth and depth of engagement. This includes more traditional channels such as free-to-air television and radio as well as social and digital media, on-demand television, along with participation in community events and the school education program.

It is difficult to estimate the direct and indirect contribution communications and engagement campaigns make towards changing customer water use behaviours because of the influence of broader social and environmental factors and the gap between self-reported and actual behaviours and intentions. The initiative has been included in the current five year program because there are already high levels of brand and message recognition among our customers. By maintaining Love Water we also provide foundational messaging for all water conservation initiatives and help to maintain the demand reduction momentum gained during the drought.

Community Water Officers

In 2021-22 post drought, the CWO (Community Water Officers) role was integrated into the Water Conservation and Compliance (WCC) role. The WCC continues to advise customers on Smart Water Choices, respond to breach notifications, exemption requests, conduct residential leakage investigations, and address non-compliance issues.

The size of the team has contracted post drought in response to workload and the severity of the water restrictions in place. Like Love Water, it is difficult to estimate the extent to which this initiative directly or indirectly contributes to reductions in water demand, however a conservative assessment found that a small ongoing partial team is economically efficient when the water storage level is less than 70%. This initiative has been included in the current five-year program to ensure that Hunter Water has the capacity to respond to community queries and reports that arise while enforceable water restrictions or permanent water conservation measures (Smart Water Choices) are in place.

3.2.2 Non-Residential

Find & Fix

Water loss due to leaking pipes and fittings or malfunctioning valves can be quite significant, particularly on large or complex sites. The water loss may be hidden from sight or be unnoticed as it discharges to sewer or stormwater and because it can slowly build up over time it may have no sudden or obvious bill impact. Data loggers can be added to water meters to collect real time information on the volume of water flowing into a customer site. This information can then be used to identify unusual flow patterns that indicate potential water loss on the premises (e.g. night flows when site is closed or gradual upward trend). The loggers also provide daily flow patterns to assist the site users with understanding how they use water. Due to the increase in data received from over 400 data loggers Hunter Water is trailing an internal purpose-built automated data analytics tool (AQUO) to help monitor and set alarms for leakage and zero usage.

Under the Find & Fix initiative Hunter Water installs permanent data loggers on the water meters of large customer sites and assists with data monitoring and alarm set ups. Temporarily deployed loggers are also available to monitor and investigate smaller, complex sites where a leak is suspected but is not visible. In some cases, follow up technical advice is provided to assist the customer with pinpointing the exact location of a leak so that they can carry out repairs.

An assessment of Find & Fix, using data from existing installations and interventions, found that it is economically efficient under all water storage conditions. It has therefore been included in the five year water conservation program.

WEMPs & Audits

As part of the Lower Hunter Water Security Plan (LHWSP), large non-residential customers (those with sites consuming more than 10 megalitres per year) are required to prepare a Water Efficiency Management Plan (WEMP).

One of the initial actions required to complete a WEMP is a detailed water audit of the site. The audit identifies sub-metering opportunities and provides a breakdown of usage across the site, opportunities to reduce the use of drinking water through the implementation of efficiency measures or use of an alternative water supply.

Hunter Water will continue to work with large and major water customers on water audits and the preparation of WEMPs. There are 227 large and major customers and to date 88 WEMPs have been completed. An assessment of an ongoing WEMP, Audit and efficiency grant, specifically targeting medium, large and major customers, found that it is economically efficient at all water storage levels so it was included in the five-year water conservation program.

Local Council Water Resilience & Audits

There are six local councils in Hunter Water's area of operations. Collectively they consume around 1.2 gigalitres of water per year across more than 3,000 sites. These sites include public pools and parks, sports fields, holiday parks, waste management centres and works depots. The spread and wide variety of water use across these locations make it challenging to identify easily implemented water saving initiatives. Specialised water audits targeting specific types of sites or end uses can however assist councils with benchmarking and preparation of water efficiency investment programs. Best practice guides that promote water efficient design, construction, operation and maintenance of council assets will also be developed where appropriate.

