Watercare
An Auckland Council Organisation

# Auckland Water Efficiency Plan

## 2021 to 2025

# Contents

# Foreword

He waka eke noa
(We're all in this together)

Tāmaki Makaurau is a growing city that thrives from its relationship with the natural environment. This makes it a great place to live, but we need to find ways of balancing increasing demand for services like water with the resources available.

Auckland is home to a third of New Zealand's population and is the economic and commercial powerhouse of the country. Our city grew by 187,000 people from 2013 to 2019, and our economy (as measured by gross domestic product - GDP) grew by nearly 40% over this time. We are also surrounded by population growth across the North Island. New Zealand's four northernmost regions, Northland, Auckland, Waikato, and the Bay of Plenty, accounted for 60% of the country's population growth between 2013 and 2019 and these regions are now home to over half of New Zealand's people. The north of our country is trying to match more growth and livelihoods with the same rain, rivers and aquifers.

More and more houses are being built here as construction continues to be a key driver of the Auckland economy. Demand for new housing is booming. Auckland's construction sector growth as measured by GDP doubled between 2011 and 2018. Developers apply for over 6000 new residential connections to the Auckland water network every year, and Kāinga Ora (formerly Housing New Zealand) has plans to build more than 43,000 new homes across five redevelopment areas over the next 20 years. This will replace existing social housing that is no longer fit for purpose and replace these dwellings with new social housing and affordable homes, responding to demand for housing in a city that is likely to remain a prized destination into the foreseeable future.

Auckland's manufacturing sector will continue to grow. Auckland is the heart of New Zealand's food and beverage (F&B) manufacturing and two-thirds of the country's top 50 F&B manufacturers are based here. These companies represent 25% of the top 100 largest water users in Auckland, and access to reliable clean water is critical for this sector to operate. Growth of F&B manufacturing in Auckland is supported by nationally funded science and research facilities and export advice and is backed by a strong national brand that presents New Zealand F&B products as safe, high quality and trustworthy. F&B manufacturing accounts for 46% of New Zealand's total exports per annum and the potential economic impact in the years to come is considerable. Some estimate that F&B processing in New Zealand could treble over the next 15 years as the market transitions east, away from our traditional markets in Europe and the US, to fully focus on Asia. The economic potential of F&B manufacturing is significant, but we need to grow it sustainably. If we want this industry to last, we cannot ramp up our manufacturing in a way that pollutes and depletes our environment. This is our opportunity to grow in a way that is sustainable and world-leading, and part of that story is how we use the water that belongs to and is needed by more and more of us.

If growth in our population and economy are big challenges for Watercare in 2021, climate change is an even bigger one. It is one of the largest hurdles that we face as a business, as a people and as a country.

The impacts of climate change are often seen through water first and therefore become a responsibility that we have to actively consider. Climate change causes new issues to arise and exacerbates problems that already plague us, demanding of us to change not only what we do but also how we need to do it. We will not be able to remain isolated from the effects of climate change in other places; we may be called to accept people who are displaced – regionally, nationally or internationally – because they will not be able to continue to live in the environment that they call home today. Given Auckland's size and scale, the city's preparedness for climate change will be a cornerstone of our national response, and how we manage our water will be key. We know that the water in our dams and rivers is not an infinite resource in the quantities that our growing city demands and therefore is not something that we can take for granted.

We will increasingly face extreme weather events, putting our water supply at risk, as well as a rise in demand for water during hot and dry periods. A single drought is not the same as climate change, but the threats to drinking water supply is one of the most pronounced impacts that this massive global issue will bring. Even slight changes to rainfall, sea level and temperature will have significant impacts on us and generations to come. We will see more frequent droughts and flooding, and rainfall will be a less reliable source of water. More days with hotter temperatures and longer dry periods will cause demand for water to increase, while the assets and plants in our water and wastewater systems will face more extreme weather events and the effects of sea level rise.

The outcomes for current and future Aucklanders will depend on the decisions we make to mitigate and prepare for the impacts of the city's growth and climate change now. As we look forward to the future, our ability to do more with less of our water is going to become more and more critical.

As New Zealanders, we respect the mana of our fresh water: te Mana o te Wai. This concept guides how we manage fresh water in New Zealand. We know that water is vital to life over and above its financial value. Preserving our drinking water through water efficiency strategies is an important part of a bigger water management system which Watercare is committed to sustaining and improving.

This document marks the final stage of Watercare's commitment to the Auckland Three Waters Strategic Plan (2008) which requires Auckland to reduce gross per capita consumption by 15% by 2025 (from 2004 levels). The final reporting period is 2021 to 2025; by 2025 we will know whether we have achieved the target we set for ourselves in 2008.

Unlike previous water efficiency plans, this one has a different purpose. Particularly in light of the recent years of below-average rainfall, the reason we need to focus on water efficiency is because we want Aucklanders and the environment we live in to thrive in the longer term. If we can use and reuse water wisely and stop as much of it being wasted as possible, this outcome will be achievable.

We have also created additional targets to lay some foundations for water efficiency before and beyond 2025: the groundwork we do with this plan is to use units of measurement that describe efficient use, rather than simply how much is used overall. More importantly, we are pursuing water efficiency not because it is the cheaper option but because we are committed to ensuring Auckland remains a healthy, green and resilient city.

**Jon Lamonte**
Chief Executive

# Why we need this plan

Almost every aspect of our lives relies on ready access to clean water. Without a reliable water supply, individuals, communities, the environment and economic activity all suffer.

For many years, Auckland has had plenty of water and we continue to seek and bring on new sources of water to supply the city. However, with the growth of the city and the impacts of extreme weather and climate change, we need to plan ahead.

Five of the past seven years have been amongst the warmest on record in New Zealand,1 followed by a prolonged drought. During 2020 we campaigned hard to urge everyone not to waste water, and then imposed restrictions to help preserve the water left in our water storage lakes. Since May 2020, Watercare has been delivering additional supply and worked to reduce demand – not only to address the drought – but also to provide Auckland's growing population with the water we need to thrive as a healthy and prosperous city. We are also increasingly exploring sources of non-potable water for uses that do not require drinking quality water.

Looking forward, given the constraints on our renewals budget and the changing climate, our water efficiency target will not be easy to achieve. Higher temperatures lead to increased demand for water and changing rainfall patterns will affect our existing water sources. We will continue to develop new sources of water and do what is within our capability to strengthen our network so that we make the most of what we have. However, we will still need Aucklanders to use water wisely so that there is enough of it to sustain all of us and the environment we live in. We want people in Auckland to embrace the idea that collectively we are the kaitiaki (guardians) of our water.

As we look ahead, we are putting more effort into fewer projects. We are refining our focus and will take a more data-driven approach. For example, a better understanding of our consumption may positively influence our relationship with water. And that is what we need to focus on.

Water is a natural treasure that we must value and protect. This plan identifies the targets Watercare will work towards to ensure the efficient delivery and use of water across our network, and how Watercare and the people of Auckland will work together to look after this precious taonga (treasure) from now and into the future.

# Te Mana o te Wai

## Māori attitudes to water guide and shape Watercare's approach.

To truly appreciate the value of water, we only have to look at the way Māori understand the interconnected nature of the water system. Water is precious in both a spiritual and a physical sense. It is a fundamental need. Kei te ora te wai, kei te ora te whenua, kei te ora te tangata (when the water is healthy, the land and the people are nourished).

As New Zealanders, we respect the mana of our fresh water: Te Mana o te Wai. This concept guides how we manage fresh water in New Zealand.

Te Mana o te Wai establishes a hierarchy of obligations where the well-being of water takes precedence over its use. This means that our discussions about managing fresh water should start with consideration of the health and well-being of the water. To give effect to Te Mana o te Wai, we must be respectful about how much water we take (not be wasteful) and be careful with how we discharge our treated wastewater, so that people can still swim and fish in the water that is part of our identity.

Our rivers and lakes – from the mountains to the sea – and how we care for and use them are a fundamental part of who we are. We need to care for the wider environment (such as our land and our trees) because this needs to be healthy to keep our water healthy.

Our treatment and delivery of water and wastewater, and all our water efficiency initiatives are only a component of a much bigger water system. We acknowledge that, overall, New Zealand's water environment is in a degraded state. Mauri (the vital essence) must be restored.

Te Mana o te Wai in freshwater management and the values of tangata whenua (the people of the land) inform key national guidelines to which Watercare is aligned. These include the Ministry for the Environment's National Policy Statement for Freshwater and the National Environmental Standards for Drinking Water.[1]

We need to play our part in adopting an integrated approach to managing land use and freshwater and work with other guardians of our water. Therefore, our investment choices need to show how much we value water. While our decisions are data-driven and we remain a cost-effective provider, we acknowledge that water is vital to life and valuable over and above its financial worth. Watercare will seek partnerships beyond the mandate of service provision and help to bring mana back to Auckland's water system.

[1] For more information about the Freshwater NPS 2014 (rev. 2017) see Freshwater NPS

# Looking around: where we are

Before we can look to the future, it is important to understand what is currently happening with Auckland's water.

# Where our water comes from

Based on our current operations, around 64% of our water comes from dams in the Hūnua and Waitākere ranges, and 31% from rivers. We also have a small groundwater source in Onehunga that supplies around 5% of the city's water.

