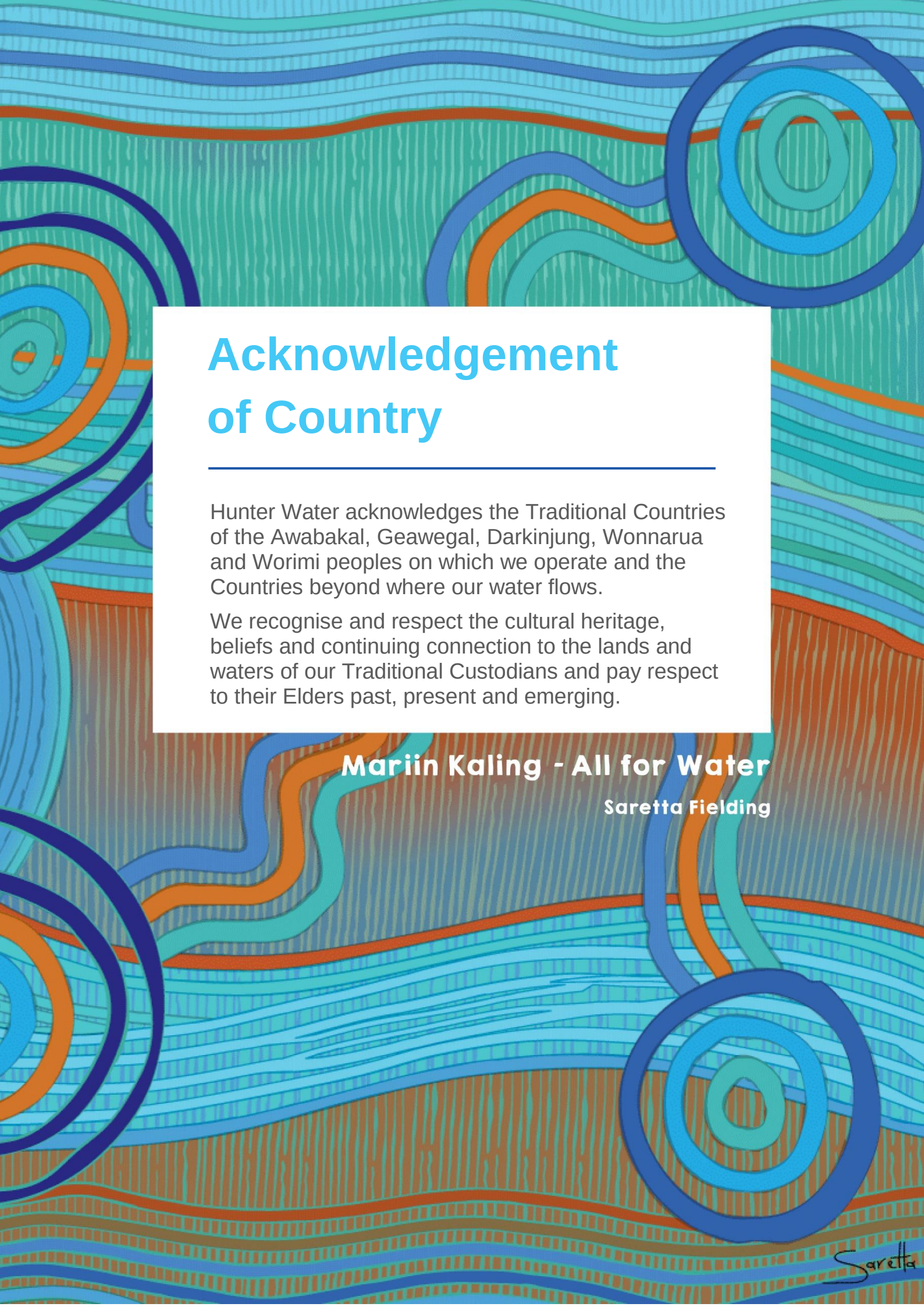
# ANNUAL WATER CONSERVATION REPORT

**September 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 Water Conservation Report 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. The future five year water conservation plans have been excluded from this report as they will be presented in the 5 Year Water Conservation Plan that is due 1 December 2023. The 5 Year Water Conservation Plan will take 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.