The use of drinking water to irrigate public parks and sports fields is limited under Level 1 and Level 2 water restrictions and banned under Level 3 water restrictions. In other jurisdictions, this restriction on irrigation was found to have a significant and long-lasting impact on community liveability outcomes during drought. Assisting councils to improve the resilience of these facilities can both reduce the volume of drinking water currently used for irrigation and ensure that the social impact of a drought is reduced. We will also be working with Council on their drought response plans.

An initiative that includes council targeted irrigation and facilities audits along with support for business case development and external funding submissions for water conservation initiatives is proposed along with ongoing collaboration on the development of alternative water source opportunities (e.g. recycled water or stormwater). An assessment of the costs and benefits of council site audits found them to be economically efficient when the water storage level is less than 70%, however improving the water resilience of council facilities provides broader community benefits so it has been included in the current five-year water conservation program.

Schools Program

The 250 schools located in Hunter Water's area of operations consume around 570 megalitres of water per year servicing a student population of more than 93,000. A previous initiative (Leakage in Schools Program) where Hunter Water assisted interested schools with the installation of data loggers on their water meters had mixed success with some schools embracing it as part of their asset management program while others only used the information for a limited period of time. Any future data logger installations at school sites will be carried out under Find & Fix.

Hunter Water has the opportunity to locally support two education programs being trialled state-wide by DPE Water to improve students' understanding about water efficiency and design ways to support their school to reduce their water consumption. These programs will be developed by DPE Water and implemented by DoE Awabakal Environmental and Zoo Education Centre (EZEC) teachers. Hunter Water will initially provide support to this program by upskilling EZEC teachers with local

knowledge about our water supply system and management. Phase two will incorporate an online water efficiency program based on the successful and long-running Victorian Schools Water Efficiency Program (SWEP). DPE Water will develop and manage the online portal and education resources, and Hunter Water will install data loggers at participating school sites.

Once the initial programs have been implemented, it may be a requirement for us to provide the resources for the ongoing education of engaged schools. This initiative has the potential to lead to long term embedded behaviour change, thereby contributing to the LHWSP target. It is therefore included in the current five year program.

Targeted Business Support & Awards Program

Hunter Water supplies drinking water to more than 12,000 small to medium non-residential customers (those consuming less than 10 megalitres per year). These customers range from hairdressers to cafes and from landscapers and car washes to office based businesses. The type of end uses vary greatly along with the scale of the potential water savings so designing practical and cost effective water conservation initiatives to support these customers is quite difficult.

Specialised audits and rebate schemes that target particular industries or end uses have been assessed as being economically efficient when the water storage level is less than 70% and have therefore not been included in the current five year program. Further customer segmentation, industry benchmarking and consultation and collaboration with key stakeholders are however being explored to support the potential future development of niche end use programs.

3.2.3 Reducing Hunter Water leakage

Hunter Water owns approximately 5,300km's of watermains and our current program of leakage work is forecast to achieve a NRW volume of 6.8 GL (leakage of 50 L/connection/day) by June 2025. It is currently proposed for a continuing NRW program of work that is forecast to reduce NRW by an additional 0.6 GL (leakage to 42 L/connection/day) by June 2030. In order to achieve this a range of works will be undertaken as detailed below.

Leak Detection

Each year, our contractors physically walk and check all of our network. Reducing water lost to leaks is one of our highest maintenance priorities. We use 'listening equipment' to identify hidden leaks and water escaping into the ground, which otherwise may not be found - about 30 new leaks are found each week. A major benefit of the program is finding small leaks, before they get bigger. Large leaks can be inconvenient for our customers due to water supply interruptions and also the possible damage to their property. A leak detection survey covering approximately 4,160 kilometres per year has been assessed as economically efficient at full storage levels.

During 2022-23, the rate of active leak detection survey was increased in response to the higher network leakage observed during the year to cover 6,300 kilometres.