The raw water is processed at treatment plants to remove contaminants. The largest of these plants are in Ardmore, Titirangi and Tuakau. Of these, Ardmore is the most cost-effective, while water from Tuakau is the most expensive. When there is enough water in the lakes, we use mostly the Ardmore supply to reduce costs. When water is scarcer, we protect the southern lakes by using other sources first. Since mid-2019, we have maximised our take from the Waikato River to the full capacity of the treatment plant, for example.

From our treatment plants, water flows along transmission pipelines through supply points to provide homes, businesses, community and government organisations with high-quality water.

We monitor quality throughout the network to make sure that every customer is supplied safe drinking water that meets:

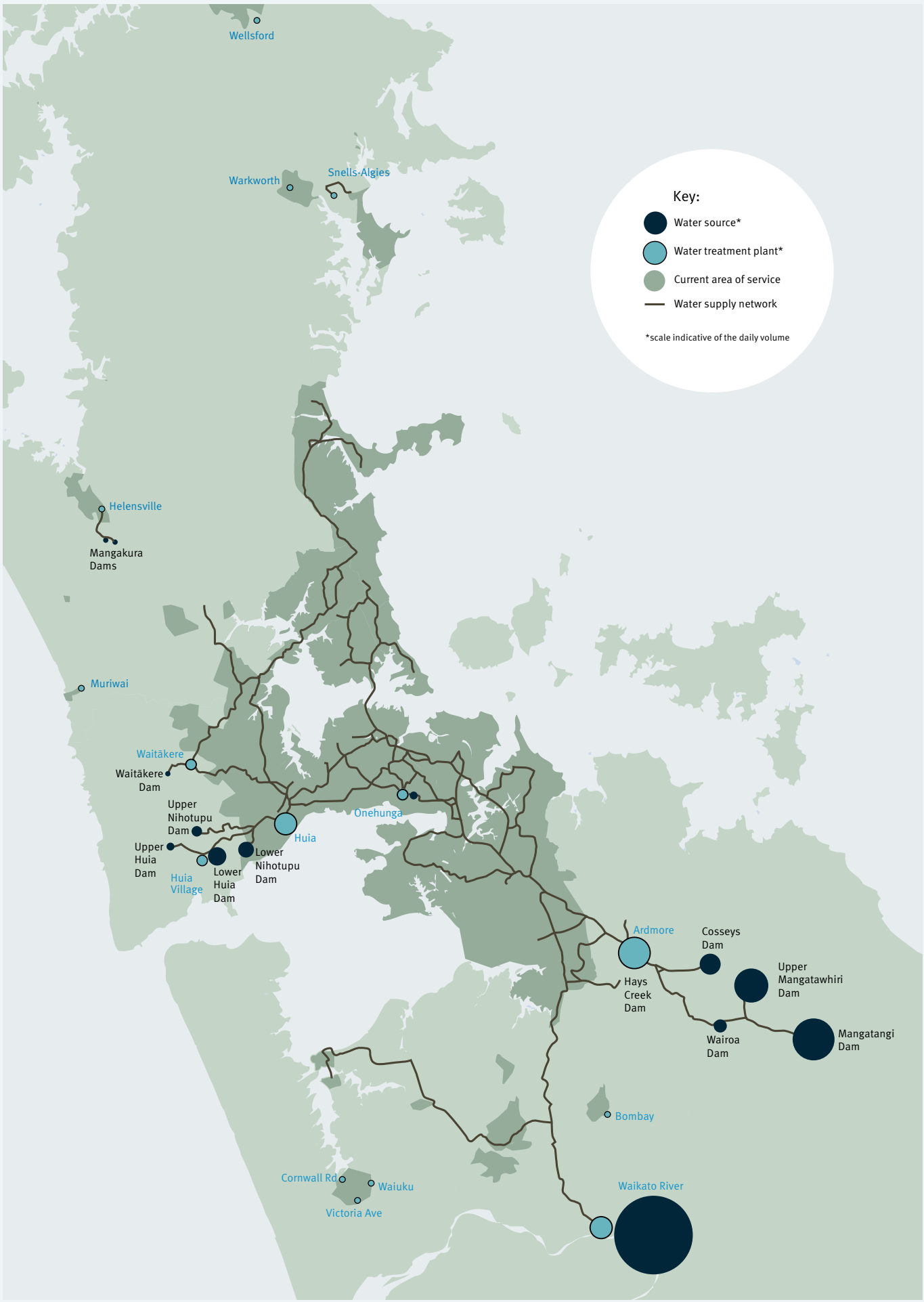
- The expectations of the New Zealand Drinking Water Safety Plan Framework
- The requirements of the Health (Drinking Water) Amendment Act 2007
- The Drinking Water Standards for New Zealand
- Any new regulations arising from the Three Waters Review by the Minister of Local Government.

**64%**
FROM DAMS

**31%**
FROM RIVERS

**5%**
GROUND WATER

## Water supply in Auckland: Treatment plants and water sources with daily contribution per source in 2019/2020



# Where our water goes

Watercare's sources provide water to at least 1.6 million people and thousands of businesses and organisations in Auckland.

Our peak summer demand reached a record high of 560 million litres per day over several days in February 2020, when many people on tank water outside the Auckland metropolitan area had run out of water.[2]

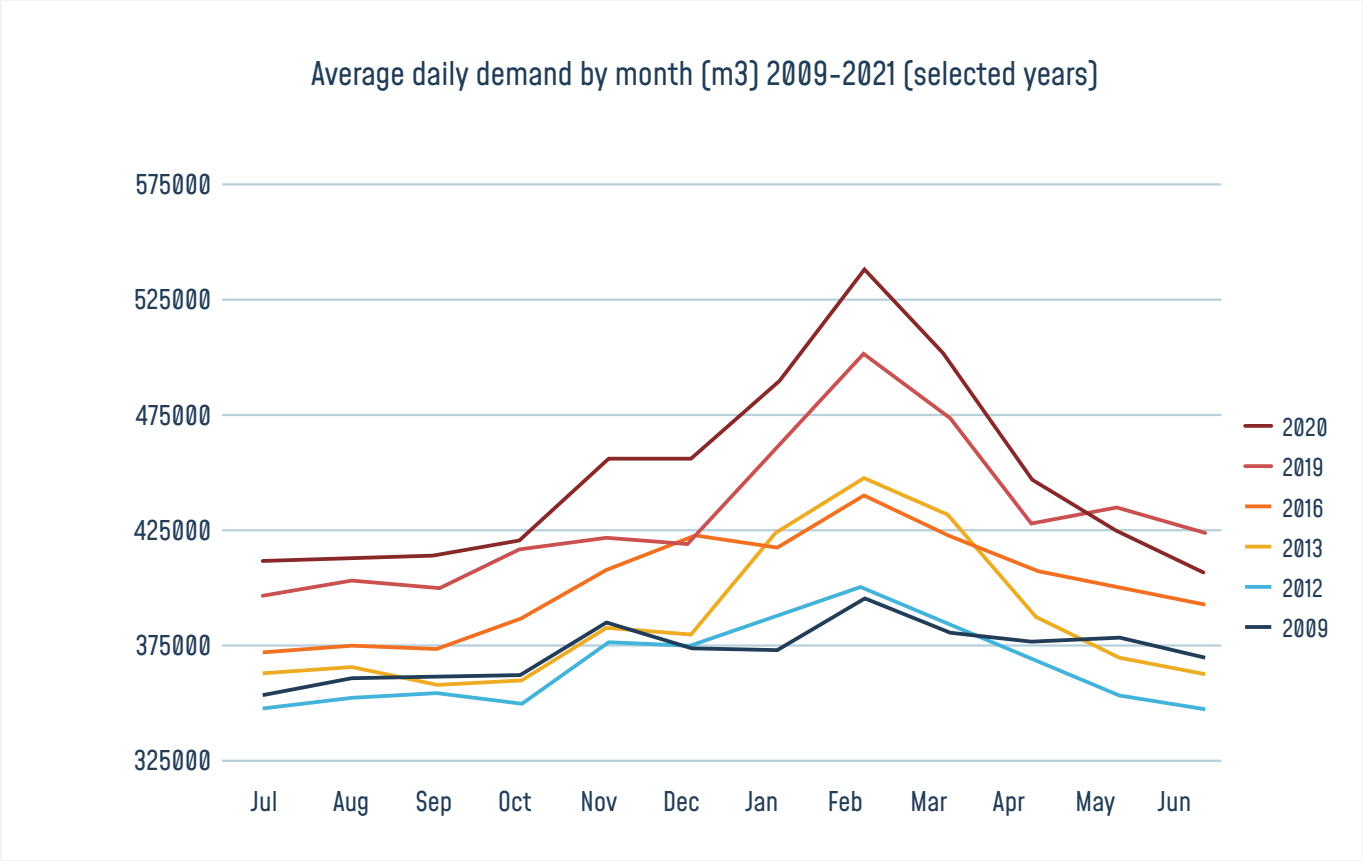
Non-revenue water includes water lost through leakage, as well as water lost through unauthorised use, firefighting, network maintenance and under-reading of meters. While water leakage in Auckland is an area for concern, and one we seek to address, it is worth noting that this is by no meansa unique issue. Water authorities around the world report similar losses through leakage.