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 Water Conservation Report provides detailed information on our performance against Clauses 12(1) and 12(2) of the 2022-27 Operating Licence and has been prepared in accordance with the relevant sections of the associated Operating Licence Reporting Manual. This Water Conservation Report provides detailed information on the water conservation projects and activities Hunter Water carried out in 2022-23. The future five year water conservation plans have been excluded from this report as they will be presented in the 5 Year Water Conservation Plan that is due 1 December 2023. The 5 Year Water Conservation Plan will take 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.

# 1 WATER CONSERVATION APPROACH

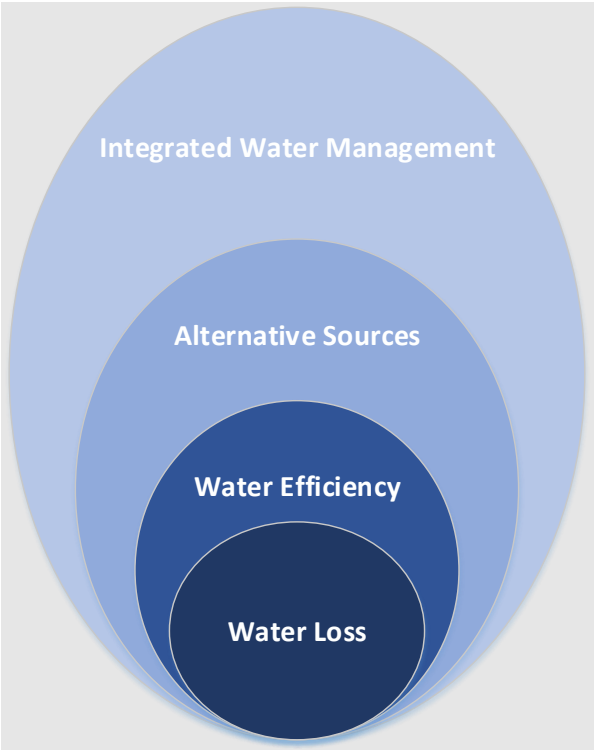
## 1.1 Why do we need to conserve water?

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

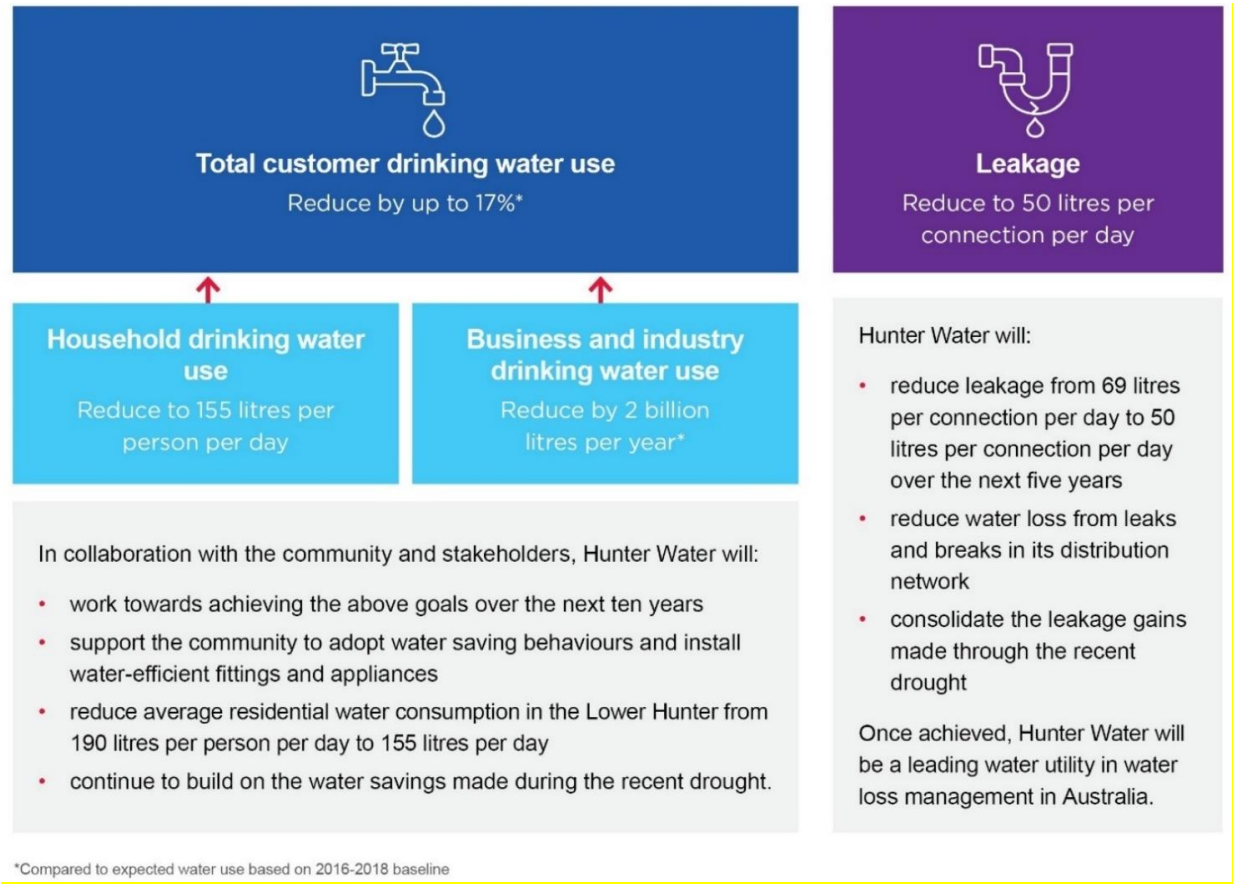
Consumption patterns at a site or population level are monitored to assess the effectiveness of each of the water conservation initiatives and the overall program. The scope and design of the program and associated activities and projects are then adjusted in response to this monitoring and, where necessary,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