Our customers know how important it is for us to find and fix leaks and save precious water. About 150 customers contact us each week to report a leak they've found. We respond quickly to every single report and prioritise these repairs along with the leaks identified by our contractors.

Pressure management

High water pressure in some areas of our system contributes to water main leaks and breaks, and excessive pressure reduces the life of our assets and equipment. Our Operating Licence states we need to provide customers with a minimum pressure of 20 metres, but some parts of our network have water main pressure greater than 100 metres. Pressure management involves the installation of automated pressure reducing valves to reduce the pressure in the water network and customer

fittings, thereby reducing the internal stress and reducing either the quantity of leaks/breaks or the volume lost from leaks/breaks. In the current price period, we have an approved program of works to address unnecessarily high pressure in 23 areas of our network. An additional 5 areas are proposed for completion in the next price period. Pressure management at these new locations has been assessed as economically efficient against a long-run value of water of $2.67/kL.

Reducing water pressure extends the life of our water mains and equipment, reduces leaks and water main breaks which inconvenience customers.

District metering

District metering involves installing network flowmeters and zone valves to segment the network into smaller 'districts'. Water movement in each district is then monitored and analysed, and any increased water use may indicate a leak in that district. Dividing the network into segments means we can identify and repair leaks more quickly, which reduces costs and customer interruptions.

Hunter Water currently has 83 district metered areas with telemetered flow monitoring, which represents 54 per cent of the network. The district meter outputs are incorporated into a software program called Takadu, which undertakes hourly monitoring and analysis of system performance changes. In the current price path we have an approved program of works to increase the number of districted metered areas so that it covers 96.5 per cent of the network. A continuing program to refine the performance of district metering has been proposed for the next price period involving improving area configuration and utilising technology including acoustic and pressure monitoring. The ongoing work was assessed as economically efficient against a long-run value of water of $2.67/kL.

Point sources

This important program fixes water lost, or likely to be lost in the near future, at our major assets, including reservoirs and trunk water mains. The repair of two reservoirs (Black Hill and Four Mile Creek) has been undertaken during this price path with the replacement of the Louth Park trunkmain planned for completion by the end of the price path. A continuing program of point source repair has been proposed for the next price period assessed as economically efficient against a long run value of $2.67/kL.

Other works

There are a number of other ongoing works that support water loss management but are justified through other drivers and include:

- Water main replacement program – the ongoing replacement of reticulation mains with a history of multiple breaks or leaks recorded. The replacement of water mains is primarily driven by asset lifecycle costs, however the value of the water lost through leaks and breaks is also taken into consideration.
- Water service replacement program – the ongoing replacement of service mains (pipe located between the reticulation main and customer meters) that have previously failed. The replacement of water services is primarily driven by asset lifecycle costs, however the value of the water lost through leaks and breaks is also taken into consideration.
- We will continue to repair break as they are reported. They are prioritised based on their size and impact on customers.

3.2.4 Alternative sources

The Lower Hunter Water Security Plan identified a preferred portfolio of options for recycled water (for irrigation and industrial use) and stormwater harvesting. Up to 1,300ML/yr of additional

alternative water supply could be delivered, offsetting drinking water demands for industrial and irrigation uses. We are working the community and recycled water (and stormwater harvesting) customers to ensure the most viable projects are implemented. This will include:

- Continuing to investigate the true value of recycled water including social and environment and resilience benefits, and monetising non-market values, to ensure cost effective recycling opportunities are not missed.
- Continuing to engage with customers and the community on their values around recycled water and understand their willingness to pay for recycled water services.
- Continuing to work with local councils to explore opportunities and build business cases for cost effective public open space irrigation schemes. These schemes may also service some private users such as golf courses and jockey clubs.
- Continuing to work with local councils, government agencies and stakeholders to explore planning and institutional barriers to cost effective recycling.
- Continuing to work with local councils, government agencies and stakeholders to explore planning frameworks and undertake economic analysis of dual reticulation options for greenfield residential areas.
- Continuing to explore the economic viability of new or expanded industrial recycling schemes.
- Continuing to monitor and investigate advances in recycled water treatment technologies and emerging contaminants.
- Explore options to utilise existing water sources (untreated) and use for industrial purposes.