The targets in this Water Efficiency Plan have been set up to provide better oversight of residential usage and non-revenue water now and into the future. Constraints on our ability to finance our renewals budget mean that we are unable to address leakage to the extent that we would like to. However, we will continue to focus on our non-revenue water to ensure we conserve as much water as we can, using the tools and the funding available to us.

[2] In 2020 we began rolling out a new type of connection called Town-to-Tank, which allows people on tank water to connect to the metropolitan supply using a low-flow connection. This enables them to top up their tanks slowly from town supply as they choose to, rather than waiting for their tanks to run low and ordering a fill from a tanker at the driest point in summer (i.e. the time of peak demand).

# How rainfall affects water demand

The more summer rainfall we receive, the less supplied water the average person uses. The difference can be significant. The graph below shows that water use was lower in wetter years such as 2017 and 2018, and notably higher in dry summers such as 2013, 2019 and 2020.




In hotter and drier summers, Auckland's average daily consumption of water is significantly higher.

Hot summer days drive demand to levels we have not seen before. Dry weather means that people reliant on tank water increasingly need to access Auckland's water supply network. As our population grows and our summers become hotter and drier, we are seeing significant rises in the city's summer demand for water.

To enable our water treatment plants to cope with Auckland's record- breaking demand for water, they have been staffed 24/7 during summer. We need to be especially mindful about water use over the hottest summer months to ensure that our treatment plants can manage this extreme demand. This means that we need to help Aucklanders moderate their consumption.

# How we use water in Auckland

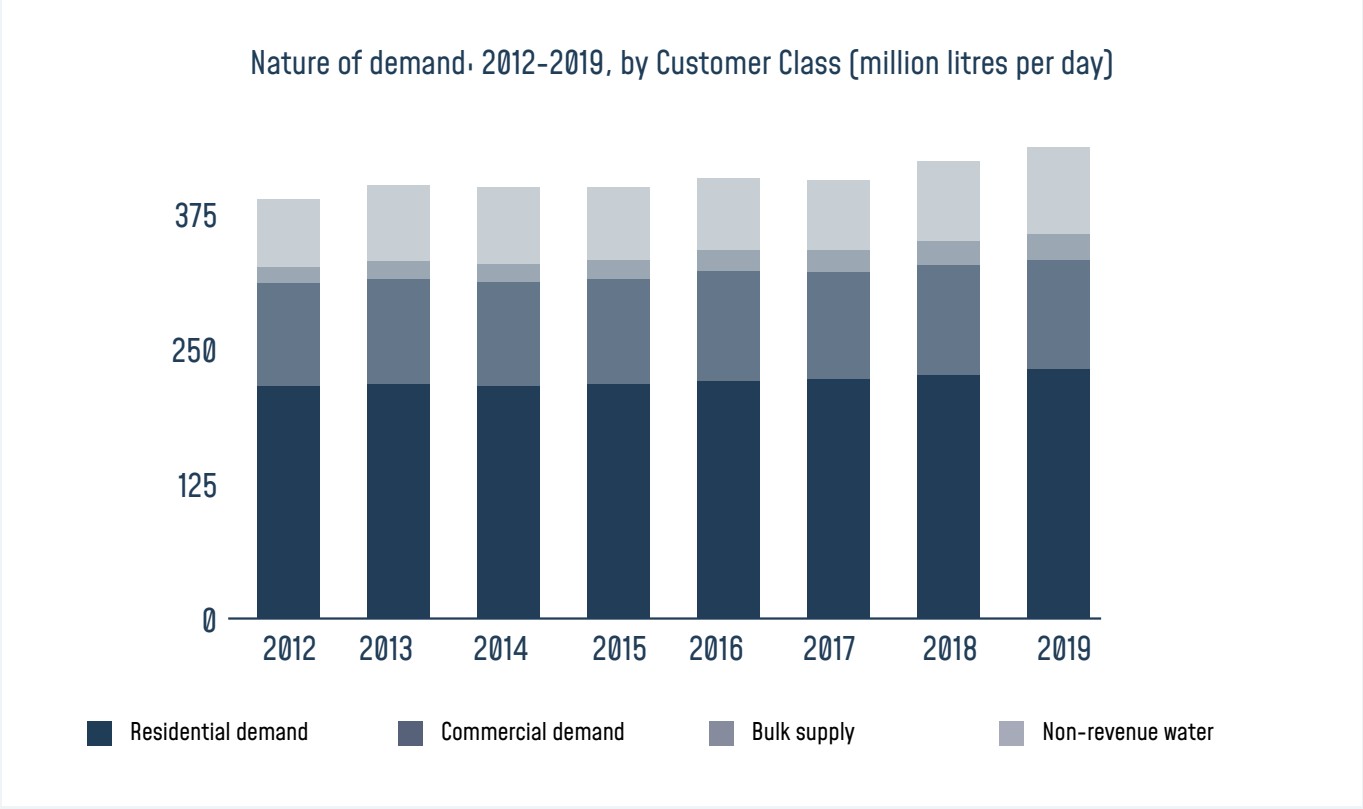
Auckland's total water use falls into four main categories:

**Residential:**
Water used in homes.

**Commercial:**
Water used by businesses, schools, hospitals, etc.

**Bulk:**
Water supplied to other local authorities to on-sell within their own networks, e.g. Papakura, Tuakau and Pokeno.

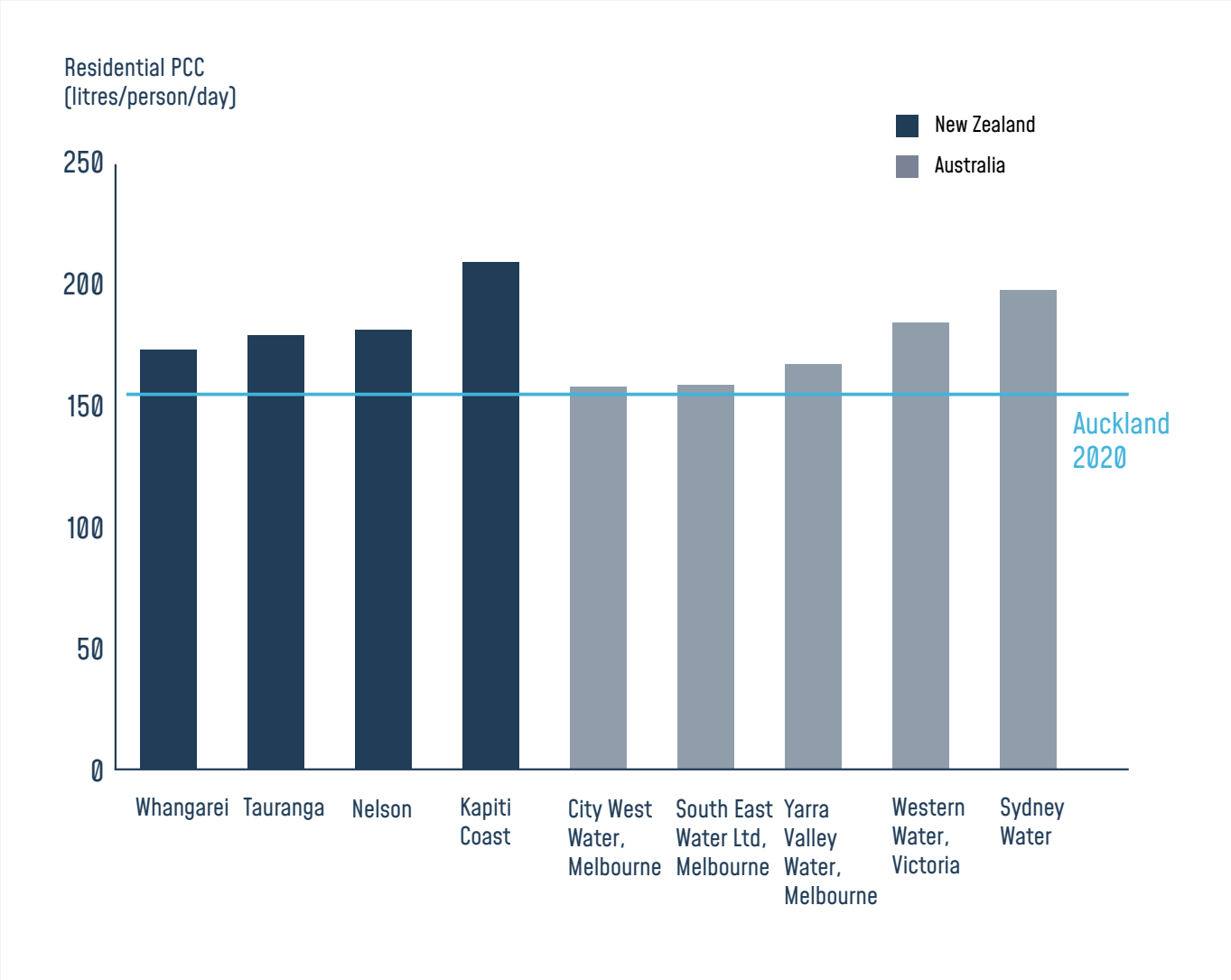
**Non-revenue:**
Water that is treated and conveyed in Watercare's network but cannot be billed to generate revenue. This includes water used for firefighting and lost through leakage, under-reading of meters or from unauthorised usage.




The breakdown of water demand in Auckland has remained remarkably stable over the years.