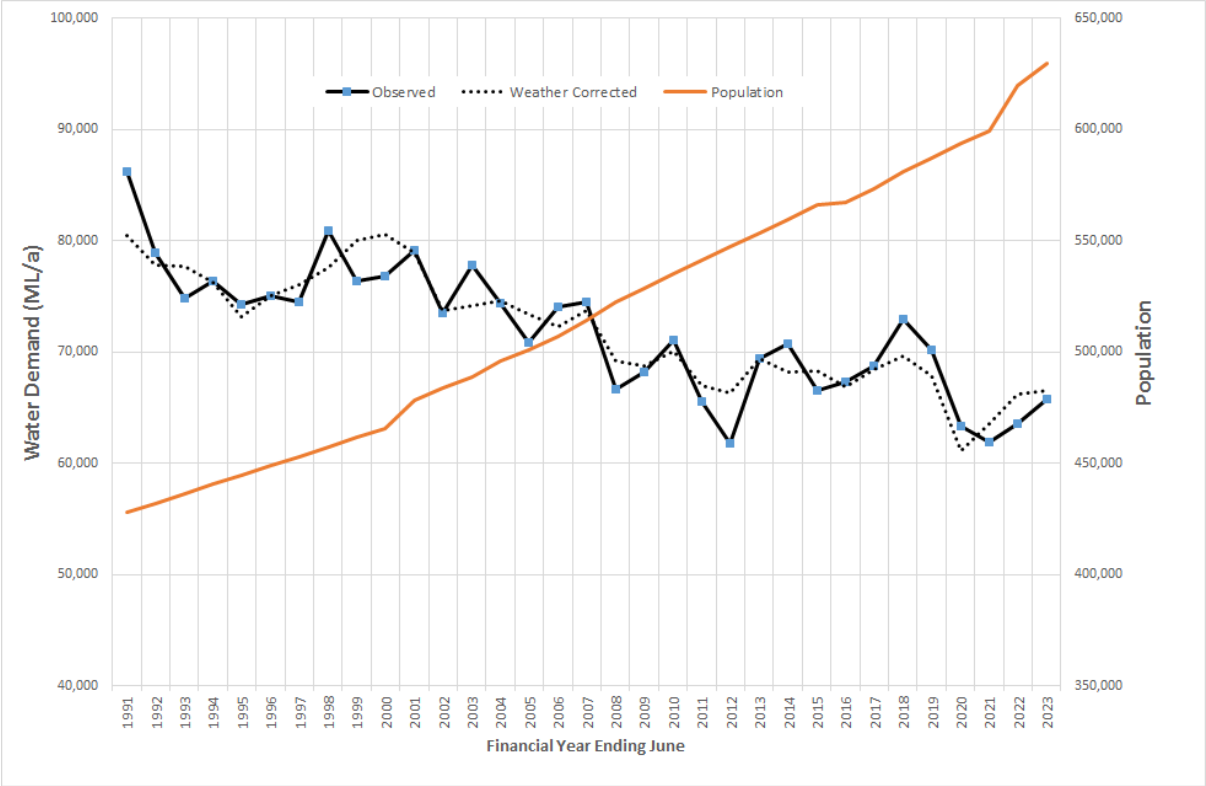



**Figure 2.2 Observed and Weather-Corrected Total and Residential Per Capita Demand**

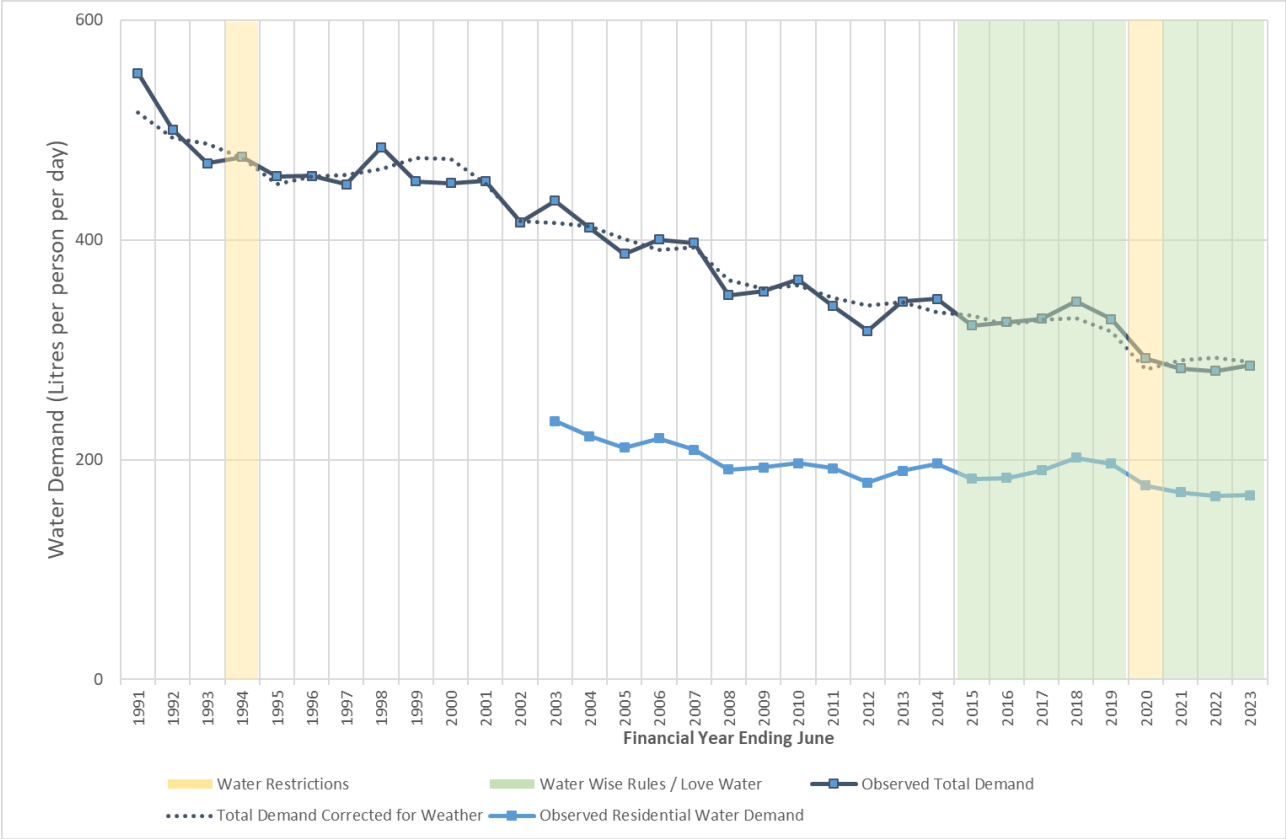
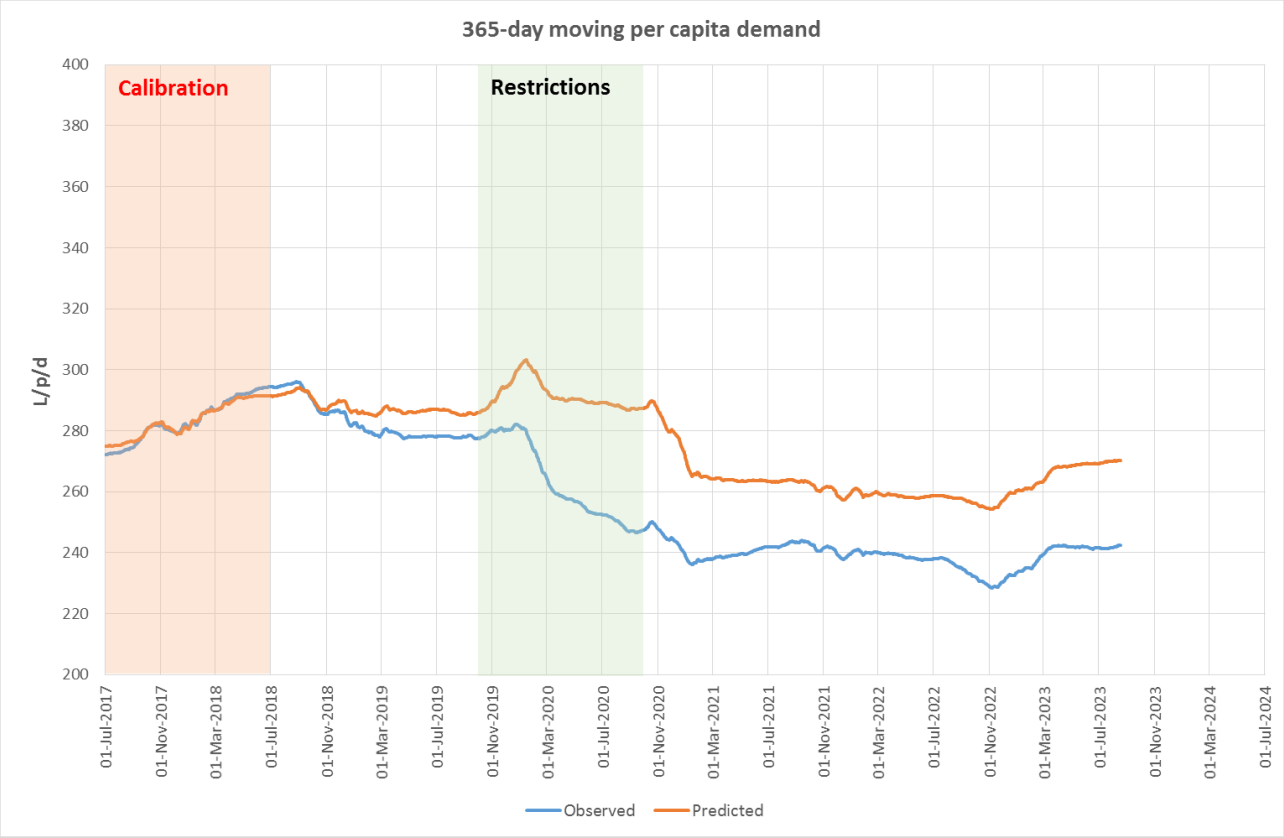


Figure 2.2 suggests that weather-corrected per capita demand has been relatively stable between 2015 and 2019. There was a significant reduction in weather-corrected per capita demand in 2019-20 due to the influence of water restrictions. That result has rebounded slightly during the last three financial 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 2016. 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.

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 previous financial years 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. Department of Planning and Environment have now requested water use data in order to assess the benefits of the 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 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. Department of Planning and Environment have now requested water use data in order to assess the benefits of the trial.

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. The approach combined with wet conditions and full storages meant that a dedicated Community Water Officer was considered necessary.

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'.<br>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.<br>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.<br>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.<br>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 just over 200 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.