The development of the Lake Macquarie recycled water scheme is underway and will deliver recycled water for the irrigation of 2.5 Ha of sporting fields in Edgeworth. The scheme will provide a resilient water supply of 9ML/year commencing in the 2024-25 financial year. Opportunities to expand this scheme or implement new schemes will be considered if there is support from the community to do so.

Opportunities to expand or implement new recycled water schemes for business and industry will be dependent on the outcomes of the deliberative forum process commencing in November 2023.

We will continue to investigate the use of alternative sources at our wastewater treatment works and implement solutions where they are the least cost approach. A number of sites have been investigated and assessed against ELWC. In addition to the implementation of recycled water supplies at three treatment plants over the past two years, the following works are currently underway:

- Shortland WWTW is currently in the design phase and will save 73ML/y when the project is implemented late 2024.
- Edgeworth WWTW soon to be constructed and will save 26ML/y when the project is implemented in early 2025.
- Toronto WWTW under construction and will save 35ML/y from late 2024.

3.3 Research and Development

Projects or activities that aim to build knowledge or capacity are not assessed using the ELWC methodology. These initiatives may lead to future water savings however quantifying them is difficult at this point.

Evaporation management

We will continue to work with other Australian water utilities and Department of Planning and Environment to encourage further research, development and testing.

Reducing evaporation from Grahamstown Dam has been identified as a significant water conservation opportunity. Floating solar and floating plant-based solutions which may also provide water quality benefits are being considered to reduce evaporation. Research is still required to build on existing monitoring and knowledge to identify if there are safe and feasible interventions that can be deployed to reduce this evaporation. In particular ecological impacts now need to be considered to inform the risk of installing floating solar.

Water Efficiency Upgrades on social housing properties

In 2021-22 a partnership between NSW Land and Housing Corporation (LAHC) and Hunter Water delivered water efficiency upgrades and water leak repairs to more than 1,300 social housing properties. Tenants in these properties had more efficient toilets, taps and shower heads installed, helping them to reduce their water and electricity costs. LAHC will be assessing the benefits of this trial in order to better inform potential future work in this space.

Washing Machine Trial

Hunter Water collaborated with NSW Department of Planning and Environment on a trial which provided social housing tenants the opportunity of purchasing a new highly efficient washing machine at a heavily discounted price. Participants in the trial were able to replace inefficient top loaders with energy and water efficient front loaders helping them save money on water, electricity and detergent. The trial commenced 2021-22 and concluded 2022-23. LAHC will be assessing the benefits of this trial in order to better inform potential future work in this space.

BASIX optimisation

Studies indicate that the fittings installed under BASIX are not always the most efficient available[10] and that there is potential for a more targeted rebate scheme to encourage the purchase of more efficient appliances and fittings.[11] We are engaging and collaborating with key planning and implementation stakeholders regarding the feasibility and possible scope of a BASIX review and the development of rebate or incentive programs to promote the purchase and installation of higher efficiency fittings and appliances.

End User Study

There is uncertainty regarding the effectiveness of initiatives that have yet to be implemented. It will require an iterative process to identify the type and level of incentive required to achieve increased uptake of water efficient behaviours, fittings and appliances. An end-user study and further monitoring and research are needed to improve the understanding of actual versus theoretical demand reductions achieved. We are currently seeking support to undertake an end use study.

[10] Institute for Sustainable Futures (ISF), 2018, "Evaluation of the environmental and economic impacts of the WELS scheme", prepared for the Department of Agriculture and Water Resources.
[11] Urbis 2012, "Evaluation of the NSW home saver rebate program", prepared for the NSW Office of Environment and Heritage.