## Residential

The average Auckland residential consumption compares well with other major centres in New Zealand. We have one of the lowest per capita consumption levels in the country.




Auckland's residential per capita consumption compares well to similar Australian cities.

Auckland uses less water per capita than other cities in Australasia. Watercare does not compare as favourably against some European cities. They have more condensed housing (with fewer private gardens, for example), significantly lower levels of network loss and much higher water charges.[3]

[3] Only 7.6% of tap water is lost in transmission in Denmark. See https://stateofgreen.com/en/partners/state-of-green/news/danes-water-consumption-the-lowest-ever-recorded/

## Commercial demand

It stands to reason that the bigger Auckland becomes, the more water we use. What is surprising, though, is that the nature of demand has remained proportionately stable, even though our economic growth has been greater than our population growth.[4] We would have expected the amount of water used by commercial and other non-residential organisations to have increased as a proportion of overall consumption, but that has not happened.

The reason for this is twofold: firstly, we have worked hard with our key commercial customers (our top 20 customers use 12% of all of Auckland's water) to reduce wastage, and many other companies have adopted water- saving initiatives over this time. Many large companies and organisations have undertaken a combination of sustainability and cost-reduction initiatives to reduce their water use. For instance, Auckland Council (our second biggest single water consumer) is continuing its drive to reduce water usage by 30%. Among many other initiatives, our commercial team has been actively looking for ways to recycle water in industrial processes where water does not need to be of drinkable quality.

We are working with commercial customers to reduce waste, but fully recognise that water use will inevitably increase as industry grows.[5] To understand the gains we make in water efficiency, we need to look separately at the growth of the economy and the drinking water supplied to residents.

## Bulk

Pokeno, Tuakau and Papakura, which receive bulk water from Watercare, face the same future as Auckland in terms of water supply. We work closely with the authorities in these areas to promote water efficiency.

## Non-revenue

The major component of non-revenue water is what we lose through leakage. Under-reading of meters and unauthorised use are relatively minor contributors, though we are working to address those. Non-revenue water used for firefighting, of course, is a community contribution we make gladly.

[4] Auckland's economy rose by 38.5% between 2013 and 2018, https://www.stats.govt.nz/information-releases/regional-gross-domestic-product-year-ended-march-2018, and the population grew by 15% during this period. https://www.stats.govt.nz/information-releases/2018-census- population-and-dwelling-counts

[5] We still work closely with our commercial customers to ensure that they have access to technology and processes that will help them be more water efficient, but by thinking beyond set reduction targets, we can better gauge our performance and more actively support theirs.

# Looking back: what have we achieved?

Watercare has been looking after Auckland's water supply for many years, implementing strategies such as the ones described in this document. Before we look ahead, we should reflect honestly on our achievements and where challenges remain.

# Encouraging Aucklanders to be more water efficient

Since 2008, we have been committed to reducing gross per-capita demand by 15% by 2025 (compared with 2004 levels). Our target in 2017 was to reduce consumption to the point where we would not have to invest in new water sources until 2031. However, this goal has proven to be unattainable due to increased demand as well as weather impacts that have constrained our water supply.

However, our water efficiency drive is working well. Through the efforts of our commercial customers and the community, gross per capita consumption has been declining. This trend continued as expected until 2019, when extremely hot and dry weather raised the summer demand for water to higher levels than we have ever seen before. The 2020 drought showed how critical it is for everyone in Auckland to take water efficiency seriously, making scarcity of water a reality for many Aucklanders who have continued their good habits even under reduced restrictions.

Below, we consider each of the four main pillars of the 2017 strategy, with comments on our performance so far.

## Municipal water efficiency programme

This relates to how Watercare itself and our largest customer, Auckland Council, use water.

### *Watercare*

Watercare has reduced water usage by reusing water in our treatment processes. Our four largest wastewater treatment plants all use recycled water in place of potable (drinkable) water where possible. In 2019, the Māngere Wastewater Treatment Plant reused 36 million litres of water per day.

Our other water treatment plants recycle water from the treatment processes as well.

### *Auckland Council*

Auckland Council is working towards saving 30% of water use via several initiatives. These include amending supply agreements to make contractors more responsible for water use, ensuring public parks are only watered when necessary (in some cases installing moisture sensors) and fixing leaks. Some public toilets have been fitted with rain tanks for flushing.

## Residential water efficiency programme

We work with schools and sports clubs to raise awareness of water efficiency.

Our school education programme focuses on the water system and stresses the importance of not wasting water. Our lessons are popular in primary and intermediate schools throughout Auckland. There is demand from schools to increase the offering to reach twice as many schools.

Together with Litefoot (an award-winning charitable trust that conducts sustainability audits on sports clubs), we monitored water consumption trends in real-time using digital meters at 10 sports clubs, with a water-saving campaign reaching total of 13,750 members. We installed 70 water-saving devices, resulting in nine million litres saved.

Our partnership with EcoMatters gives households the opportunity to have their water use audited by a sustainability advisor who comes to their home. Households are then given a tailored report on the water and dollar savings they can achieve by changing the way they use water, having maintenance done or changing their appliances. Each household is sent a follow-up report on their water usage over a six-month period. The key areas covered in audits are education around leak testing, shower time and installing flow restrictors.

**13,750**

MEMBERS REACHED

**70**

WATER-SAVING DEVICES INSTALLED

**9M**

LITRES SAVED IN 2019

## Commercial water efficiency programme

Our commercial team continues to work with key customers to reduce demand from our largest water users. To date, our digital meter roll-out project includes 51 high-use commercial customers, representing nine different industry segments, e.g. food manufacturing, education and retail. Twenty-seven meters have been deployed in schools and 26 at high-use sports clubs. In total, 104 digital meters have been installed across high-use sites. We are working with our partners on how to make the most of the new visibility they have about their water use.

We are also investigating the viability of water reuse with commercial customers, e.g. in using purified recycled water to irrigate public green spaces. We intend to work with the Ministry of Health to develop the required quality standards and guidelines and ensure that our customers receive good advice as to how they might use a 'cascades of quality' approach in production where appropriate.

## Non-revenue water reduction programme

Watercare has made good progress on reducing three aspects of non-revenue water: leakage, under-reading of meters, and unauthorised use.

### *Leakage*

As noted earlier, there is leakage in every water network. Our focus to date has been to bring our non-revenue water down to align with global standards.

Metering technology helps us to reduce water loss and improve leak detection. Data we receive from the network is making it easier for us to know where to look for leaks. This was seen in our sweep of Māngere and Maungakiekie in 2019 where we found and fixed more than 600 leaks, saving about 1.4 million litres of water per day. We have also developed smaller district metered areas. For instance, Waitākere re-established smaller district metered areas to pinpoint the worst areas for leakage. Such district meters are increasingly providing real-time data to add to the amount of data we receive from bulk supply points.

Pressure reduction has also helped to decrease non-revenue water usage by limiting pressure on pipes and meters so they are less likely to break and has reduced the amount of water lost when leaks do occur.

**2870+**

**LEAKS FIXED IN FY2021 (TO DATE)**

**>6M**

**LITRES SAVED PER DAY IN FY2021 (TO DATE)**

### *Meter inaccuracies*

In addition to reducing network leakage, we are focusing on addressing domestic meter inaccuracies. Watercare has about 450,000 customer meters, of which 30% are more than 20 years old. With age and consumption over time, these mechanical meters slow down and under-read consumption. In some cases, as plumbing fittings and home appliances become more water efficient, household use has fallen to levels that the old meters are too inaccurate to correctly measure.

To address this, we have accelerated our aged meter renewal programme from 20,000 to 30,000 meters per year. Newer meters, with increased accuracy, will help us reduce non-revenue water consumption and also provide valuable detailed insights into water usage.

### *Unauthorised use*

To address unauthorised use in the network, we have established a revenue assurance team at Watercare. These personnel visit construction sites and other locations with high water use on a rostered basis. They assess the site for correct meter installation and report any cases of unauthorised use. This work started in January 2020 and revealed 12 cases of unauthorised water use from 74 construction sites within six months

To combat unauthorised use of water, we:

- Conduct periodic audits on property data where there are dwellings near the Watercare network without known connections. We had to take immediate action in about 10% of cases where properties had unauthorised connections.
- Compile information received from Aucklanders who are concerned about the misuse of water. This guides us to where we should undertake site visits, install security cameras or provide customer education.
- Alert our contractors about the unauthorised use of water. This led to a doubling of reports received from them between October and December 2019. Around 20% of reports confirmed the unauthorised use of the water supply. The success of the campaign led to an ongoing programme of site investigations.