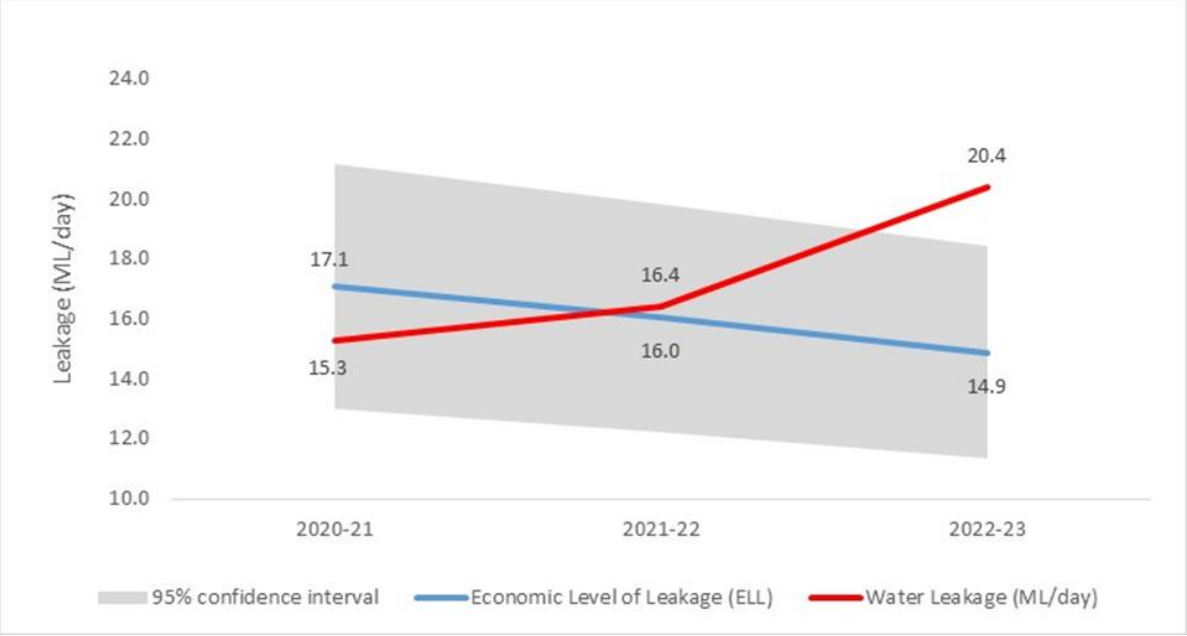
### 2.3.3 Reducing Hunter Water Leakage & Consumption

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 and two recycled water treatment plants across the Lower Hunter. Hunter Water has 16 recycled water schemes which provide water for irrigation, agriculture and industry. About 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**