Continuous Improvement and Incentives

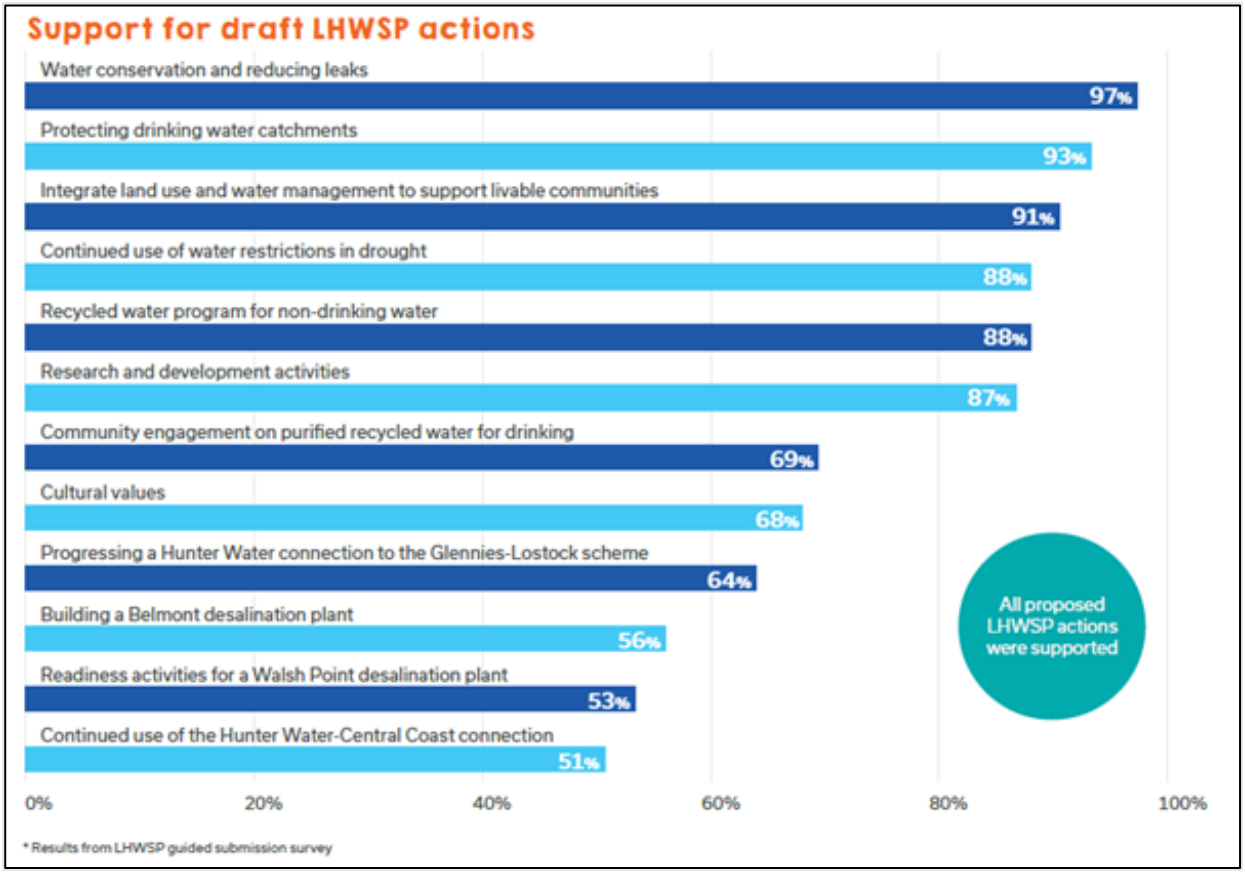
A continuous review of assumptions and data feeding into the design of water efficiency programs is required. As part of this ongoing review, investigate and research options and mechanisms to support and incentivise customers to upgrade to more efficient appliances or make their businesses more water efficient.