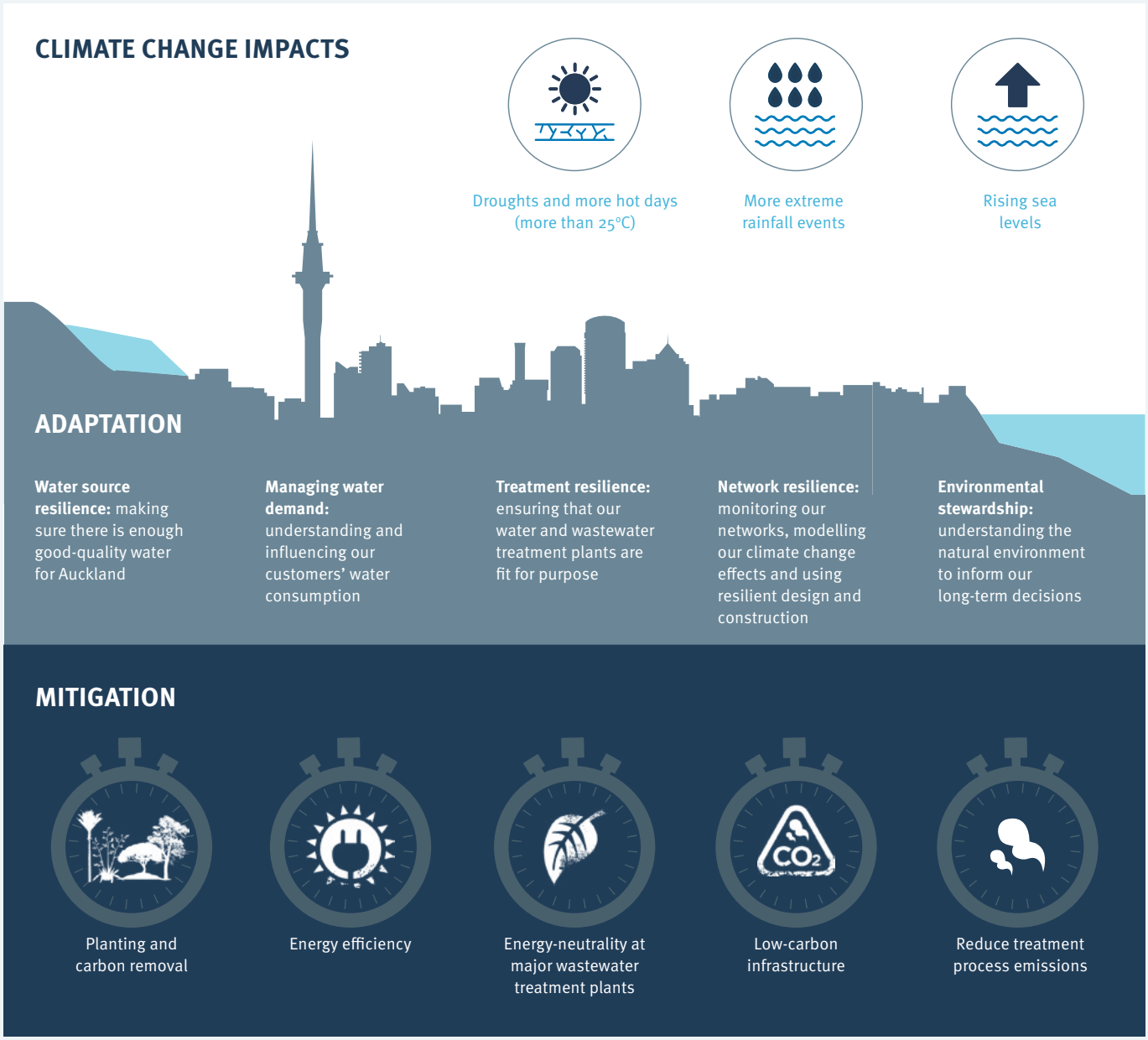
# Looking around: the challenges we face

We have to address the challenges ahead to ensure we are prepared to face them.

# Climate change

One of the greatest challenges that we face as an organisation and as a people is climate change. This worldwide issue requires immediate and decisive action. The global climate has already changed at an unprecedented rate. The main driver for this is the increase in greenhouse gas emissions from human activity. Climate change poses considerable challenges to the supply of water and wastewater services in Auckland, as well as for Hamilton and other communities relying on supply from the Waikato River.

We are already seeing the impacts of severe weather events today and the projections show this impact increasing for the next 100 years and beyond. There is uncertainty about the severity of impacts that the changing climate will pose. However, we do know we will experience different weather patterns, which will affect Auckland's water supply and demand in future.[6]




Climate change will have wide-ranging effects on how we live in Auckland.

[6] For more information, see Auckland Region Climate Change Projections, NIWA: https://knowledgeauckland.org.nz/media/1170/tr2017-030-2-auckland-region-climate-change-projections-and-impacts-revised-jan-2018.pdf and Watercare's climate change strategy: https://wslpwstoreprd.blob.core.windows.net/kentico-media-libraries-prod/watercarepublicweb/media/watercare-media-library/sustainability/climate_change_strategy.pdf

Watercare is working closely with Auckland Council on our joint response to the challenges of climate change. Water plays a key role in Te Tāruke-ā-Tāwhiri, Auckland's Climate Plan.

In mid-2017, Auckland Council and its Council-Controlled Organisations commissioned the National Institute of Water and Atmospheric Research (NIWA) to model the projected climate changes for the city and to assess their potential impact. The study uses two emission scenarios to set a range of possible impacts:

- **Scenario 1** is the stabilisation or best-case scenario.
- **Scenario 2** reflects business as usual, where global greenhouse gas emissions continue to climb unabated at their current projected rate.

This information is the basis for Watercare's climate change strategy. The scenarios have different timeframes attached and under both scenarios the seasonal distribution of rainfall in Auckland is projected to change markedly. While total annual rainfall may not change significantly, we expect there will be less rainfall in spring and more in autumn. The number and intensity of extreme rainfall events are likely to increase. In addition, droughts are projected to become more common and more severe in Auckland due to changing rainfall patterns and temperature increases.

Auckland is predicted to become considerably warmer. Projections for Scenario 1 indicate a mean annual temperature increase of between 1.6°C and 3.4°C by the year 2110. Currently we experience 20 hot days per year (days where the maximum temperature exceeds 25°C). Under Scenario 1, most of Auckland is projected to experience more than 40 to 50 additional hot days per year by 2110. Under Scenario 2, it will be more than 70. As noted earlier, warmer days lead to increased demand for water.

We are likely to see increasing fluctuations in water availability from our sources. Decreases in summer and autumn rainfall and higher losses of water due to higher temperatures could lead to reduced water supply. Long periods of drought will further reduce supply. The outcome is that we will have to manage our water supply more proactively throughout all seasons.

Climate change could also cause more water leakage across the network. We know that leaks increase in extreme weather. Long, hot, dry spells reduce soil moisture, putting pressure on pipes (particularly joins), which leads to more pipe breakages.

In sharp contrast, extreme rain increases land instability and erosion, causing the ground around our pipes to shift, which also increases the need for maintenance. As the climate becomes more extreme, this will put more pressure on the network. To conserve as much of our water as possible, we will need better oversight of where our water is going, and when this is happening.

We are establishing stronger measurement, monitoring and performance protocols to track the impacts of the changing weather on water supply and demand. This information will help us meet the targets of this Water Efficiency Plan, as well as support our growing understanding of how we might adapt our water management systems into the future.

# Population growth

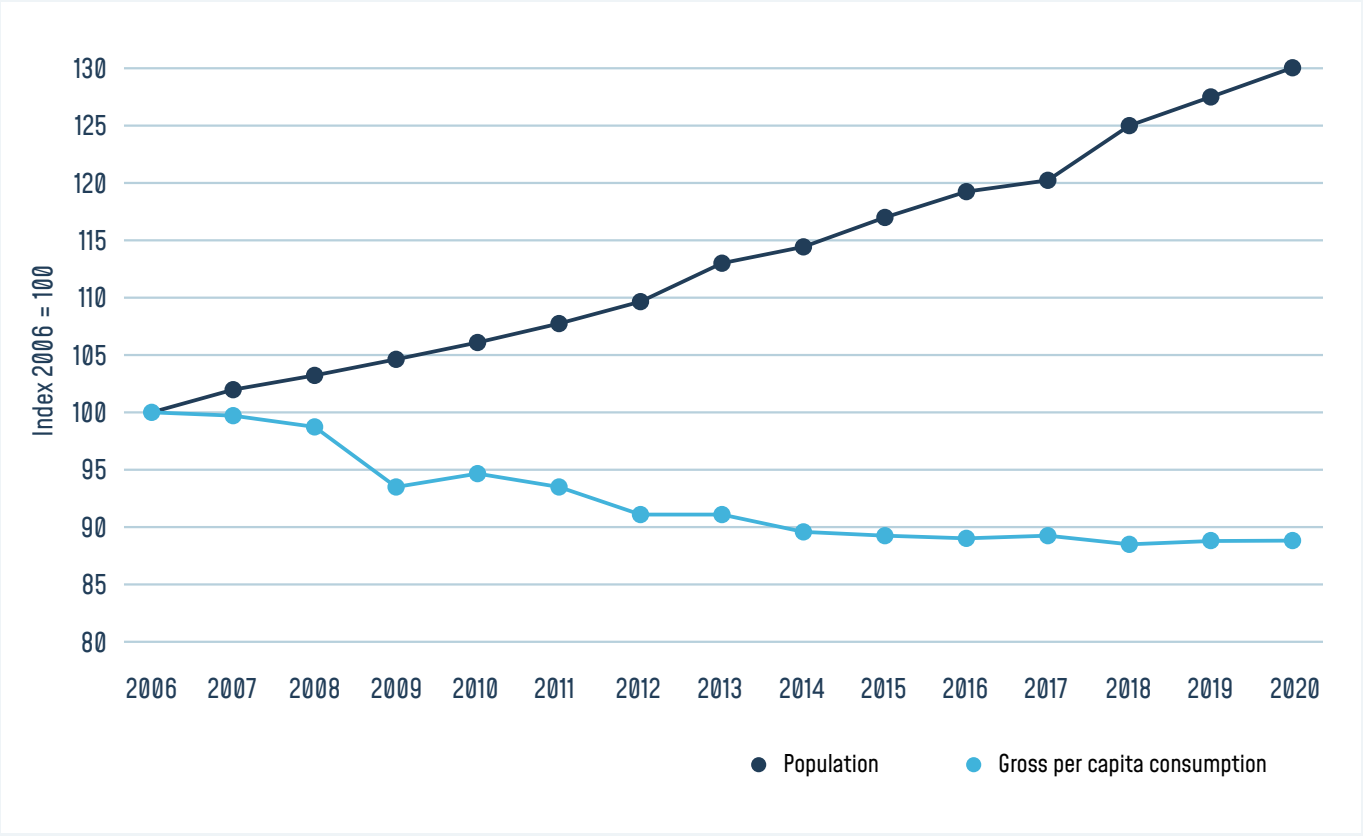
Although Aucklanders have been measurably reducing their per person consumption of water since 2006, the demand on Auckland's water supply has increased, simply because we have so many more people now. (Auckland's resident population grew from 1.3 million in 2006 to 1.6 million in 2018.) In addition, as the chart below shows, since 2014, progress in per capita consumption has flattened out. In their own words, most Aucklanders believe they are 'already water efficient'.[7] Yet, the conservation campaign during the drought showed that Aucklanders can do even better. The seven-day rolling consumption rate is well below the target and significantly lower than for the previous year. Our aim is to make the current attitudes towards conserving water more permanent.