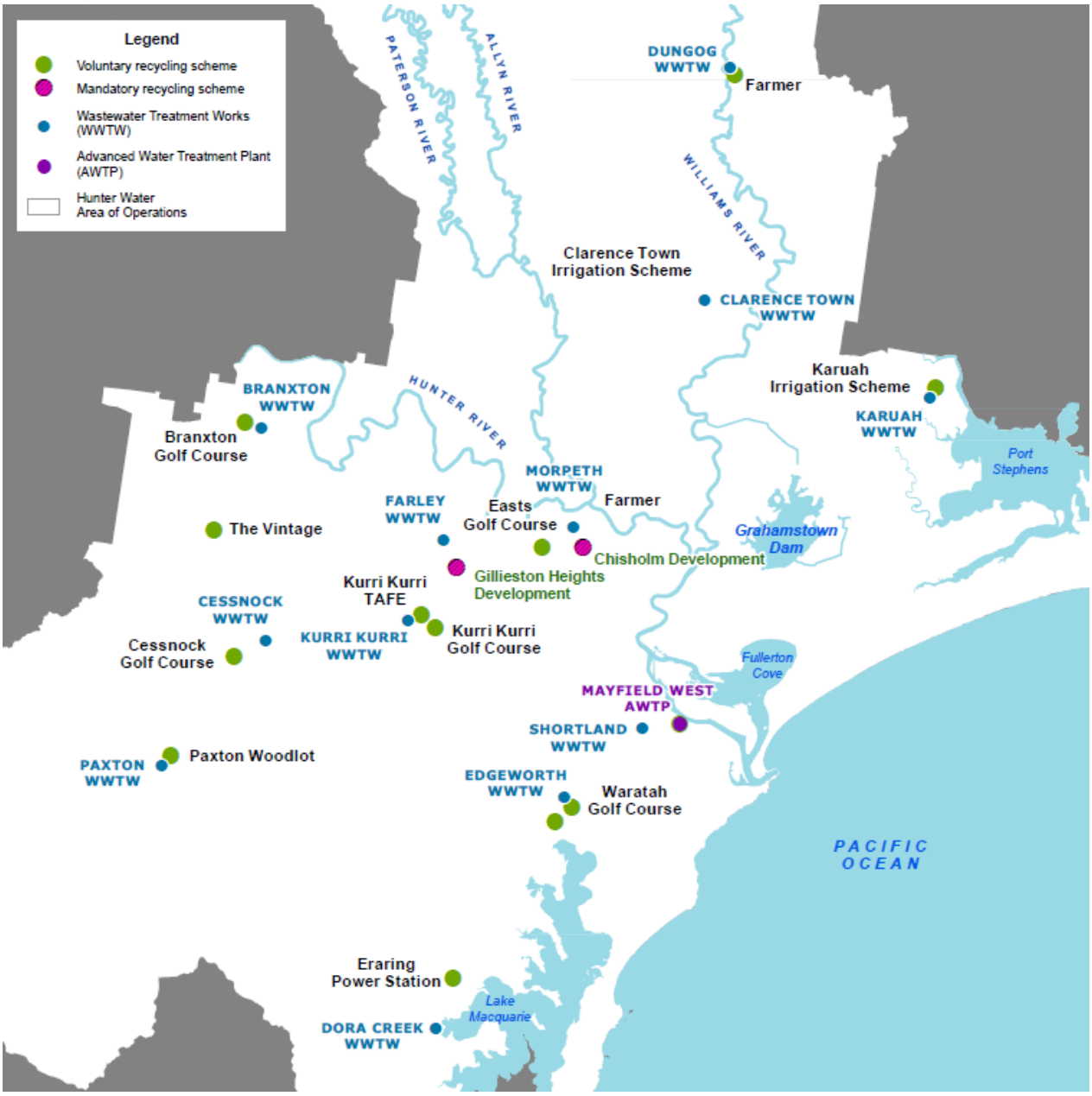


**Table 2.4 Hunter Water's recycled water schemes**

| 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.

# 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"*.[1]

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).

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

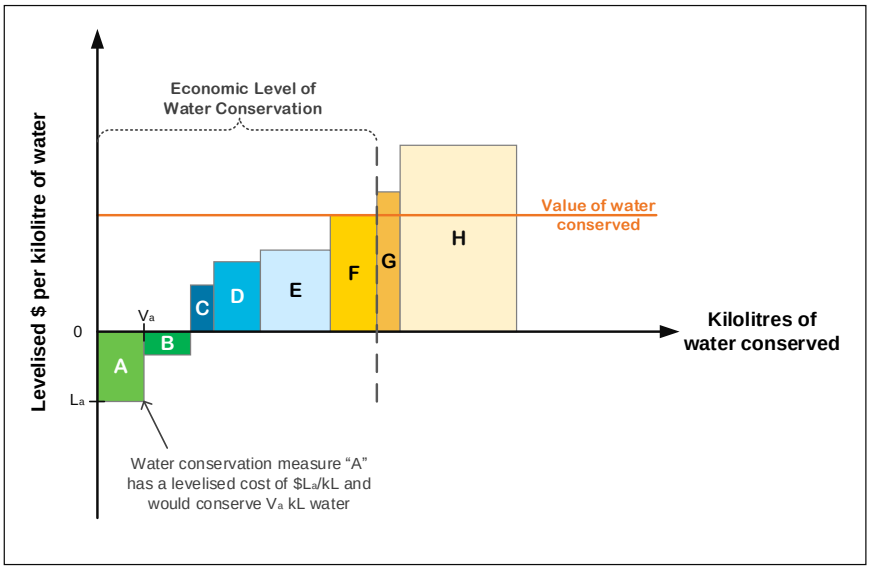



**Figure A1.1 Conceptual diagram showing calculation of the Economic Level of Water Conservation**

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.

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