Behaviour Change

Customers responded well to the water conservation messaging during the 2019-2020 drought. Since this time water conservation behaviours appear to be declining, possibly due to the wetter than average conditions. We are continuing to see improved water saving behaviours compared to pre 2018.

As part of the Lower Hunter Water Security Plan an extensive engagement program was undertaken to understand community views, values and preferences to inform the plan. Across the three phases of engagement, Hunter Water used a wide range of communications and engagement tools and techniques, both qualitative and qualitative, to ensure there was an opportunity for the community to provide feedback on the plan.

During the development of the plan, the community expressed high levels of support for water conservation, and when community feedback was sought in 2021 on the draft plan, water conservation had the highest level of support out of all of the included actions, see Figure below.



In more recent engagements (2022-23) to support Hunter Water's next pricing proposal, water conservation continues to be important to our customers and the community and this will be explored in more detail as part of a deliberative forum process commencing November 2023.

The outcomes of this community engagement will continue to inform our water conservation program.

APPENDIX A.1- ELWC METHODOLOGY FOR WATER TREATMENT AND TRANSMISSION

The ELWC methodology is based on a cost-benefit analysis framework where the costs and benefits are assessed in marginal terms from a societal perspective.

A water conservation measure is considered to be economically viable if the benefits are at least equal to the costs.

- The benefits are assessed in terms of the value of water conserved
- The costs are assessed in terms of the levelised cost of implementing the water conservation measure, and
- The costs and benefits are expressed as present value of dollars per kilolitre of water.

That is, when the cost to society of a water conservation measure is less than the value of water it is expected to save, it is economically viable.

The value of water conserved is based on the marginal cost. Marginal cost is the cost incurred in the production of one extra unit of water supply.

- In the short-run, this cost is usually the operating cost associated with, for example, the additional pumping and chemical treatment of supplying an extra unit of water through the existing network.
- In the long-run all inputs are considered variable and therefore this cost is the cost associated with all actions required to bring supply and demand into balance, including capital expenditure on source augmentations (if necessary).

The value of water conserved depends on the timing and durability characteristics of the water conservation measures being assessed (i.e. short or long-term).

For conservation measures with short-term benefits, the short-run value of water reflects the short-run marginal cost including direct operating costs, the social costs of water restrictions, and the alternative drought measures and supply options.

For conservation measures with long term benefits, the long-run value of water reflects the long-run marginal cost plus an option value. *"Options value refers to the value of delaying an irreversible commitment to an investment, where it increases the likelihood of delaying or avoiding the need for the investment, or that the cost of the investment would reduce - eg, as a result of technological progress"*.[12]

The ELWC is calculated by adding the volume of water conserved from all new water conservation measures that are assessed as being economically viable. That is, our investment in new water conservation activities could increase (depending on available projects and funding) until the marginal benefit of saving an extra unit of water is just equal to the marginal cost of supplying an extra unit of water. The economic level of investment is achieved when the marginal values are equal. This can be explained with the assistance of a diagram (see Figure A1.1).

[12] IPART, 2019, Review of pricing arrangements for recycled water and related services, page 37.