Our overall target per capita is 924 litres per connection per day.[8] This is the target for all water supplied to the metropolitan region, inclusive of domestic consumption, commercial (non-domestic) consumption and non-revenue water.

However, as signaled in a previous water efficiency strategy, we are additionally measuring other indicators of water efficiency that accurately reflect our performance in specific areas. These are:

- Residential consumption
- Non-revenue water

All of these factors will be measured in litres per connection per day (l/c/d) and will be reported quarterly.[9]




This chart shows our population growth and our per capita water efficiency performance over time relative to 2006 levels. Since 2006, our per capita consumption of water has decreased, and then flattened out.

[7] In mid-2020, 66% of Aucklanders said that they are already doing all that they could to reduce their water consumption (TRA/Watercare: Aucklanders' relationship with water, presented 12 June 2020).

[8] This is the equivalent of 253 litres per person per day in 2025, based on connections growth of 6000 new connections (both residential and commercial) per annum and population growth at 1.8% per annum in accordance with Statistics New Zealand's estimates. To achieve this, we need to achieve a drop of 36 l/c/d per connection as our current level is at 960 l/c/d. The starting value used for population numbers is based on the 2013 census data.

[9] In line with our Statement of Intent (SOI), we will establish baseline measures of commercial (non-domestic) consumption by sector, and publish a target for our next (2021/22) SOI. But for reasons described above, we are working with commercial customers to reduce waste rather than productivity, and will develop a target which better measures water efficiency performance than 'water used' per connection.

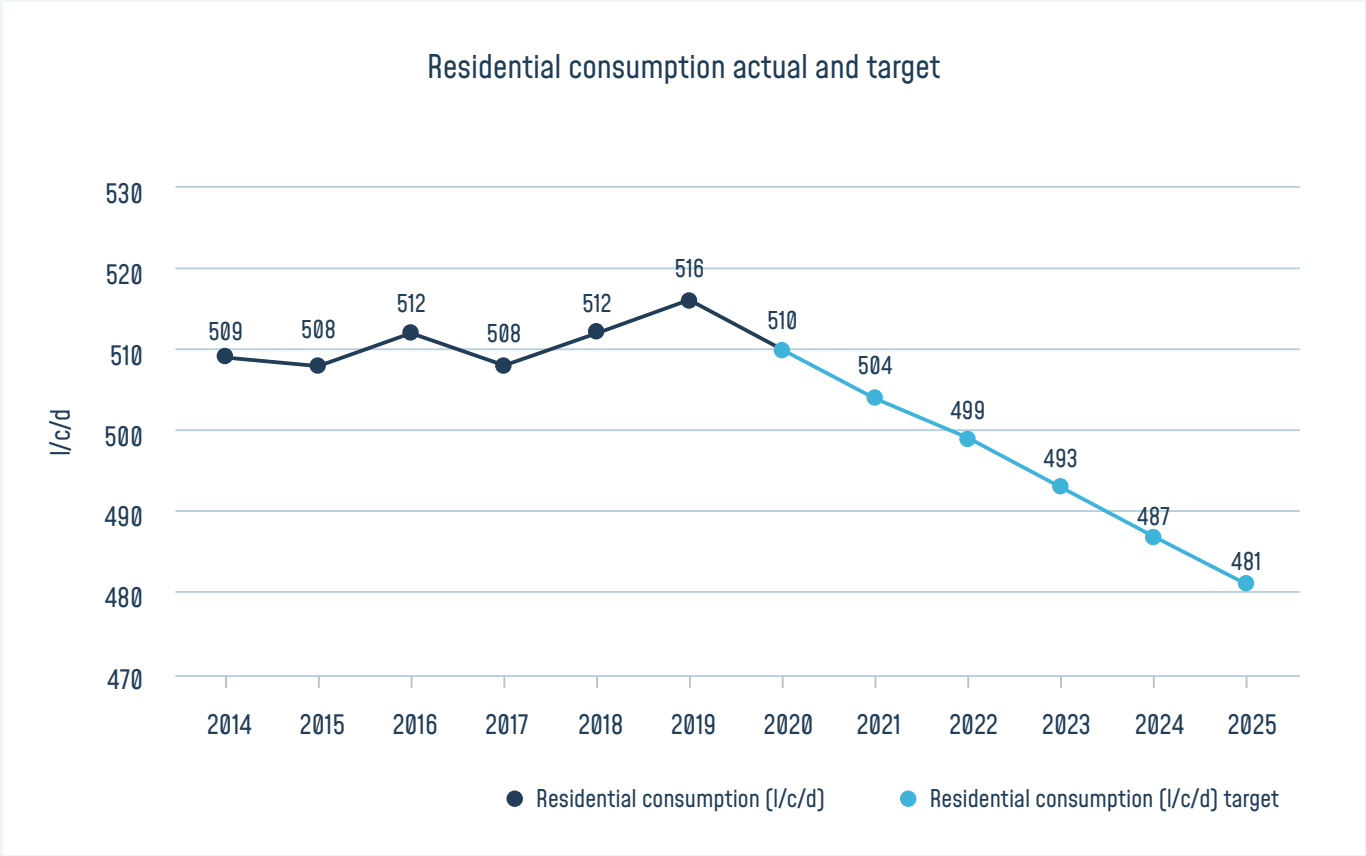
## Residential rather than overall consumption

Our change in performance metrics is in line with our Statement of Intent, which refers to the "average consumption of drinking water per day per resident", and reflected in the wording of the Department of Internal Affairs as "the average consumption of drinking water per day per resident."[10] As previous mentioned, residential consumption is a better indicator of Watercare's performance, whereas commercial demand speaks more to Auckland's overall economic health. For instance, the chart above shows how overall gross per capita consumption improved significantly in 2008/09, as industries suffered due to the global financial crisis.

## Per-connection measure

We will also use residential consumption per connection as a measure of water efficiency over time. This is much more accurate than measuring the total population's usage. We know how many households are connected to our network; however, we do not know how many visitors use our water, or how many people are leaving, arriving or staying in Auckland at any given time.

We project overall domestic growth of 1.8% per year, with about 6000 new (residential) connections each year. Our target is to reduce domestic consumption from 516 litres per connection per day in 2019 to 481 litres per connection per day in 2025.




Actual past residential water consumption and our future target consumption.

[10] Under Part 2 (5) Demand Management https://www.dia.govt.nz/diawebsite.nsf/Files/Local-Government-Non-Financial-Performance-Measures-Signed-Rules/$file/Local-Government-Non-Financial-Performance-Measures-Signed-Rules-1.pdf Also see letter from John Pfahlert, CEO, Water New Zealand, to Richard Hardie, DIA, regarding Non-Financial Performance Measure Rules Improvement Opportunities, and DIA wording around drinking water supplied/consumed https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=3645

## OUR EXPANDED TARGETS FOR 2025 ARE:

**GROSS WATER SUPPLY** OF

**924**

LITRES PER CONNECTION PER DAY

**RESIDENTIAL CONSUMPTION** OF

**481**

LITRES PER CONNECTION PER DAY

**NON REVENUE WATER** AT OR BELOW

**186**

LITRES PER CONNECTION PER DAY

Our ability to meet this target will depend on the strength of our relationship with the people we serve, our continued commitment to reducing non-revenue water, and on how well we improve the oversight of our network.

NOTE: Non-revenue water (NRW) is not the same as leakage or real loss. NRW includes water used for firefighting, to clean water mains, unauthorised connections and use, and meter under-reading as well as leakage.

# Looking ahead: how we intend to meet our targets

In response to the challenges we face, Watercare has devised a range of strategies to ensure that we make the most of what we have in the years ahead.