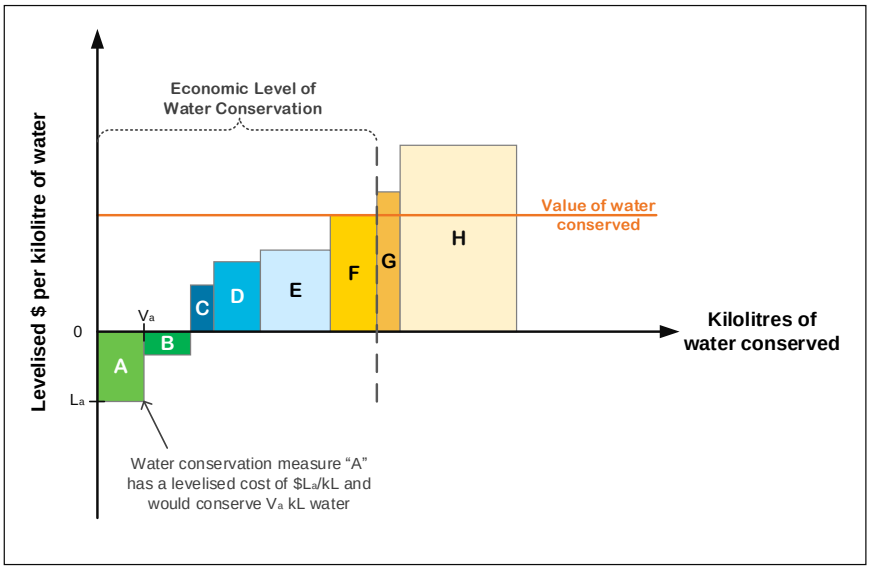


Figure A1.1 Conceptual diagram showing calculation of the Economic Level of Water Conservation

The horizontal axis represents the volume of water saved through implementing water conservation measures, while the vertical axis represents the cost per kilolitre. Each new water conservation measure (e.g. A to H) can be characterised by an estimated *volume of water conserved*, which is shown by the horizontal width of each rectangle, and a *levelised cost*, shown by the height of each rectangle. The levelised cost of a water conservation measure can be negative (measures A and B) or positive (measures C to H). A negative levelised cost means the water conversation measure results in a levelised benefit (even before considering the value of water conserved). For example, in the diagram water conservation measures A and B have negative levelised costs and are shown below the horizontal axis. Measure A could be a water efficient showerhead giveaway to customers that enables the customer to save more money on electricity costs for water heating than the financial cost to Hunter Water to buy the showerheads.

In this conceptual example, the projects are ordered by increasing levelised cost from left to right. That is, projects towards the left of the figure are more economically beneficial than those towards the right of the figure. Adopting this convention, the shape formed by the levelised costs of all measures assessed is similar to a marginal cost curve - the cost to save one kilolitre of water rises as we try to save more and more water.

The orange horizontal straight line - "value of water conserved" - reflects the marginal costs of supplying water. It is assumed to be constant at a given point in time, under specific assumptions about balancing supply and demand in the short and long terms.

Using the ELWC methodology, all water conservation measures with a levelised cost less than or equal to the value of water are considered to be economically viable. The volume of water that could be saved if Hunter Water implemented all of these measures is the Economic Level of Water Conservation. In Figure A1.1, measures A to F are economically viable. In other words, the vertical height of the rectangles for A to F are all no taller than the orange horizontal line representing the value of water conserved. Reducing water use any further (e.g. implementing measures G and H) would not be economically beneficial.

The ELWC is a forward-looking methodology. That is, only new potential water conservation projects are assessed using the ELWC methodology. We do not assess research, pilot trials or initiatives to drive behavioural change using our ELWC methodology as these types of projects aim to provide us with better information to use in the ELWC methodology, for example to calculate the project costs and water savings.

APPENDIX A.2 – STRATEGIC ASSET MANAGEMENT PLANS

We identify new options for water conservation through Hunter Water's Strategic Asset Management Plan. The Plan is the delivery mechanism for Hunter Water's overarching Asset Management Strategy.

The Strategic Asset Management Plan (SAMP) is an overarching document describing how services are to be provided through continual planning, delivery and management of assets. The SAMP outlines how Hunter Water's strategic objectives are fed into asset management objectives, ensuring the assets' performance both delivers and adapts to the required level of service at an acceptable level of risk and cost.

The SAMP outlines the tasks required for identifying existing and future community service objectives, then planning and delivering those objectives through the asset management functions across the life cycle of the varied asset types. The SAMP articulates the processes and the documentation related to managing assets as governed in the Asset Management Policy.

The SAMP is revised every four years as part of the strategic asset management planning cycle.

In our planning and asset management activities Hunter Water recognises the importance of water conservation in:

- Water resource availability and supply augmentation
- Supply costs
- Infrastructure capacity requirements; and
- Maintenance activity levels and scheduling.