# Smarter ways to make the most of our water

Looking ahead to a significantly different climate with more droughts and more extreme rainfall events, we need to find a sustainable way forward.

There are numerous ways to reduce the amount of water we use. In many industries, pricing is seen as a way to manage demand, and we know that future sources of water will be more expensive. It is more costly to produce and distribute water from the Waikato River than from the water storage lakes. However, our goal is to work within Auckland to find smart solutions we can implement, with the cooperation of our customers, rather than using high prices as a disincentive to use water. We have looked at a wide range of options to improve our water efficiency. Rather than try to do everything at once, we have decided to focus on measures that can be implemented quickly, are sustainable over time and are likely to give the biggest benefit.

We identified four key areas that meet all these criteria:

- Making every drop of water count by reducing loss
- Improving oversight from source to tap (for better visibility of loss and consumption)
- Optimising pressure in our network
- Residential, community and commercial water efficiency.

The following is a statement of principles and aims, identifying our key priorities. It does not provide a detailed operational plan of how we will achieve our goals.

# Focus Area 1: Making every drop of water count by reducing loss

Like many of our peers worldwide, Watercare puts more water into our network than is bought by our customers. This non-revenue water consists of:

- Water used to clean mains
- Water used to fight fires
- Unauthorised connections
- Meter under-reading
- Leakage in the network

**Our target is to hold our non-revenue water at or below 186 litres per connection per day.**

While all the factors above play a role, most of the losses are through network leaks. To fix this, we need to invest in leak detection and manage pressure across the network. Both activities can be more effectively managed by centralised data that identifies the areas we need to focus on.

Based on the costs and benefits found in an extensive trial covering more than 500 kilometres of pipeline, we estimate it will cost $111 million over five years to reach our target. (This cost includes renewals, which are required to ensure that pipes do not continue to break due to age while they are being fixed.) As noted earlier, our renewals budget is not sufficient to enable us to reach our 2025 target without the help of our customers conserving water. However, our aim is to use a targeted approach to where we carry out renewals to give us the best water-saving value possible given our financial constraints. The length and severity of breaks determine the parts and labour required, as well as the type of ground covering (e.g. grass or concrete) and the nature of the area (e.g. areas requiring significant traffic management). We will do our best with the resources that we have.

The table below outlines the initiatives we will undertake to achieve our target.

| | |
|---|---|
| District meters | District meters create smaller areas within the network where we can monitor leakage and other non-revenue water. Leak detection and pressure management can then be targeted at the highest priority areas and the effectiveness of our leak reduction activity can be measured and tracked. |
| Active leak detection | We use proactive leak detection in the areas in which we notice higher losses. Contractors use acoustic methods to detect leaks. They will survey 500km of network pipes per month. |
| Innovation in leak detection | Watercare is looking at new methods to discover leaks rather than relying on contractors using physical methods, e.g. through minimum night-flow analysis and acoustic and pressure sensors within zones, and the use of dogs who are able to sniff out leaks so these can be found and fixed faster. |
| Rapid response teams | Contractors will increase their staffing levels to reduce any backlog of leaks to be fixed when the need arises. Maintenance Services Networks, Citycare and Downer crews will receive extra training to undertake these works safely and in a timely manner, while continuing to limit customer disruption and minimising the loss of water. |
| Minimising water loss due to breaks | Watercare already has an active renewals programme to maintain our assets in good condition. In future, we will replace assets based on water loss, rather than simply their age. Replacing pipes and meters that are in the most critical condition will maximise the water savings of the renewals programme. |

# Focus Area 2: Improving oversight from source to tap

We will continue to build a smarter network, enabling more proactive maintenance of our network and consequently minimise customer disruption due to bursts and leaks.

Building a smart network means that we will develop a dynamic data model that measures loss across the network at any point in time. Greater data oversight will give us an early indication of where water is lost, and which assets need to be maintained or replaced.

We are developing new methods to detect leaks through minimum night-flow analysis, as well as with acoustic and pressure sensors. The intention is to incorporate information from new sensing and analytical technologies into the Watercare Nerve Centre. The Nerve Centre is a centralised monitoring and remote management platform. It organises data into an alert system that we use to direct our maintenance and network development work. The idea is to find burst pipes proactively and start fixing them before customers even become aware that there is a leak.

Access to real-time consumption data will create greater awareness of water use for both residential and commercial customers. It will also help with the early detection of leaks, thereby minimising water loss and the potential of high bills for customers.

We replace 30,000 water meters every year, based on their age, to ensure customers have accurate visibility of their consumption. By attaching smart loggers to these meters, we will be able to provide real-time visibility of water use. This enables us and our customers to make efficient, data-driven decisions and ultimately waste less water. We have already started rolling out smart meters to our commercial customers and all Auckland schools.

Finally, our smart network will help us take greater control of our standpipes and provide better oversight of fire hydrant use.

| | |
|---|---|
| Bulk supply point data | Bulk supply points will continue to be used to direct our efforts, particularly in terms of water loss and pressure management. |
| District meter area data | Smaller district metering areas are under development also and will allow us to pinpoint our efforts even further, giving greater understanding of our network. |
| Customer data | Our smart meter roll-out will provide customers with transparent consumption data in real-time, enabling them to proactively manage their water use, make more informed decisions and identify high usage as it happens. |

# Focus Area 3: Optimising pressure in our network

Water pressure management is an integral part of Watercare's strategy to reduce consumption. Through network intelligence and improved control of water distribution, we can achieve more stable (and typically slightly lower) water pressure within the network and control loss.

In terms of water efficiency, this has the benefit of reducing:

- The instances and severity of leaks in both private and public pipes
- The associated flushing after a leak repair
- Customer water use by marginally reducing the rate of water flowing out of taps.

The first stage of pressure management is underway, reducing excessive pressure in zones where there are a high number of network leaks and more vulnerable pipes. We also prioritise areas that experience fluctuations in pressure, by trimming excess supply pressure. We are developing ways to integrate pressure data into the centralised Nerve Centre for real-time reporting.

In the second phase, we will assess the success of our initial pressure management activities. We can then reconfigure area boundaries with new pipework and valves, as well as install new flow meters and pressure-reducing valves at supply points. The aim is to reduce the size of network areas to improve the visibility and performance of our network. At the same time, we need to ensure a high level of service to customers and good pressure for firefighting use.

This phase will also introduce a more comprehensive data reporting system to track breaches of upper and lower pressure limits. This data will be used alongside leak detection to manage system performance, to help prioritise asset replacement and to assist with planning.

We anticipate that losses from our network will decrease because flows from leaks will be smaller, customers in previously high-pressure areas will consume less water, and data capture will give us greater network intelligence that we can use to achieve further gains. A pressure optimisation pilot was undertaken during 2020 in three metropolitan zones which supply around 50,000 people. As a result of a minor pressure reduction, water savings of 1 to 2 million litres per day and an average of at least 5% fewer reported faults were observed over a three-month period.

# Focus Area 4: Residential, community and commercial water efficiency

Watercare needs to develop the relationship we have with our customers beyond the transactional purchase of water and wastewater services, towards greater whakawhanaungatanga (establishing links, working together). Aucklanders need to understand how to conserve more water, and we need to communicate what is happening in our world in a constructive and informative way.

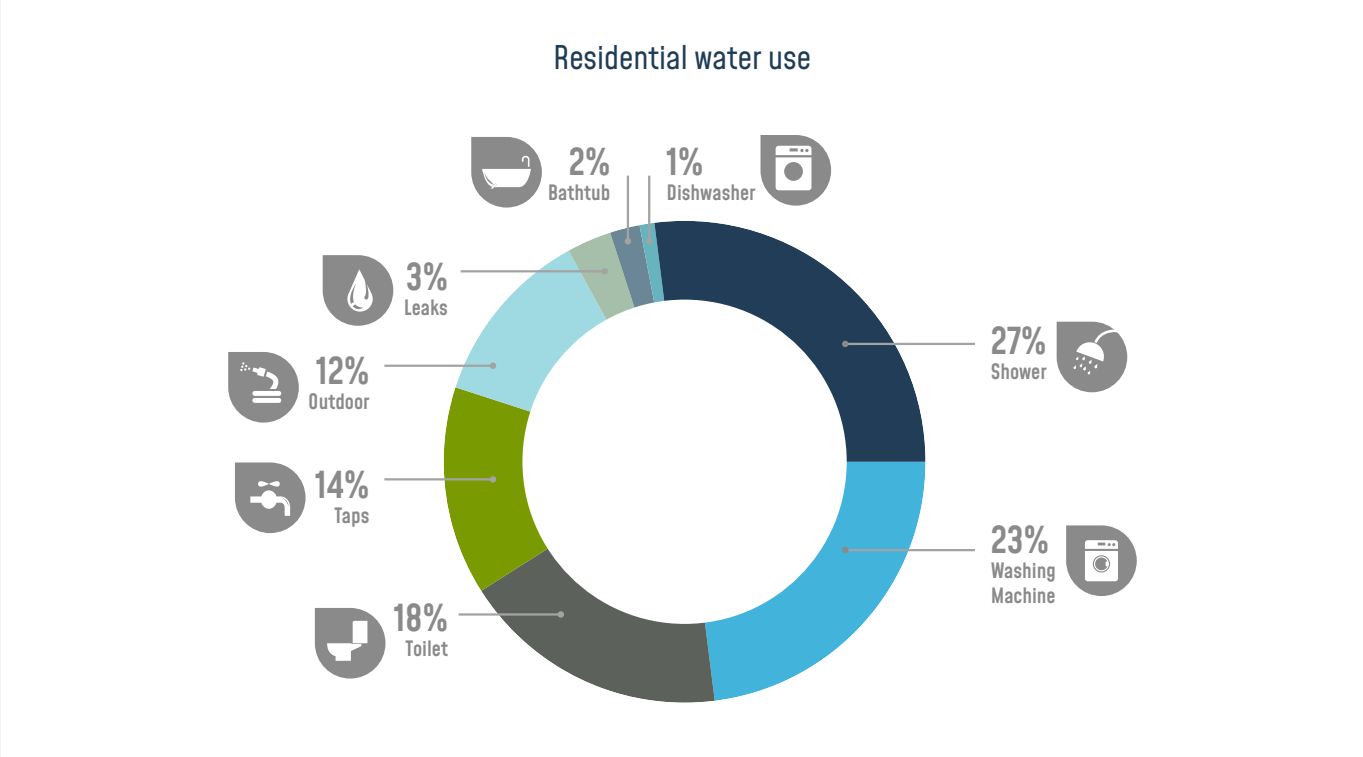
As we look ahead, we can see that our customers are looking for different kinds of support from us, and there is no one-size-fits-all approach to reducing demand. To enhance water efficiency, we need to approach customers in a way that speaks to their needs and values.

As we learn more about our customer base, we can send communications that are more helpful to people in whatever stage of life they are at, be they landlords, retirees, younger people flatting, or large families. We will increasingly encourage Aucklanders to save water using language and channels that are meaningful to them and which embrace ingenuity. Improving water efficiency amid climate change is an opportunity to co-create solutions for problems that we all share.

In general, Aucklanders seldom see the pipes which carry our water and, until recently, have not considered the possibility of a serious drought. Many people are not aware of how much water they use or where it goes (the answer is that most of the water we use in our homes is in the shower and the washing machine, with the toilet being the next biggest use of water).

Most believe that they are already conserving as much water as they can.[11] However, our customer research shows that only half of Auckland's households have a water-efficient washing machine, and only one in five has a water efficiency device installed.[12] Only a quarter of Aucklanders with gardens collect rainwater.

So, while there is a perception among the community that there is little left to do to further reduce our water use, and we are efficient compared to other New Zealanders, there is more that we need do to ensure that Auckland has a supply of top-quality water available, now and in the future.




A typical Auckland household uses more water for showering than anything else. (Breakdown of water use in an Auckland home, Auckland water use study, BRANZ 2008)

[11] TRA research, Aucklander's relationship with Water, June 2020

[12] Monthly Tracker survey data, available upon request.

In Auckland, the relative scale of our customer base means that it is possible for small individual activities to make a significant difference overall. We are already encouraging the use of non-potable water where appropriate. When enough people reduce their shower time or reuse water in the home, for instance, this can make a significant difference overall.

We also have partnerships that we can leverage to improve people's awareness and help them be more water efficient. One of these is EcoMatters, a not-for-profit community organisation and long-term partner of Watercare in our efforts to reduce water waste. EcoMatters' advisors have helped our customers understand and reduce their water usage through community engagement and home water audits. Follow-up support can help people to embed good habits in the longer term. EcoMatters has developed an online water audit and hopes to reach many more Aucklanders to make the small savings at home that will add up to big savings overall.

## Recycling water

We also need to consider how we can recycle and reuse water in both commercial and residential settings. Water reuse is a growing trend worldwide, involving recycling wastewater back into the water network, directly or indirectly. Direct reuse takes highly treated wastewater from the treatment plant and puts the purified water back into the water network. Indirect reuse is similar, taking treated wastewater and discharging it to another environment first, like a river, dam or aquifer catchment. Other approaches being investigated include on-site wastewater treatment and reuse for non-drinking purposes, like irrigation of sports fields and the wash-down of manufacturing and production plants.

We are aware of the barriers to the use of treated wastewater in the current New Zealand regulatory framework. While it is not feasible to apply for discretionary resource consents for individual uses of recycled water in the longer term, we are advancing conversations at a council and national level to establish a suitable framework. We have committed to Waikato-Tainui that should the current Board of Inquiry application be granted, we will not submit any further applications for use from the Waikato River; 300 million litres per day is the maximum we will take from that source. Therefore, we must actively consider reuse as a new source of water for Auckland, as well as reuse in homes, businesses and other organisations as a way of reducing demand. We are already exploring options around the use of treated wastewater from the Rosedale plant for the irrigation of council parks. Similarly, we will continue to work closely with Auckland Council to promote water reuse in the home, through providing advice and improving support for greywater tanks.

## Rainwater and greywater tanks

Rainwater and greywater tanks can reduce mains water use. Stored water can be used for watering gardens, agriculture, flushing toilets, in washing machines and for washing cars. If rainwater tanks could substitute for metropolitan supply for outdoor use alone, in theory this could save 12% of residential water usage. Watercare doesn't recommend using rainwater for drinking where the public network is available.

Rainwater tanks offer other benefits too:

- Diverting some of the roof-generated contaminants away from public waterways
- Reducing potential vulnerability during civil defence emergencies
- Removing some stormwater run-off from our natural environment, where that stormwater would otherwise contribute to bank erosion and ecological contamination
- Embedding a culture that values water as precious taonga within our communities.

As rainwater tanks generate most savings in times of frequent rain, they are not a solution to meeting peak summer demand. Consumers who depend on rainwater tanks need to purchase more water from tanker operators during the warm and dry periods of the year. This means that the water sold to tanker operators, which is supplied by our metropolitan network, is then distributed to consumers that are not connected to our metropolitan network.

By contrast, greywater tanks provide more reliable water savings all year round. However, on-site greywater recycling systems are not common in Auckland and we need to investigate this option further. Other home water recycling is already occurring, and will continue to be encouraged, such as using water from the shower or washing machine to water the garden.

Our approach to reducing demand is as follows:

| Commercial Customers | |
|---|---|
| Top 100 commercial water users | Our top 100 customers account for 12% of all water consumed in Auckland. We will continue to engage with them individually to provide advice on ways to become more water efficient. |
| Reuse | We will introduce opportunities for reuse, both externally and internally at Watercare, encouraging industry to think about 'cascades of quality' in their water use. We will work more proactively with targeted industrial customers to promote the use of recycled or non-potable water sources when treated drinking water is not required. |
| Water audits | We have previously been carrying out wastewater audits for commercial customers and are introducing complete water audits to make the best use of water and minimise waste. |

| Residential Customers | |
|---|---|
| Insight-based communications | We will further develop our customer communications, including directing customers to the best advice for water-saving appliances, devices and resources. We need to ensure that our customers know we support and appreciate their independent and resourceful water- saving initiatives and Kiwi ingenuity. To achieve the most water-saving benefit from our efforts, we will communicate our advice to the people we know are most interested in it. |
| Tips and tricks to reduce water use | With support from our partners, we will target specific communications to high users to help them identify waste and reduce their usage. |
| EcoMatters support | We continue our work with EcoMatters and leverage their expertise to support our water efficiency communications and encourage even more Aucklanders to make their homes more water efficient. This includes an online water audit survey as well as their established home water-saving visits. |
| Incentives | We will consider a model that rewards customers who replace inefficient appliances and fixtures with water efficient ones. |
| Smart meter customers | For domestic customers with smart meters, we will guide them in learning how to use their own data to support water efficiency using a mobile app. This means that our smart meter customers will be able to better understand their water use, identify whether there is a leak, and learn how to make the most of their water. |

| Community Based | |
|---|---|
| Schools | We will double our efforts in our school education programme to reach 80 Auckland schools (about 15,000 Auckland children) each year. |
| Educational materials | We will look to develop water literacy, including water efficiency, as a component of the New Zealand school curriculum. |
| Water guardian programme | We will launch a programme that encourages children to become champions who pledge to reduce their water use. Students will record their usage and share water-efficient activities in a fun, gamified way. |
| Iwi groups | We will engage with iwi in Tāmaki Makaurau to leverage the knowledge to help us get the message across to all Aucklanders about the need to conserve water. We will learn and demonstrate how water can be saved in new ways. This will grow the knowledge of all people and makes our water-saving mahi (work) more effective. |
| Community co-design | We will identify local water efficiency challenges and, based on learnings from programmes that have proven to be effective overseas, we will plan and put into action projects to drive water efficiency. |

# Conclusion

## If we all save a little, together we can save a lot.

We know that water is precious, and as Watercare we have the responsibility to provide kaitiakitanga (guardianship).

We need Aucklanders to continue to be mindful of their water use, beyond drought and water restrictions. Combined with the effects of proactive leak detection, our smart network and pressure management, this will help us all achieve our water-efficiency targets.

In earlier strategies, the outcome we sought was to defer investment in new water sources. This time, our intention is to ensure that the city and its people have the best chance to thrive in a changing climate with a growing population. But this plan does not reinvent the wheel. We acknowledge the good work that has been done and are continuing to make the most of the water we have. We look to the future with a greater understanding of the importance of water efficiency, and with enthusiasm to work together and achieve our shared goals.

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