New water conservation options are compared using the ELWC methodology (described in A.1). Programs and projects are selected for funding and implementation in the same manner as other operating expenditure and capital expenditure proposal, that is through robust internal governance process and IPART price reviews.

APPENDIX B – OPERATING LICENCE REPORTING MANUAL REQUIREMENTS

This section presents water conservation work program requirements in the Reporting Manual associated with Hunter Water's 2022-2027 Operating Licence (specified in section 2.1.1 of the Reporting Manual) and provides a guide to where the relevant requirement is addressed in this report.

Item No.	Reporting Manual requirement	Reference
1.	Describe and explain Hunter Water's progress against implementation (or otherwise) of water conservation activities for the previous financial year	Section 2.2 and Section 2.3.
2.	Include, for water conservation activities upstream of Hunter Water's water treatment plants, information about Hunter Water's water conservation program for the previous financial year and for at least the next five financial years, including where relevant (but not limited to): • Hunter Water's strategies, programs and projects relating (at a minimum) to water efficiency (**Water Conservation Measures for Water Storage and Transmission**) • How and when the Water Conservation Measures for the Water Storage and Transmission will be implemented. • The expected water savings, and • The method to assess the effectiveness of the Water conservation Measures for Water Storage and Transmission.	Section 2.2, Section 3
3.	Include, for water conservation activities within and downstream of Hunter Water's water treatment plants, information about Hunter Water's water conservation program for the previous financial year and for at least for the next five financial years, including where relevant (but not limited to): • Hunter Water's strategies, programs and projects relating (at a minimum) to water leakage, recycled water and water efficiency (**Water Conservation Measures for Water Treatment and Transmission)** • Whether the Water Conservation Measures for Water Treatment and Transmission are economic. • How and when the Water Conservation Measures for Water Treatment and Transmission will be implemented. • The targeted water users. • The expected water savings. • The cost of the measure (expressed as both total cost and cost per kilolitre of water saved) • The method to assess the effectiveness of the Water Conservation Measures for Water Treatment and Transmission, and • the extent to which these Water Conservation Measures for Water Treatment and Transmission accord with the Economic Level of Water Conservation (ELWC) and the Current Economic Method.	Section 2.2, Section 2.3 and Section 3

Item No.	Reporting Manual requirement	Reference
4.	Include details of all the Water Conservation Measures for Water Treatment and Transmission relating (at a minimum) to water leakage, recycled water and water efficiency that were considered by Hunter Water in developing its water conservation programs, and clearly identify those Conservation Measures for Water Treatment and Transmission that: • are economic when assessed by the Current Economic Method • may become economically efficient at a later date • Hunter Water is required to implement under Licence clause 12(2) • Hunter Water has implemented • Hunter Water is proposing to implement at a later date(or under specific circumstances) • Hunter Water is proposing not to implement and the reasons for not implementing. •	Completed in each individual sections under Section 2.2 and Section 2.3.
5.	Describe and explain Hunter Water's progress against each of the Water Conservation measures of its water conservation program for the previous financial year, including any deviations from the program	Section 2.2 and Section 2.3.
6.	Describe and explain any changes to Hunter Water's water conservation program relative to the water conservation activities identified in the previous Annual Water Conservation Report	Section 2.2 and Section 2.3.
7.	Outline how Hunter Water's water conservation activities relate to the Lower Hunter Water Plan	Section 1.6
8.	Include information on any Water Conservation Measures researched, piloted or developed for the previous financial year (including the funds spent on these activities)	Section 2.2.2
9.	Include information on the following measures for the previous financial year (where applicable): • quantity of Drinking Water drawn by Hunter Water from all sources expressed in gigalitres per year aggregate. • the level of water leakage from Hunter Water's Drinking Water supply system against the economic level of leakage for that financial year (in megalitres per day) • the volume of water sourced from Recycled Water (in megalitres), and	Section 2.1 Tables 2.1 and 2.2

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